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Preface

Cancer is widely recognized as one of the most formidable human afflictions. It is an increasingly important item on every country’s health agenda. Cancer annually affects 10 million people and causes 6 million deaths worldwide. In the Western Pacific Region, cancer is one of the five leading causes of adult mortality in 26 countries and areas. In China alone, deaths from cancer amount to 1.3 million each year. As the proportion of elderly people is increasing in most countries, so too are tobacco use, unhealthy behaviours, and exposure to other carcinogens. The burden of cancer is therefore likely to rise significantly. It is expected that 300 million new cases of cancer and 200 million deaths from the disease will occur globally in the next 25 years, with almost two-thirds of cases arising in developing countries.

Scientific studies and successful control activities indicate that cancer is not inevitable. One-third of all cancer cases are preventable, and further one-third are potentially curable if diagnosed sufficiently early, while appropriate palliative care of the remaining one-third of cancer patients can bring about substantial improvement in the quality of life.

The world today provides many challenges to our traditional ways. Many new health issues have appeared which require different approaches. Individuals, the family and the community have more responsibility than ever before to help themselves avoid diseases and to develop lifestyles and environments that support positive health. Governments must ensure that appropriate policies are developed and adequate services are in place to support individual, family and community activities. Cancer prevention and control must take into account the larger context in which people live and work, which helps to shape their health.

Innovative approaches which are people-centred and reflect the recognition that lives are led in complex and changing circumstances, are proposed in the regional policy framework, New horizons in health which was endorsed by the Member States at the forty-fifth session of the Regional Committee in 1994.

Health promotion is an important approach. Through health promotion, we can encourage people, in conjunction with their families,
communities and nations, to improve and manage their own health. Most of the measures for primary prevention and early detection of cancer are strongly related to personal behaviours and lifestyles, as well as to awareness of health issues. Therefore, the general public should be provided with sufficient information and guidance on what are risk factors and how to avoid them. They need to know what may cause cancers, how to prevent some types of cancers, and how to recognize early signs of cancer.

Development and implementation of cancer control programmes should be intensified at national, provincial and community levels with emphasis on tobacco control activities; promotion of a healthy diet; infant vaccination against Hepatitis B; an increase in the coverage of early detection and screening for breast cancer and cervical cancer; and availability of palliative care, especially the WHO method on pain relief, in all countries of the Region.

The importance of integrating cancer control into primary health care should be emphasized. This is a direct response to the epidemiological transition of disease patterns occurring in many countries and areas. Primary health care workers, community health educators, family doctors and nurses should play an important role in cancer control. Their knowledge, attitudes and practices need to be upgraded with regard to the scientific evidence supporting cancer causation and primary prevention, durability of certain cancers when these are detected early, and the successful amelioration of suffering through cancer palliative care and pain relief.

This manual presents current knowledge on prevention and control of common cancers and defines the tasks wherein health workers will be most useful. By doing so, it is hoped that attitudes will also change, from a sense of pessimism and hopelessness, to a firm conviction that indeed cancer can be prevented and controlled, and that cancer control can be enhanced at grassroots level through an improvement in knowledge, skills in prevention and early detection, and palliative care.

S. T. Han, MD, Ph.D.
Regional Director
Introduction

The cancer control programme review conducted in 1994 by the WHO Western Pacific Regional Office suggested that the current objectives, targets and strategies for cancer control were too general. Specific packages for each type of common cancer should be developed, offering the most effective intervention measures. In order to respond to this suggestion, the development of a manual on the prevention and control of common cancers was proposed. The manual was to serve several purposes, namely:

1) to provide detailed guidance on WHO strategies for the prevention and control of common cancers;

2) to provide an update on the epidemiological situation and the epidemiological characteristics of common cancers which are prevalent in the region;

3) to provide standardized intervention methods for primary prevention, early detection and curative treatment, in addition to cancer pain relief and palliative care, and to provide evaluations of the intervention methods for different common cancers in terms of scientific views on their effectiveness, acceptability and prognosis;

4) to collaborate with Member States and health professionals in establishing targets, setting priorities and explaining intervention methods for prevention and control of common cancers; and

5) to provide scientific information on the prevention and control of common cancers to be used in health education for the general public and health campaigns in member countries.
Introduction

The manual was to be developed especially for primary health care workers, general practitioners and nurses in district health units, township or community health centres, and public health educators in the prevention and control of cancers. It was to be used as a guide or reference to:

1) *provide WHO strategies and standardized approaches on the prevention and control of common cancers;*

2) *develop local or national programmes on prevention, early detection and curative treatment, and cancer pain relief and palliative care of common cancers;*

3) *develop training materials for health workers who are dealing with prevention, early detection and palliative care at the grassroots level;*

4) *develop health education materials and programmes to prevent and control common cancers; and*

5) *evaluate cancer intervention measures including primary prevention, early detection and screening, and cancer pain relief based on effectiveness, acceptability and cost-effectiveness.*

It was assumed that, firstly, a large number of health workers themselves are still unaware or unconvinced that many cancers can either be prevented or cured when detected early. In addition, many still do not fully realize that much of the pain and suffering of advanced cancer can be effectively relieved. The following misconceptions appeared to be fairly prevalent:

- We still do not know what causes cancer. (So how can we prevent it?)

- Cancer is incurable (So why bother with early detection?)

- Suffering is inevitable with cancer. (So why bother consenting to treatment, or even to consult a physician?)

Secondly, it appeared that those who are beginning to believe that something can be done hesitate to actively participate, thinking their individual efforts futile and unaware of the other elements of the total cancer prevention and control programme. Thirdly, it was assumed
that those who are eager to participate simply do not know the most important things they can do, and how to do these properly.

These three assumptions were to be the major issues addressed by the manual, particularly in the site-specific chapters. The general objectives of site-specific chapters are:

1) to change the knowledge, attitudes, beliefs and practices of community-based health workers regarding cancer prevention and control;

2) assuming that they are now convinced that something can be done, to promote awareness of the total control programme; and

3) to provide sufficient details on specific activities that health workers will be engaged in.

The general outline of the site-specific chapters is as follows:

Part 1. Changing knowledge, attitudes, beliefs and practices. Provides the most impressive evidence (scientific reference) to demonstrate:

• the magnitude of the problem: incidence, trends, prevalence of risk factors;

• the causality;

• that population-based primary intervention is feasible and has been shown to decrease incidence;

• that an early detection method is effective and efficient and can result in decreased mortality of the screened population; and

• that cancer palliation is both feasible and preferable in advanced cancer.

Part 2. An overview of the total site-specific cancer prevention and control effort including:

• policy;

• legislation, regulations;

• health promotion and health education;
Introduction

- early detection:
  - screening;
  - early diagnosis of symptomatic cases;
- principles of curative/palliative treatment; and
- target indicators.

Part 3. What the health worker should do. Detailed descriptions for activities of health workers in:

- health education; and

- procedures: breast examination, Pap smear, oral examination; hepatitis B virus (HBV) vaccination; rectal digital examination; fine needle aspiration biopsy.

If another WHO publication is comprehensive and detailed (e.g. National Cancer Control Programmes; Pap smear managerial and technical guidelines; Tobacco control; Food, nutrition and health), these are highly recommended as “required reference” and many details have not been repeated in this manual. Appendices have been used to facilitate understanding of text contents on matters which are not primary responsibilities of community-based health workers (e.g. breast cancer staging).

The chapters preceding the site-specific chapters are of two general categories:

- Information important to the general understanding of the magnitude of the cancer problem, and the major components of national cancer control programmes.
  - Cancer in the Western Pacific Region
  - National cancer control programmes
  - Cancer surveillance
- Risk factors or control activities that are common to most, if not all, site-specific cancers.
  - Tobacco or Health
  - Diet, nutrition and the prevention of chronic diseases
  - Health education
◊ Cancer pain relief and palliative care.

The manual reflects current technical views and suggestions on the prevention and control of common cancers which are prevalent in the Western Pacific Region and is intended to complement the WHO publication *National cancer control programmes: policies and managerial guidelines*.
Introduction

The Western Pacific Region, one of the six regions of the World Health Organization, is home to approximately 1.6 billion people, nearly one-third of the world’s population. It stretches over a vast area, from China in the north and west, to New Zealand in the south, and French Polynesia in the east (Figure 1.1). With 37 countries and areas, the Region is perhaps the most culturally and socially diverse of the six regions of WHO. The following are the WHO Member States in the Region:

- Australia
- Brunei Darussalam
- Cambodia
- China, People’s Republic of
- Cook Islands
- Fiji
- Japan
- Kiribati
- Lao People’s Democratic Republic
- Malaysia
- Marshall Islands, Republic of
- Micronesia, Federated States of
- Mongolia
- Nauru

Associate Member: Tokelau

Areas in the Region which are not responsible for the conduct of their international relations:

- American Samoa
- French Polynesia
- Guam
- Mariana Islands, Commonwealth of the
- New Caledonia
- Pitcairn Island

New Zealand
- Niue
- Palau, Republic of
- Papua New Guinea
- Philippines
- Republic of Korea
- Samoa
- Singapore
- Solomon Islands
- Tonga
- Tuvalu
- Vanuatu
- Viet Nam
The Western Pacific Region includes some of the world's least developed countries as well as its most rapidly growing economies: countries as varied as Australia, with its federation of six states; Japan, with its industrial might; Papua New Guinea, with its abundance of natural resources; and Tonga, a kingdom built on coral atolls.

**Figure 1.1: WHO Western Pacific Region**

Mortality

In spite of the diversity of the Region's Member States and their populations, the general trend in the region shows a sharp decrease in the prevalence of communicable diseases while the incidence of noncommunicable diseases and associated mortality rates are increasing. Cancer is now one of the leading causes of adult death in 26 countries and areas in the Region. The mortality rates for cancer exceed 100 per 100,000 population in Australia, China, Japan, the Republic of Korea, New Zealand and Singapore. In China alone, deaths from cancer amount to 1.3 million each year.
The number of deaths from cancer among males in Australia, Japan, New Zealand and Singapore increased from 1950 to 1989 (Figure 1.2). With the exception of Japan, these countries also saw an increase in female cancer mortality (Figure 1.3).

**Figure 1.2: Trends in mortality of cancer in males from 1950-1989 in selected countries per 100,000.**


A great proportion of the increase in cancer mortality in these countries is due to a rise in the prevalence of lung cancer (Figures 1.4 and 1.5). This is attributed to the increasing prevalence of cigarette smoking among both sexes.
Figure 1.4. Trends in mortality of lung cancer in males in selected countries per 100,000.


Figure 1.5. Trends in mortality of lung cancer in females in selected countries per 100,000.


Incidence

Population-based cancer registration is carried out in 10 countries and one area in the Region producing incidence data from which the International Agency for Research on Cancer (IARC) have made
comparative estimates for 1990 (Tables 1.1 and 1.2). There are only small differences between rates for children (0-14 years) in the 11 countries, as the risk of contracting childhood cancer is less affected by lifestyle and environmental factors than for adult cancer. Among adults, age-specific rates progressively and dramatically increase with increasing age. There is, however, a wide variation between countries in age-standardized rates for adults. This can be attributed to differences in the prevalence of unhealthy lifestyles and environments, notably tobacco smoking and chewing, unhealthy diets, Hepatitis B infection, and Human Papilloma Virus transmission.

<table>
<thead>
<tr>
<th>COUNTRY/AREA</th>
<th>0-14</th>
<th>15-44</th>
<th>45-54</th>
<th>55-64</th>
<th>65+</th>
<th>ASR</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUSTRALIA</td>
<td>12.45</td>
<td>61.53</td>
<td>338.84</td>
<td>925.19</td>
<td>1973.80</td>
<td>279.77</td>
</tr>
<tr>
<td>CHINA</td>
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<td>66.10</td>
<td>326.11</td>
<td>903.12</td>
<td>1580.00</td>
<td>251.24</td>
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<tr>
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<td>18.43</td>
<td>73.91</td>
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<td>1069.37</td>
<td>2054.07</td>
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</tr>
<tr>
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<td>10.47</td>
<td>43.13</td>
<td>296.84</td>
<td>886.22</td>
<td>2012.59</td>
<td>266.22</td>
</tr>
<tr>
<td>MALAYSIA</td>
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<td>31.15</td>
<td>222.19</td>
<td>590.98</td>
<td>1299.88</td>
<td>179.88</td>
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<tr>
<td>NEW ZEALAND</td>
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<td>298.66</td>
</tr>
<tr>
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<td>593.60</td>
<td>1116.30</td>
<td>186.38</td>
</tr>
<tr>
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<td>224.31</td>
<td>526.75</td>
<td>979.16</td>
<td>152.32</td>
</tr>
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<td>REPUBLIC OF KOREA</td>
<td>11.07</td>
<td>58.33</td>
<td>373.54</td>
<td>800.92</td>
<td>1116.30</td>
<td>211.82</td>
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<td>SINGAPORE</td>
<td>12.41</td>
<td>49.51</td>
<td>310.72</td>
<td>765.10</td>
<td>1499.73</td>
<td>225.52</td>
</tr>
<tr>
<td>VIET NAM</td>
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<td>69.14</td>
<td>384.87</td>
<td>840.95</td>
<td>1477.52</td>
<td>249.95</td>
</tr>
</tbody>
</table>
Table 1.2. Cancer, all sites, FEMALES: age-specific incidence rates (ASR) per 100 000 in ten countries and one area in the Western Pacific Region (1990 Estimates, Reference 1).

<table>
<thead>
<tr>
<th>COUNTRY/AREA</th>
<th>0-14</th>
<th>15-44</th>
<th>45-54</th>
<th>55-64</th>
<th>65</th>
<th>ASR</th>
</tr>
</thead>
<tbody>
<tr>
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<td>73.29</td>
<td>371.38</td>
<td>774.36</td>
<td>1456.09</td>
<td>239.83</td>
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<tr>
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<td>60.47</td>
<td>291.66</td>
<td>708.16</td>
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<td>457.57</td>
<td>984.44</td>
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<td>434.73</td>
<td>727.59</td>
<td>144.40</td>
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<td>470.16</td>
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<td>1678.44</td>
<td>285.75</td>
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<td>55.80</td>
<td>333.30</td>
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<td>1072.40</td>
<td>186.13</td>
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<td>45.50</td>
<td>299.50</td>
<td>461.68</td>
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<td>142.20</td>
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<td>SINGAPORE</td>
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<td>VIET NAM</td>
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<td>565.31</td>
<td>852.32</td>
<td>190.48</td>
</tr>
</tbody>
</table>

Among males, the highest rates were in Hong Kong, New Zealand, Australia, Japan and China, all exceeding 250 per 100 000 males. The most numerous cancer sites were those in the stomach, lungs, liver, oesophagus (mainly in China), mouth/pharynx, colon/rectum, and prostate (mainly in Australia and New Zealand).

The age-specific incidence rates (ASR) among females were lower than those of males, with only New Zealand having an ASR of more than 250 per 100 000. This was followed by Australia, Hong Kong and China where rates were more than 200 per 100 000, and by Singapore and Viet Nam where the rates were approaching 200 per 100 000 females. The most numerous cancer sites for women were those in the breast, cervix, stomach, lung, liver, oesophagus (mainly in China), colon/rectum, and mouth/pharynx.
Reference

2. National cancer control programmes

Introduction

The upward trend of cancer incidence in developing countries mirrors that observable wherever societies become increasingly urbanized/industrialized and is probably the result more of demographic and social changes than of industrialization *per se*.

Table 2. Numbers of cancer deaths and new cancer cases in the world as estimated for 1985 and predicted for 2015.

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Death (millions)</th>
<th>New cases (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>Developed countries</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Developing countries</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>All countries</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>2015</td>
<td>Developed countries</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Developing countries</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>All countries</td>
<td>9</td>
<td>15</td>
</tr>
</tbody>
</table>

Efforts to reverse this trend, and to make optimal use of resources to put research findings into practice, are likely to fail unless they are
properly coordinated. National cancer control programmes (NCCPs) offer the best means of reconciling what is possible with what is achievable in particular circumstances.

Cancer control covers a broad spectrum, from primary prevention, through early detection and screening, treatment and rehabilitation, to palliative care. The word "control" does not imply that cancer can be eradicated in the way that an infectious disease can be eradicated, by immunization, but that control can be exercised over its causes and consequences: the concept of cancer control empowers society to achieve mastery over the disease. The magnitude of the cancer problem and its growing importance in almost all countries, coupled with the clinical knowledge now available, compel the development of national strategies for cancer control. There is little evidence so far of a balanced use of resources for population-wide control of cancer by governmental and nongovernmental bodies acting in partnership, yet the means exist to prevent between a third and a half of the nine million cancer cases that occur annually throughout the world. Current knowledge would also allow the early diagnosis and effective treatment of a further one-third of those cases, and pain relief and palliative care to improve the quality of life of patients whose cancer is incurable.

Because the individual patient with cancer seeks help from medical practitioners, the problem of the disease tends to be widely viewed as one of fulfilling treatment needs. With national planning and coordination, however, another approach becomes possible - that of intervention to minimize the incidence of cancer. Similar approaches to other health problems, such as tuberculosis and infant mortality, have met with marked success. Thus, national policy should embrace not only cancer treatment but also the measures that can be taken, by the individual as much as by the government, to prevent the occurrence of the disease.

While large areas of ignorance still remain, enough is known about cancer causes and control measures for suitable interventions to have significant impact. At least one-third of the nine million new cases of cancer each year are preventable by such means as controlling tobacco and alcohol use, and immunizing against viral hepatitis B. Early diagnosis, and therefore treatment, of a further one-third of cases (for example, cancer of the cervix, cancer of the breast) are possible where resources allow. Effective techniques for pain relief are sufficiently well established to permit comprehensive palliative care in the remaining, more advanced cases. The most rational and effective means of implementing these measures is through an NCCP, which can achieve optimal use of resources by setting realistic priorities and instituting appropriate strategies.
An NCCP may be defined as a process leading to the development of a comprehensive, integrated national or regional programme with specific, measurable intermediate and outcome objectives and strategies for the balanced use of resources for cancer control. Ideally, the process of establishing an NCCP should be organized, democratic, empowering and pragmatic, with the boundaries of the programme defined by the social, medical and political environment of the country concerned.

In the absence of any national coordinating mechanism, it is possible for limited resources to be largely consumed in the treatment of cancer by prestigious hospitals. Such institutions often serve only selected populations and do little to reduce the national cancer burden. An effective cancer control programme, on the other hand, is an integrated set of activities covering primary prevention, early diagnosis and treatment and palliative care, and operates with an appropriate allocation of available resources.

The NCCP should be approved and endorsed by the Ministry of Health, and all its basic measures, such as legislation to control tobacco use or to ensure the availability of morphine for oral administration in palliative care, should be undertaken at a national level. In large countries and countries where there is significant state or provincial autonomy, however, it may be appropriate for many elements of the programme to be administered on a state or provincial basis. All sectors of the population should be covered by the provisions of an NCCP; few countries have the resources to do all that is theoretically possible to control cancer, but an equitable distribution of resources can be achieved by coordinating activities through the NCCP.

For many years, the World Health Organization has supported a number of countries in establishing NCCPs and has worked out general policies on primary prevention, early diagnosis, screening, cancer pain relief and palliative care, as well as a method of achieving cost-effectiveness in cancer control.

This manual outlines the scientific knowledge that is the basis for national cancer control programmes and offers extensive guidance on their establishment and organization. Much of its content derives from experience gained in the various countries that have already, with WHO support, instituted their own NCCPs.

Cancer annually affects about ten million people and causes approximately six million deaths. In developed countries it is the second most common cause of death, and epidemiological evidence points to the emergence of a similar trend in developing countries. The principal factors contributing to this disease pattern are the increasing proportion
of older persons (in whom cancer is more prevalent) in most populations, the greater ability of medical science to control once-fatal communicable diseases, and the rising incidence of certain forms of cancer, notably lung cancer, resulting from tobacco use. It is likely that 300 million new cases of cancer and 200 million deaths from the disease will occur in the next 25 years, with almost two-thirds of cases arising in developing countries.

When cancer is diagnosed, it is a natural reaction to seek to cure the condition, and increasingly effective treatment strategies do indeed make cure possible in certain cases. However, undue reliance on this approach, which often involves the use of sophisticated and expensive techniques, can result in an inequitable selection of patients, a rapid depletion of scarce resources and a shift in emphasis away from much more appropriate and affordable prevention activities.

The nature of cancer

The term cancer is used generically for some 100 different diseases including malignant tumours of different sites (breast, cervix, prostate, stomach, colon/rectum, lung, mouth, etc.), leukaemia, sarcoma of the bone, Hodgkin’s disease, and non-Hodgkin lymphoma. Common to all forms of the disease is the failure of the mechanism that regulates normal cell growth and proliferation: ultimately, there is progression of the resulting uncontrolled growth from mild to severe abnormality, with invasion of neighbouring tissues and, eventually, spread to other areas of the body.

The disease arises principally as a consequence of the exposure of individuals to carcinogenic agents in the atmosphere and in what they eat and drink. Personal habits such as tobacco use, frequently developed in response to social circumstances, and occupational exposure to carcinogens, play a particularly significant role in the etiology of cancer, as may biological factors such as viral hepatitis B infection. Many of these factors can be exploited as a means of cancer control: vaccination against hepatitis B, for instance, can protect against liver cancer.

Prevention of cancer
The present and potential burden of tobacco-induced cancer is such that every country should give immediate priority to tobacco control in its fight against cancer: tobacco use in all forms is responsible for about 30 per cent of all cancer deaths in developed countries and a rapidly rising proportion in developing countries. The habit of tobacco use is reinforced by addiction to nicotine, and cigarette smoking in particular is encouraged by the marketing activities of national and multinational tobacco companies. Unchecked, smoking will cause more than ten million deaths from cancer (predominantly lung cancer) in the next decade.

Dietary modification is another approach to cancer control. In recent years, substantial evidence has pointed to the causative role of excessive dietary fat in the development of certain cancers, and to the protective effect of increased consumption of whole grains, fruits and vegetables. Moreover, eating habits that may inhibit the development of diet-associated cancers will also lower the risk of cardiovascular disease.

Occupational and environmental exposure to a number of chemicals can cause cancer in a variety of sites: examples include lung cancer (asbestos), bladder cancer (aniline dyes) and leukaemia (benzene). Excessive consumption of alcohol increases the risk of cancer of the oral cavity, pharynx and oesophagus, and is strongly associated with cancer of the liver in developed countries. Strong links also exist between a number of infections and certain types of cancer: viral hepatitis B is linked with cancer of the liver, and human papilloma virus infection with cervical cancer. In some countries the parasitic infection schistosomiasis significantly increases the risk of bladder cancer. Exposure to some forms of ionizing radiation and to excessive ultraviolet radiation, particularly from the sun, is also known to give rise to certain cancers, notably of the skin.

The wealth of knowledge that already exists about these predisposing factors provides obvious and ample scope for action to reduce the cancer burden of all countries.
Early detection of cancer

The earlier a cancer is detected and diagnosed, the greater the chance that curative treatment will be successful. This is particularly true of cancers of the breast, cervix, mouth and skin. It is therefore critical that people are taught to recognize early signs of the disease, such as lumps, sores that fail to heal, abnormal bleeding, persistent indigestion and chronic hoarseness, and are urged to seek prompt medical attention. This can be promoted in all countries by public health education campaigns and through training of primary health workers.

Population screening, i.e. mass application of simple tests to identify individuals with asymptomatic disease, is another approach to early detection. However, screening programmes should be undertaken only where their effectiveness has been demonstrated; where resources (personnel, equipment, etc.) are sufficient to cover at least 70 per cent of the target group; where facilities exist for confirming diagnoses, and for treatment and follow-up of those with abnormal results; and where prevalence of the disease is high enough to justify the effort and costs of screening. At present, mass screening can be advocated only for cancer of the breast and cervix. Efforts should concentrate on women at greatest risk of developing invasive cancer, i.e. those aged 35 and over for cervical cancer screening and those aged over 50 for mammography programmes to detect breast cancer.

Treatment of cancer

The primary objectives of cancer treatment are cure, prolongation of life, and improvement of the quality of life. An NCCP should therefore establish guidelines for integrating treatment resources with programmes for screening and early diagnosis, and provide therapeutic standards for the most important cancers in the country.

Care of cancer patients typically starts with the recognition of an abnormality, followed by consultation at a health care facility with appropriate services for diagnosis and treatment. If necessary, there should be referral to a specialized cancer treatment centre. Treatment
may involve surgery, radiation therapy, chemotherapy, hormonal therapy or some combination of these.

The most advanced forms of treatment may produce a 5-year survival rate of 75 per cent or more in certain types of cancer, e.g. cancer of the uterine corpus, breast and testis, and melanoma. By contrast, survival rates in cancer of the pancreas, liver, stomach and lung are generally less than 15 per cent. Some treatments require sophisticated technology that is available only in locations with substantial resources. Since the cost of establishing and maintaining such facilities is high, it is desirable that they should remain concentrated in relatively few places in a country to avoid draining resources that could be devoted more usefully to other aspects of the NCCP's work.

**Palliative care**

Improved quality of life is of paramount importance to patients with cancer and pain relief and palliative care must therefore be regarded as integral and essential elements of an NCCP, whatever the possibilities of cure. Since they can be provided relatively simply and inexpensively, they should be available in every country and should continue to be given high priority, especially in developing countries where cure of the majority of cancer patients is likely to remain impossible for years to come. *Health professionals should be trained to deliver palliative care, both within health-care facilities and in patients' homes.* Guidelines for the relief of cancer pain have been drawn up by, and are available from WHO. The widespread availability of morphine for oral administration is critical to pain relief, and should be ensured by appropriate legislation.

**National policies for cancer control**

The development of national policies for cancer control depends upon assessing the extent to which the population is affected by cancer, determining the factors responsible for the disease, and identifying means of dealing with the problem. The essential data can be obtained
from cancer registries where these have been established, but may also be available from other sources.

Policies should take account of the resources that can be devoted to proposed activities, and programmes should be undertaken only if they fulfil the criteria of scientifically demonstrable value, acceptability to the population concerned and financial feasibility. In the long run, preventive activities are more effective and much less costly than efforts to treat the disease. Policies should therefore make provision for:

- controlling tobacco use by various means, including mass education, tax increases and restrictions on sales and places of use;
- evaluation of dietary intake of fats, fruits and vegetables, and promoting the adoption and maintenance of healthy diets;
- alerting the public to the cancer risks of certain communicable and sexually transmitted diseases, and promoting appropriate measures such as vaccination against viral hepatitis B infection;
- identification of carcinogens to which people are exposed, and legislation for their control.

The relative importance of the various forms of cancer in the country concerned should be considered. The national cancer control strategy should incorporate measures for prevention, early diagnosis and treatment, and should be based on comprehensive analysis of the existing situation, including a review of the causes of these cancers and of the resources available to deal with them.

Greatest effectiveness is achieved by the integration of cancer control into a country’s overall health service, with coordinated action on the risk factors that are shared with other diseases. The health infrastructure can be used for mass education about the nature of the disease, its causes and manifestations, and about what preventive action can be taken by the individual (with regard to diet and alcohol and tobacco use) and by society as a whole (control of tobacco availability and use, and of occupational and environmental exposure to carcinogens). Policies should cover the training and continuing education of primary health workers in the prevention and early detection of cancer, and in the referral of patients to appropriate diagnostic and treatment services.
Policies for cancer control should also extend beyond the health sector to include relevant activities in the fields of education, agriculture, industry and commerce. Where possible, economic incentives for minimizing cancer hazards should be provided to industry and agriculture.

**Establishing a National Cancer Control Programme**

Four basic steps are involved in the establishment of a national cancer control programme (NCCP).

- assessing the magnitude of the cancer challenge;
- setting measurable cancer control objectives;
- evaluating possible strategies for cancer control; and
- choosing priorities for initial cancer control activities.

Personnel involved in formulating and implementing the overall strategy should be health professionals with experience in disease control and large-scale health programmes, cancer experts and other health service workers. Ultimately the NCCP should involve the general public, whose knowledge and awareness of the problem can and should become a major force in combating cancer. With an appropriate mobilization of all available human resources, it is possible to develop cancer control policies that are acceptable to the people for whom they are intended, affordable, integrated with other national health programmes and linked effectively with sectors, other than health, that are relevant to cancer control.

Political commitment to the adoption and implementation of these policies is essential. It should be the responsibility of health leaders to persuade political leaders, health practitioners and the public of the magnitude of the national cancer problem and of what can be done to overcome it. It is particularly important to emphasize the epidemiological nature of the problem, for example by pointing out that the current incidence of lung cancer is largely the result of cigarette smoking over several decades.
Different objectives and priorities will be set in different countries, according to the national cancer burden and the resources available for cancer control. However, the processes to be undertaken in all countries - whether an NCCP is to be introduced for the first time or an existing programme is to be revised to make it more effective - are sufficiently similar for the following general summary to be universally relevant.

Assessing the magnitude of the cancer challenge

As an initial step, an NCCP requires an analysis of the national cancer problem, including the dynamics of the situation. The most prevalent forms of cancer, which will differ from place to place, must be the first to receive attention. Since there is a marked time lag between exposure to a carcinogen and the manifest disease, it is essential to give priority to those forms of cancer likely to increase in incidence as well as to those of highest current prevalence.

Epidemiological data on the occurrence of cancer, and knowledge of causative factors and how to avoid them, will provide a basis for determining where the emphasis of cancer control efforts should be placed. Mortality statistics are often the most readily available data, but it is important to monitor the actual occurrence of cases to the greatest practical extent. Surveillance of cancer incidence provides a direct indication of the amount and distribution of the disease. By contrast, mortality rates are affected by anything that influences the course of the disease, including early diagnosis and treatment, and hence only indirectly reveal the prevalence of the disease and trends in incidence.

Whatever methods are adopted, effective cancer surveillance systems require substantial and continuous effort. Benefit comes only from analysing the collected data, and it is therefore essential to allocate adequate resources for that purpose when a cancer surveillance system is planned.

Five categories of information are needed for the initial "situation analysis":

- demographic data
- data on cancer incidence and mortality
• data on other diseases
• information on health care facilities and personnel
• policy review

Demographic data

Generally speaking, demographic data, with appropriate projections to the present day, are fairly readily available through national censuses. Because cancer rates vary by age, sex and, in some countries, race, data on these population characteristics are essential.

Cancer data

For a comprehensive situation analysis, it is essential to have incidence, prevalence and mortality data both for all forms of cancer combined and for each of the most common forms of the disease.

Incidence

Data on incidence, or the number of new cases of cancer arising in unit time (usually in a year, and usually expressed per 100 000 population), may be directly available from a population-based cancer registry, either within the country concerned or in a similar country, but may often have to be estimated. Several developed countries maintain cancer registries but in most developing countries that approach is not currently feasible.

The existence of a population-based cancer registry is not a prerequisite for an effective NCCP; other approaches can be used to estimate the cancer burden. A carefully designed sampling operation, for example, can yield useful information concerning the cancer situation. In China, a survey of cancer was conducted throughout the country over a one-year period, and the USA maintains surveillance of cancer by registries in areas that include about one-tenth of the population. Furthermore, if statistical information on causes of death is complete and accurate, incidence can be estimated on a site by site basis using annual mortality rates and survival data from cancer treatment centres, although this relies on the cause of death - and even the actual fact of death - being reliably recorded.
In many developing countries, mortality data will be unavailable and it then becomes necessary to derive an estimate of the probable total cancer incidence by considering the size of the country’s population and its age and sex distribution. It can be assumed, by analogy with other countries, that the background incidence of cancer is of the order of 100-180 per 100 000. The lower level will correspond to a country where over half the population is under the age of 20 years, the upper level to a country with one-third or less of the population under the age of 20. Probable incidence by site can then be estimated by applying to these totals the percentage distribution of cancer cases, by site, presenting to medical centres for treatment, after making allowances for the likely selective referral of different cancer sites. Wherever possible, data should also be obtained from treatment centres on the stage of cancer at the time of diagnosis, again by site of disease. For these purposes, complete hospital-based cancer registries are not required, since they are primarily intended to supply data for assessment of treatment effectiveness in the institutions concerned.

**Prevalence**

Prevalence, or the total number of people in the population at any one time who have cancer (excluding those considered to be cured), provides an index of the demands on cancer treatment services. In developed countries, prevalence will be approximately 2-3 times the expected incidence. However, in developing countries, where many cancers are diagnosed at advanced states and the survival rate is therefore low, prevalence may hardly exceed estimated incidence; and assumption that prevalence is 1.5 times the overall expected incidence will thus suffice to indicate the current probable burden. As the cancer control programme develops and survival improves, prevalence will increase relative to incidence.

**Mortality**

Mortality rates may be directly available if a good vital statistics system exists: efficient death registration facilitates the development and monitoring of cancer control. To be most useful, both in delineating the problem and in assessing progress, mortality information should be compiled on countrywide, regional or provincial, and local levels. Where there is no reliable vital statistics system, mortality may be approximated by multiplying the 5-year case fatality rate, on a site by site basis, by the estimated incidence for each site.
**Forecasting trends in incidence and mortality**

In assessing the future cancer burden, potential changes in the relative importance of various cancers and the impact of cancer control measures, forecasting of trends in incidence and mortality is valuable. The most important variables for forecasting the actual burden in the future are:

- *overall population trends;*
- *the increase in the numbers of older persons; and*
- *the prevalence of cigarette smoking 30 years earlier.*

The relative burden of cancer in the future is a function not only of the absolute amount of cancer but also of trends in other causes of death. In most countries, an increase in the absolute number of cancer deaths is accompanied by a decrease in deaths due to infectious diseases (other than AIDS). Moreover, the decline in infectious diseases usually outpaces the increase in the number of cancers. The net result of these two trends is that deaths from cancer will constitute an increasing proportion of all deaths.

**Implications for health services**

The paragraphs above indicate methods for deriving estimates of the actual numbers of cancer cases and deaths due to cancer: the numbers of cases known to the health services are often lower. Indeed, in countries where awareness of cancer is low and access to health care is limited, only a small proportion of the actual cases are known, even as few as 5-10 per cent. Demands for care will therefore rise even more rapidly than the actual increase in need resulting from increased incidence: with greater awareness of cancer, a higher proportion of people with the disease will present to the health services for care.
Data for other diseases

It is essential to establish the importance of cancer relative to that of other diseases. Available data on other diseases will rarely be as detailed as those for cancer. Good vital statistics systems will provide the necessary data on mortality but, in their absence, proxy data, such as hospital admissions by cause, may have to be used.

Health care facilities and staffing data

Data on health care facilities and personnel will usually be available in some form from the Ministry of Health. Information is required on those hospitals that treat cancer patients and on their coverage; on equipment available for cancer treatment, especially for radiotherapy, including cobalt machines and brachytherapy; and on the availability of drugs for chemotherapy and for pain relief. Professional associations may be able to supplement data on personnel with numbers of specialized groups, such as oncologists, radiotherapy technicians, pathologists and cytotechnologists. Data are also required on members of allied health care professions, such as nurses and technologists, and on primary care professionals and facilities. For many of its projected activities in the areas of prevention, early diagnosis and palliative care, the NCCP will be dependent on interested primary health care workers who can relate to the individuals under their care.

Policy review

Once the situation analysis is completed, it will be possible to develop the policy for cancer control. A policy may be defined as an explicit commitment by government which provides objectives for a balanced cancer control programme, seeks the relative priority of each objective and indicates the resources and measures required to obtain the objectives. It should cover the following elements:

- The challenge posed by cancer, both now and in the future. For the present, this is represented by the cancer data described above, together with information (if available) on the stage at diagnosis of the important cancers in the country.
• The broad aims of the cancer control policy, which are:
  - prevention of cancer;
  - early diagnosis, coupled with effective and efficient treatment of potentially curable disease; and
  - relief of pain and adoption of other measures to improve the quality of life of patients with cancer that is probably incurable, palliation of symptoms and terminal care.

• The principles on which the policy is to be developed.

• An explicit statement of priorities within the policy.

• The programmes, both new and revised, that will be required to carry out the policy.

• Any legislative measures that will be required, such as those to control tobacco use, allocate funds for recommended activities, or ensure the availability of oral morphine.

• Indicators for monitoring and evaluation of the NCCP.

• Managerial aspects of the NCCP.

**Prevention policy**

Prevention should be one of the main aims of cancer control. However, the nature of cancer requires a preventive strategy to extend over several decades, with measures aimed at avoiding future cases of the disease. Because of the time involved in the biological course of the disease, any substantial impact on cancer incidence is unlikely to be apparent within ten years after control of its causes is effected.

Depending upon the circumstances in any given country, measures that can and should be adopted specifically for cancer prevention include:

• mass education concerning cancer hazards, especially tobacco and excessive alcohol use;

• restricting tobacco and alcohol sales through increased taxation or other means;
• promoting dietary modification (or preventing change of diet to a more hazardous pattern);

• emphasizing the implications for cancer of certain communicable disease control activities, such as use of hepatitis B vaccine and curtailing schistosomiasis;

• identifying exposure to carcinogenic chemicals in industry and elsewhere, and establishing and enforcing standards for control of such exposures.

The principle of cancer prevention offers many opportunities to developing countries. Liver cancer can be expected to diminish with mass immunization against viral hepatitis B where this is indicated, and with control of exposure to aflatoxin. Radical action to control smoking would dramatically reduce the number of deaths from lung cancer: without such action, mortality figures for people aged 45-74 years have been estimated in tens of millions for the next century.

Integration with national health programming

The WHO Seventh, Eighth and Ninth General Programmes of Work for the periods 1984-1989, 1990-1995 and 1996-2001, respectively, all endorsed by the World Health Assembly, urge Member States to strengthen, or to consider initiating, the development of cancer control measures as an integral part of national health plans. Control of cancer can be achieved most efficiently in the context of a comprehensive national plan. A cancer control policy will enrich the total health effort, and cancer control efforts will themselves be enhanced by becoming an integral part of the total national health plan. Those responsible for national health programming should therefore establish measurable objectives for cancer control.

Many aspects of cancer control are already important elements of modern health programmes. The concept and implementation of primary care, as part of the WHO Global Strategy for Health for All by the Year 2000, should be extended to include cancer. Primary health care workers everywhere are the first line of defence against cancer as well as against other diseases among the people they serve; they should be prepared to undertake three principal responsibilities with respect to cancer:

• educating people about the disease, particularly about how to prevent it and how to recognize its early symptoms;
• **detecting** the disease at a curable stage by looking for it systematically, and empowering the individual to seek help;

• **referring** people suspected of having the disease to the relevant diagnostic and therapeutic services.

In addition, appropriately trained community-based health workers can play an important role by providing continuity of care, both curative and palliative, between hospital and home.

The necessary care for cancer can usually be delivered most effectively through a district system, with appropriate specialists available at hospitals to which patients have ready access. The most complicated cases may be referred to cancer centres that provide the most advanced forms of diagnosis and therapy available in the country. However, the care provided by such centres cannot be extended to the entire population. Achieving equity in care for cancer patients requires mobilizing cancer specialists to become part of a system for that care, organized on a regional basis, so that the best available service reaches the maximum number of people. The situation analysis discussed earlier will indicate the most useful role for specialized care at a given time and place, and how cancer therapy specialists can make their greatest contribution.

Continuing education of both health care workers and the general public is essential to maintain the highest level of efficiency and effectiveness.

**Intersectoral aspects of cancer control**

Because cancer is so often a consequence of social circumstances and because its control involves so many social vectors - economic, educational and political - a broad, society-based approach is required. Expertise in the disease alone will not suffice. Those concerned with cancer control must work with authorities in agriculture, commerce, communications, education, industry and law in order to achieve success.

This is exemplified by the need to control tobacco use as a means of preventing cancer. Although individual dependence plays an important role in perpetuating the use of tobacco, strong social and economic pressures are also involved in the initiation and maintenance of the habit. Controlling tobacco use therefore necessitates dealing with international agencies, governments, the tobacco and allied industries, the media, the growers and sellers of tobacco and health professions, as
well as with the general public. Another example is the need to increase the availability of oral morphine for palliative care, which requires the cooperation of drug regulators and legislators, in addition to the expertise of cancer specialists.

Intersectoral collaboration is also essential if programmes are to be cost-effective. *The public cannot cope with conflicting educational messages*, such as one set of dietary recommendations for the avoidance of cancer and another for the avoidance of cardiovascular disease. Similar coordination is required for counselling on sexual lifestyles, designed to prevent sexually transmitted diseases, cervical cancer and AIDS. The intersectoral approach requires an analysis of all the social elements that can affect the control of cancer.

Establishing effective links with other groups interested in chronic disease control deserves high priority. Moreover, fundamental, long-term social interests - including employment, productivity and the economy, as well as health - can be served by making cancer control an integral part of the nation’s health programme.

**Setting measurable cancer control objectives**

A clear statement of aims, goals, and objectives is essential to any disease control strategy.

The overall *aims* of an NCCP are to reduce the incidence of cancer and the associated mortality and to improve the quality of life of cancer patients.

The *goals* of an NCCP may be summarized as follows:

- to prevent future cancers;
- to diagnose cancers early;
- to provide curative therapy;
- to ensure freedom from suffering; and
- to reach all members of the population.
Decisions on objectives for any particular country must take into account the nature and extent of the cancer problem, the resources available or potentially available and other national priorities. Strategic planning, of which the statement of objectives forms the core, includes a clear projection of what can and will be done to implement the NCCP. The situation must be realistically assessed and precise steps outlined for achieving the objectives. A clear definition of programme components and a timetable for their introduction are essential.

Cancer control objectives should be compatible with general health objectives and should be formulated along the following lines:

- to make optimal use of limited resources to benefit the whole population;
- to achieve high coverage with early detection and screening measures;
- to ensure equality of access to cancer care; and
- to improve control of symptoms.

Objectives are more specific than general aims, and cannot be fully specified in the absence of a detailed situation analysis. It is not possible to dictate objectives that are universally applicable: each country must make its own decisions. All that is attempted here is a guide for setting relevant objectives.

By the year 2000, as an extension of the targets expressed in the Global Strategy for Health for All by the Year 2000, majority of the countries should have achieved the following:

(1) There should be a clear picture of how cancer is affecting the country’s people, particularly which forms of the disease affect which segments of the population, and, in so far as scientific knowledge will permit, an understanding of the factors responsible for the national cancer situation. In addition, there should be some understanding of probable future trends in incidence. In most countries, the number of cancer cases will increase because of increases in population size, ageing of the population, and - for some sites - changes in risk factors and/or introduction of early detection programmes. Increasing incidence is likely to be accompanied by increasing prevalence, resulting from the increasing incidence and from longer survival (as a result of improvements in therapy and/or the introduction of early detection programmes.)
(2) There should be an understanding by health professionals, including primary health care workers and leading health authorities, of their individual roles in cancer control. Relevant information must be provided during both the initial training of health professionals and in continuing education programmes.

(3) There should be an understanding by the general public of the nature of cancer and of what each person and society as a whole can do, to minimize the risk of the disease and respond to its symptoms. This will require public education strategies appropriate to the health and social situation of the country concerned and its cancer control plan.

(4) There should be a comprehensive plan for cancer control, developed in the context of the national health situation and including measurable objectives for reducing cancer mortality over specified time periods. This will require a careful analysis of actual and potential resources available for comprehensive cancer control measures, including prevention, screening, treatment and pain relief. The plan should allow for coordination of cancer control activities with other health initiatives: for example, action on tobacco and diet should be planned in conjunction with programmes for the control of cardiovascular disease.

(5) There should be political consensus on the broad social action necessary for cancer control, particularly the elimination of tobacco use. This will require careful analysis of the potential for consensus and vigorous leadership by national and world health authorities to develop and mobilize public interest in cancer control.

(6) There should be legislative and budgetary support for the NCCP. This will require involving society in cancer control and ensuring that long-term health interests, particularly cancer control, are given the priority they merit, despite possible conflicts with short-term interests.

(7) There should be a system for monitoring the activities initiated with a view to implementing the cancer control plan; compilation and review of data on prevention, screening, treatment and pain relief. Existing health service data systems may require expansion to include information of this type.

(8) A report should be prepared for the world community on national progress towards, and further plans for:
• elimination of tobacco use, and reduction in lung cancer incidence;
• dietary modification to achieve a healthier diet;
• reduction of the incidence of liver cancer where the disease is a problem;
• reduction in mortality from cervical cancer;
• reduction in mortality from breast cancer;
• control of cancer pain; and
• achieving other aspects of the NCCP.

Evaluating possible strategies for cancer control

It is important to give very broad consideration to the possibilities for action from a number of perspectives:

• the magnitude of the cancer problem (as reflected by the ten most common cancers);
• the organizational level, e.g. primary care or hospital;
• the stage of intervention, e.g. prevention, early diagnosis, treatment, palliative care;
• the general concerns of the public regarding resources, economic productivity, etc.;
• management activities, e.g., information systems; and
• political and planning concerns.

The relationship between these different perspectives can be set out in matrices, and each matrix can be used to identify possible priorities for initial cancer control activities and rank them in order of importance. New interventions will have to be considered, particularly for prevention, and early detection and treatment of cancer. Their effectiveness should be carefully assessed to ensure that any benefits they offer are not accompanied by unacceptable costs that may divert resources from more effective policies.
Choosing priorities for initial cancer control activities

Resources for cancer control (funds, trained people, equipment, and facilities) in both developed and developing countries are insufficient to allow all possible activities to be undertaken. It is therefore essential that resources are used as effectively and efficiently as possible. Health authorities should establish appropriate priorities.

When a range of possible activities has been identified, the measures of effectiveness and cost should be defined and the following steps carried out for each activity:

- identifying the immediate target;
- estimating the impact in terms of reduction in incidence or mortality;
- estimating the resources needed; and
- estimating the cost of the activity.

A number of models have been developed to facilitate this process. It must be recognized, however, that the validity of a model is entirely dependent on the validity of the assumption made and the data entered into the model. The models incorporate epidemiological data, knowledge gained in research, and expert judgements for applying the principles of cost-effectiveness analysis in setting priorities. The use of such quantitative methods allows estimation of the impact of various cancer control activities in a population over a given period of time and thus permits priorities to be set.

The application of such methods in Chile in 1986, for example, indicated that, by 1995, the average cost of screening for cervical cancer beginning at age 35 years (measured as the cost of reducing mortality by one death after 10 years of screening) would be US$840, compared with US$42 193 if screening were started at age 20. Either of these options, however, would be far more cost-effective than screening for stomach cancer or chemotherapy for breast cancer.

Since cancer control depends on the application of existing knowledge, no activity should be introduced unless its effectiveness is strongly supported by data from research programmes or from cancer control programmes elsewhere. Such programmes usually provide data
that enable the costs of the activity to be estimated, although the information may have to be modified, e.g. to reflect different salary scales, if it is to be relevant to another country.

Once cost estimates have been made, it is possible to compare the effectiveness and cost of all activities and make a rational decision about priorities for both current and proposed new activities. It is useful to classify priority areas in two groups: activities that can be introduced (or improved) without the need for additional resources; and activities that will require extra resources (staff, technology, drugs, etc.). It is important for existing activities to be included in the process of priority setting, as additional human or financial resources may be released by terminating relatively unproductive activities.

**Political will for cancer control**

Even in countries where resources are limited, there has been an unfortunate tendency for cancer policies to adopt the high-technology approach to cancer control pursued in North America, Australia, Europe and Japan. This had led to the construction and operation of a very small number of cancer treatment facilities that can serve only a tiny fraction of the population. As a result, most cancer patients are deprived of whatever benefit high technology can bring and the advantages that could be gained from other approaches are lost.

There must be political commitment to a broad approach to the cancer problem, which avoids undue emphasis on the dramatic, but limited, possibilities of high-technology treatment. Sophisticated techniques can be made available as and when feasible, but more expenditure in that area should not be allowed to detract from a more comprehensive approach based on prevention and early detection as well as treatment. National policy that makes cancer control part of an overall health plan must also involve national development, because health affects, and is affected by, many other elements of development. Cancer as a significant and growing aspect of a nation’s health problems requires the attention of the highest levels of government.
Reference

1. *National cancer control programmes - policies and managerial guidelines.*
3. Cancer surveillance

Introduction

Cancer comprises a group of diseases with similar clinical and pathological features, characterized by uncontrolled cellular growth. For the most part, this has dramatic consequences for the human organism, and the growth and spread of the tumour leads, if untreated, to very obvious clinical dysfunction and death. There are some exceptions to this pattern, such as some tumours of the skin which grow quite slowly and rarely spread to other organs, and cancers which have not grown sufficiently to manifest themselves before death supervenes from a different, competing cause (latent cancers). Nevertheless, the serious nature of most cancers means that, except in a few societies without access to “Western” medical care and concepts, they will almost always present for diagnosis (and treatment, if available), so that enumeration of incident cases of cancer is relatively easy in comparison with other diseases. It is this fact that has permitted the development and use of cancer registries, particularly population-based registries which relate the incident cancer cases to a defined population at risk.

Cancer surveillance can be defined as the systematic, active, ongoing observation of the occurrence and distribution of cancer within a population and of the events or conditions that increase or decrease the risk of such disease occurrence. The most important outcomes of interest, particularly in planning, monitoring and evaluating cancer prevention and control programmes, are cancer incidence and mortality.
Incidence

Incidence of disease is clearly an important measure of burden, since it describes the stream of new cases which will require some kind of medical attention. Measurement of incidence requires the identification of all new cases of disease in a defined population, and hence some kind of case-finding mechanism, and record-linkage to ensure that persons are not confused with events. The cancer registry is the usual method of collecting such data. However, cancer registration is a relatively recent development, the oldest functioning registries having been in existence for at most 50 years (Wagner, 1985).

Measurement of cancer incidence involves collection of data on new cases of cancer in the population. Statistics based on utilization of health services (e.g. clinic attendance or hospital discharges) are often available, but, since these are event-based, it is not possible to relate them to incidence rates. Incidence rates for cancer are produced by population-based cancer registries (Jensen et al, 1991), which collect information on all new cases of cancer in a defined population.

A registry must collect information on cancer cases from multiple sources, and link together the documents pertaining to a single individual (or more correctly a single tumour) so that, as far as possible, no new case of cancer is missed and no case is recorded twice. Sources of information may be special notification forms completed by physicians and sent to the registry. In some countries there is a legal obligation to provide notification.

However, most registries rely in addition, or as an alternative, upon the use of documents completed for other purposes. Hospital discharge abstracts, treatment records (especially from oncology or radiotherapy units) and pathology reports mentioning the word cancer are the most common source documents. Most registries also make arrangements to obtain, from vital statistics offices, copies of death certificates which mention cancer as a causative or contributory factor. Most registries try to obtain further information on cases of cancer which first come to their attention in this way but, even if they cannot, they record those which remain untraced as Death Certificate Only (DCO) cases. The proportion of cancer cases first coming to the attention of the registry in this way is a useful indicator of the completeness of registration (Parkin et al, 1994). A variety of other procedures are used by registries to evaluate completeness of registration. For example, it is universal practice to examine the ratio of deaths to new cases for a given
population, this M:I ratio should be close to the case fatality ratio (or 1-
survival).

The validity of the information recorded by cancer registries is
routinely evaluated by indices such as the percentage of cases with a
histological diagnosis, and the percentage of cases of which the only
notification received was a death certificate. Many studies have been
done to compare cancer registry records with independent reviews of
case records to evaluate the validity of recorded data (reviewed in
Parkin et al, 1994). In general, the accuracy of the major variables (sex,
age, 3 digit ICD-code) in cancer registries is high, and undoubtedly
superior to that of death registration. Cancer registries which aspire to
be published in the major international compilation of International
Agency for Research on Cancer (IARC) Cancer Incidence in Five
Continents (e.g. Waterhouse et. al., 1982; Muir et al., 1987; Parkin et
al., 1992) are expected to achieve at least 95 per cent complete
registration, although some registries in developing countries are
included where the figures is probably 90-95 per cent.

Incidence rates derived from cancer registries are considerably more
restricted in availability than mortality rates. The establishment of
cancer registration worldwide has been a very haphazard process. In
some countries there has been a (more or less) official policy to support
and fund registries. Elsewhere the individual initiative of research-
oriented clinicians and pathologists has often been a major factor. The
present status of coverage of the population of different world regions by
well established population-based registries is summarized in Table 3.

As an alternative to cancer registration, data on incidence of cancer
can be obtained from morbidity surveys. These may be ad hoc studies
limited to identifying specific tumours, which are essentially the same
as cancer registration except that the timescale is limited and the
survey purely retrospective. General morbidity surveys record all cases
of disease appearing in a sample of the community, e.g. at primary care
level. The problem with such community-level surveys is that for
comparatively rare causes of morbidity, such as cancer, there are
relatively few cases among the large number of contacts recorded by
primary care workers, so that the populations are too small to yield very
useful information.
### Table 3. Status of coverage of populations of different country/region for cancer mortality + incidence data: 1990

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Percent of Population covered</th>
<th>Mortality data</th>
<th>Incidence data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>WHO</td>
<td>Other</td>
</tr>
<tr>
<td>EME* Countries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North America</td>
<td>100</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>100</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>100</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Australia/New Zealand</td>
<td>100</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>FSE** countries</td>
<td>99</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Total (Developed Areas)</td>
<td>100</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>0.3</td>
<td>7.0a</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>-</td>
<td>1.1b</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>10.6</td>
<td>0.7d</td>
<td></td>
</tr>
<tr>
<td>Other Asia &amp; Pacific</td>
<td>-</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Latin America + Caribbean</td>
<td>57</td>
<td>8e</td>
<td></td>
</tr>
<tr>
<td>Middle East &amp; North Africa</td>
<td>15</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Total (Developing Countries)</td>
<td>11</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>30.3</td>
<td>1.7</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- a South Africa
- b Bombay Municipality
- c “Selected Areas”, 1989
- d Disease Surveillance Points (DSP) sample, 1991
- e Sao Paolo, Brazil
- f Limited sites only for Russia, Ukraine, Moldova (57.6% of total)

*EME = Established market economies
**FSE = Formerly socialist economies - includes ex-socialist Eastern Europe and ex-USSR.

***CI5(VI) = Cancer incidence in five continents, Vol. VI (see reference 16)
Mortality

Mortality rates have been more widely used than incidence rates, since they have been available for a much longer period, and usually for large populations. Mortality rates may be used as a sort of “proxy” for incidence rates in epidemiological studies comparing disease rates between different populations and over time (here the focus of interest is in the differences in disease risk, not really upon the number of people dying). In addition, they provide a measure of the cancer burden: comparisons of numbers of lives lost has a long history in health services research and health economics, for example in evaluating the effectiveness of programmes for prevention, early diagnosis and treatment of cancer.

The concept of person-years of life lost (Dempsey, 1947; Greville, 1948) was introduced almost fifty years ago in order to refine the traditional mortality rates by providing a weighting for deaths at different ages. These methods started to become more widely used from the late 1970’s in health services planning. There are many variations in the calculations used, depending upon the weights to be used (the value of years of life at different ages), the “normal” lifespan against which to compare premature death (fixed upper limit, or lifetable expectations of life), and the “discount rate” to apply to life years which would have been lived in the future.

Mortality data derive from registration systems where the fact and causes of death are certified, usually by a medical practitioner. The International Classification of Disease (ICD) provides a uniform system of nomenclature and coding, and a recommended format for the death certificate. Mortality statistics are produced according to the underlying cause of death, and this may not equate with the presence of a particular tumour. Although the ICD contains a carefully defined set of rules and guidelines which allow the underlying cause to be selected in a uniform manner, interpretation of the concept probably varies considerably (e.g. when death occurs from pneumonia in a person previously diagnosed as having cancer). Comprehensive mortality statistics thus require the availability of diagnostic data on decedents, which are transferred in a logical, standardized fashion to death certificates which are then accurately and consistently coded, compiled and analysed.

There have been a host of studies on the validity of cause of death statements in vital statistics data. These compare cause of death
entered on the death certificate with a reference diagnosis derived from autopsy reports (e.g. Heasman and Lipworth, 1966), detailed clinical records (Puffer and Griffith, 1967; Bosch et al., 1983) or cancer registry data (Percy et al., 1981). Such studies reveal that the degree of accuracy of the stated cause of death declines as the degree of precision in the diagnosis increases. Thus although the total number of deaths from cancer may be only slightly underestimated, the distribution of cancer by site may be incorrect. There is a tendency to over-record nonspecific diagnoses instead of the correct location (e.g. large intestine instead of rectum), and accuracy is sometimes lower in those dying at older ages, or at home. There are also quite marked differences between different countries in the allocation of ICD-codes to death certificate diagnoses, further complicating international comparative studies (Percy and Dolman, 1978; Percy and Muir, 1989).

The great advantage of mortality statistics is their comprehensive coverage, and their availability. About 42 per cent of the world population is covered by vital registration systems producing mortality statistics on cancer (Table 3). They are not, however, of the same quality in all countries. In some countries, coverage of the population is manifestly incomplete, and the so-called mortality rates produced are implausibly low. In others, quality of cause of death information is poor. This can sometimes be predicted when a substantial proportion of certificates are completed by non-medical practitioners (WHO has in recent years provided a useful table in World Health Statistics Annual giving, for a few countries at least, the relevant percentage). Otherwise, quality of data must be judged from indicators such as the proportion of cancer deaths coded to `senility and ill defined conditions', and the proportion of cancer deaths without specification on the primary site, or where site is specified in only vague terms (ICD-9 codes I95-I99).

**Prevalence**

Prevalence of cancer is often advanced as a useful measure of the cancer burden (Hakama et al., 1975), indicating the number of patients currently alive who require medical care. However, there is no standard definition of a prevalent case of cancer. In theory, it should refer to someone ever diagnosed as having cancer who is still alive, but then long survivors who are “cured” are included, and this scarcely relates to “burden”, if this is to be used to determine resource allocations. A reasonable compromise is to regard only patients alive between 0 and 5 (or 10) years after diagnosis as “prevalent” cancers, since this approximates to be the period of active treatment and follow-
up of cases. Prevalence can be estimated directly by some cancer registries (Tulinius et al, 1992) from their files of cases registered who have not died. Alternatively, prevalence can be estimated from the incidence of disease and survival curves, either for short-term survivors (e.g. 5 to 10 years), or, if incidence and survival data are available for long periods of time, including long-term survivors also (Feldman et al, 1986; Hanai, 1987; Adami et al, 1989).

Survival

Cancer treatment is usually evaluated in terms of survival. The computation of survival rates depends upon a follow-up of diagnosed cancer patients and the calculation of numbers surviving after different intervals of time. The usual method is the actuarial or life-table method. There are different ways of allowing for “normal” or non-cancer mortality in the followed-up patients. The most familiar is “relative survival” which computes the observed mortality rate in the cancer patients as a ratio of that expected in the population from which they come (American Joint Committee, 1982). The source population of the cancer patients must be carefully defined. Comparisons between populations require representative samples of cancer patients, as provided by population-based cancer registries. Series from individual hospitals or clinicians are inevitably subject to selection biases.

Other Statistics

In some countries, there are neither vital statistics systems capable of producing reasonable cause-specific mortality data, nor population-based registries from which incidence rates can be estimated. In these circumstances, the only information available may be the relative frequency of different cancers among cancer diagnoses as a whole, obtainable from various ad hoc sources. These may be cases admitted to one or several hospitals, or cases recorded in departments of histopathology. Since these cannot usually be related to a population at risk, it is impossible to calculate incidence, so that the magnitude of the cancer burden is unknown. They purport solely to illustrate the relative importance of different cancers. Even here, however, there are problems, since all such series are subject to various forms of selection bias. Hospital series include cases for which therapeutic facilities are present, and often exclude advanced or incurable cancers.
Histopathology series include an excess of easily biopsied tumours, and a deficit of cancers usually diagnosed by other means (Parkin, 1985).

When such data are all that are available, care must be taken in comparative studies based simply on percentage frequencies (Boyle and Parkin, 1991). It is probably preferable to estimate incidence, based upon a notional “all sites” incidence, and age-specific frequencies of each cancer (Parkin et al 1993), but avoiding series which result in a biased sample of cases (e.g. from histopathology series). “All sites” incidence rates are derived from the estimated mortality rates of neoplasms, calculated by regression methods developed by Preston (1976) and Hakulinen et al (1986). These mortality estimates are necessarily available for just a few broad geographic regions (e.g. Sub-Saharan African, Middle East). The corresponding incidence rates are then calculated by means of the regression models based upon the observed ratio of deaths: cases for different cancers in registry data in the same geographic area.

In any case, such statistics are grossly unsatisfactory for purposes of planning and evaluation, and countries without any means of monitoring incidence or mortality would be well advised to take appropriate measures to establish some.

**Recommendations**

1) Cancer registration is of high priority, and should conform to international technical and methodological standards as defined in relevant publications of the International Agency for Research on Cancer (IARC) and the International Association of Cancer Registries (IACR).

- All countries with a population of 200 000 or more should maintain at least one population-based cancer registry. Countries with populations of 5-10 million should not aim for national registration, but rather for regional registries covering a limited population, the number of such “sentinel” sites, depending on the size of the country.

- For small countries, periodic cancer “surveys” (retrospective census of cases) are a more realistic option.

- Population-based registries should aim to identify all cases (however diagnosed) in a defined population. They should
collect information from all potential sources of information, and these should include at least (1) hospitals, (2) pathology laboratories and (3) death registrations. In the absence of well-established existing health information systems, collection of information requires an active search for cases by personnel specifically employed for the purpose. Registration dependent upon passive notification of cancer cases by health care professionals is not adequate for the purpose.

- The information recorded on cancer cases should comprise at least the minimum data set recommended by the IARC and the IACR: name of patient; date of birth (or age); sex; address; primary site of cancer, histology; date of diagnosis; basis of diagnosis; and source of information.

- Adequate staffing is required. This implies some form of medical supervision (at least part-time, depending on the registry size), and clerical personnel trained in data collection, coding and entry. As an indication, about one clerk is required per 1000 annual new registrations.

2) Cause of death reporting systems should be strengthened when this is feasible. Generally speaking, it is only reasonable to expect good quality material when deaths are certified by a medical practitioner.

3) Where certification of cause of death is incomplete, or an unacceptable proportion of certificates are completed by non-medical personnel (more than 90 per cent), consideration should be given to ensuring adequate certification of a sample of the population. This sample should be of known representativeness, so that national estimates can be prepared.

All countries, except the smallest, should have at least one cancer registry capable of monitoring incidence and survival. The first priority, therefore, is to aid the establishment of cancer registries where none currently exist.

A second priority is to provide support to those countries where the registries are underperforming. They should have either a comprehensive, national registry (for the island states), or two to three regional population-based registries.

The third priority is to encourage the extension of the number of cancer registries in countries where they are currently insufficient.
References and suggested readings


25. Wagner G. *Cancer Registration: Historical Aspects In: Parkin DM, Wagner G, Muir CS (eds.) Role of the Registry in cancer control.* Lyon,

4. Tobacco or Health

Smoking as a health hazard

Active Smoking

Current worldwide estimates show that 2.7 million deaths are caused annually by tobacco use, of which 0.5 million occur in the Asia Pacific area. In 1990 the number of premature deaths due to smoking was estimated for males to amount to 24% of all deaths in all developed countries combined, and 7% for females, with the proportion for females increasing. The estimated average number of years of life lost by those who died from tobacco-related diseases was about 16. About half of all regular smokers in developed countries eventually die due to the habit. Teenagers or young adults who become regular cigarette smokers are reducing their life expectancy by about 8 years.

Table 4.1 shows that cigarette consumption has been decreasing in more developed countries, but increasing by 2.5% per year in less developed countries. Among the six regions of WHO, the Western Pacific Region has the second highest consumption among adults. By the early 1990s, prevalence of smoking among adult males would have been higher in less developed countries, and highest in the Western Pacific Region (Table 4.2). Table 4.3 shows the proportions of male and female smokers in the Region, and in the four most populated countries (China, Japan, Republic of Korea, the Philippines). More than half of male adults are smokers.
Table 4.1. Global and regional estimates and trends in consumption of cigarettes.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO Regions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African Region *</td>
<td>460</td>
<td>570</td>
<td>590</td>
<td>2.1</td>
<td>0.3</td>
<td>1.2</td>
</tr>
<tr>
<td>American Region</td>
<td>2580</td>
<td>2510</td>
<td>1900</td>
<td>-0.3</td>
<td>-2.8</td>
<td>-1.5</td>
</tr>
<tr>
<td>Eastern Mediterranean Region</td>
<td>700</td>
<td>940</td>
<td>930</td>
<td>2.9</td>
<td>-0.1</td>
<td>1.4</td>
</tr>
<tr>
<td>European Region</td>
<td>2360</td>
<td>2500</td>
<td>2340</td>
<td>0.6</td>
<td>-0.7</td>
<td>0.0</td>
</tr>
<tr>
<td>South-East Asia Region</td>
<td>850</td>
<td>1140</td>
<td>1230</td>
<td>2.9</td>
<td>0.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Western Pacific Region</td>
<td>1100</td>
<td>1610</td>
<td>2010</td>
<td>3.8</td>
<td>2.2</td>
<td>3.0</td>
</tr>
<tr>
<td>More developed countries</td>
<td>2860</td>
<td>2980</td>
<td>2590</td>
<td>0.4</td>
<td>-1.4</td>
<td>-0.5</td>
</tr>
<tr>
<td>Less developed countries</td>
<td>860</td>
<td>1220</td>
<td>1410</td>
<td>3.5</td>
<td>1.4</td>
<td>2.5</td>
</tr>
<tr>
<td>World</td>
<td>1410</td>
<td>1650</td>
<td>1660</td>
<td>1.6</td>
<td>0.1</td>
<td>0.8</td>
</tr>
</tbody>
</table>

*Smoking prevalence estimates for the African Region are based on very limited information and should be used with caution. (Source: Reference 34)

Table 4.2. Estimated smoking prevalence, men and women, 15 years of age and over, by region, early 1990s

<table>
<thead>
<tr>
<th>WHO Regions</th>
<th>Men (%)</th>
<th>Women (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>African Region*</td>
<td>29</td>
<td>4</td>
</tr>
<tr>
<td>American Region</td>
<td>35</td>
<td>22</td>
</tr>
<tr>
<td>Eastern Mediterranean Region</td>
<td>35</td>
<td>4</td>
</tr>
<tr>
<td>European Region</td>
<td>46</td>
<td>26</td>
</tr>
<tr>
<td>South-East Asia Region</td>
<td>44</td>
<td>4</td>
</tr>
<tr>
<td>Western Pacific Region</td>
<td>60</td>
<td>8</td>
</tr>
<tr>
<td>More developed countries</td>
<td>42</td>
<td>24</td>
</tr>
<tr>
<td>Less developed countries</td>
<td>48</td>
<td>7</td>
</tr>
<tr>
<td>World</td>
<td>47</td>
<td>12</td>
</tr>
</tbody>
</table>
Smoking prevalence estimates for the African Region are based on very limited information and should be used with caution. (Source: Reference 34)
### Table 4.3. Prevalence (%) of daily smokers (15 years and above) of manufactured cigarettes as at April 1997.

<table>
<thead>
<tr>
<th>Country/Area</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>Date of Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Samoa</td>
<td>41</td>
<td>16</td>
<td>16</td>
<td>1994</td>
</tr>
<tr>
<td>Australia</td>
<td>35</td>
<td>37</td>
<td>33</td>
<td>1993</td>
</tr>
<tr>
<td>Brunei</td>
<td>22</td>
<td>40</td>
<td>14</td>
<td>1992</td>
</tr>
<tr>
<td>Cambodia, Urban</td>
<td>65</td>
<td>15</td>
<td>15</td>
<td>1994</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>86</td>
<td>1994</td>
</tr>
<tr>
<td>China</td>
<td>56</td>
<td>5</td>
<td>5</td>
<td>1991</td>
</tr>
<tr>
<td>Cook Islands</td>
<td>44</td>
<td>26</td>
<td>26</td>
<td>1991</td>
</tr>
<tr>
<td>Fiji</td>
<td>42</td>
<td>19</td>
<td>19</td>
<td>1994</td>
</tr>
<tr>
<td>French Polynesia</td>
<td>41</td>
<td>27</td>
<td>27</td>
<td>1986</td>
</tr>
<tr>
<td>Guam</td>
<td>40</td>
<td></td>
<td>40</td>
<td>1989</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>15</td>
<td>27</td>
<td>3</td>
<td>1996</td>
</tr>
<tr>
<td>Japan</td>
<td>36</td>
<td>59</td>
<td>15</td>
<td>1994</td>
</tr>
<tr>
<td>Kiribati</td>
<td>85</td>
<td>7-70</td>
<td>19</td>
<td>1981</td>
</tr>
<tr>
<td>Laos</td>
<td>41</td>
<td>15</td>
<td>15</td>
<td>1995</td>
</tr>
<tr>
<td>Macao</td>
<td>33</td>
<td>6</td>
<td>6</td>
<td>1991</td>
</tr>
<tr>
<td>Malaysia</td>
<td>23</td>
<td>41</td>
<td>5</td>
<td>1990</td>
</tr>
<tr>
<td>Mongolia</td>
<td>16</td>
<td>39</td>
<td>7</td>
<td>1991</td>
</tr>
<tr>
<td>Nauru</td>
<td>53</td>
<td>59</td>
<td>59</td>
<td>1975</td>
</tr>
<tr>
<td>New Caledonia</td>
<td>28</td>
<td>34</td>
<td>34</td>
<td>1992</td>
</tr>
<tr>
<td>New Zealand</td>
<td>24</td>
<td>25</td>
<td>23</td>
<td>1996</td>
</tr>
<tr>
<td>Niue</td>
<td>58</td>
<td>17</td>
<td>17</td>
<td>1980</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>37</td>
<td>46</td>
<td>28</td>
<td>1990</td>
</tr>
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<td>Philippines</td>
<td>41</td>
<td>64</td>
<td>18</td>
<td>1988</td>
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<td>Republic of Korea</td>
<td>37</td>
<td>68</td>
<td>7</td>
<td>1990</td>
</tr>
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<td>Samoa</td>
<td>34</td>
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<td>Singapore</td>
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<td>3</td>
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<td>Solomon Islands</td>
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<td>33</td>
<td>1989</td>
</tr>
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<td>Tokelau</td>
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<td>68</td>
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<td>1991</td>
</tr>
<tr>
<td>Tonga</td>
<td>34</td>
<td>65</td>
<td>14</td>
<td>1991</td>
</tr>
<tr>
<td>Tuvalu</td>
<td>51</td>
<td>31</td>
<td>31</td>
<td>1976</td>
</tr>
<tr>
<td>Vanuatu</td>
<td>30</td>
<td>50</td>
<td>10</td>
<td>1990</td>
</tr>
<tr>
<td>Viet Nam (2 cities and 2 rural)</td>
<td>73</td>
<td>4</td>
<td>4</td>
<td>1995</td>
</tr>
</tbody>
</table>

Source: Tobacco or Health in the Western Pacific Region, 1997, WHO, Manila.

During the WHO Western Pacific Regional Meeting on Tobacco or Health held in Tokyo, Japan, in November 1987, it was emphasized that heart disease, circulatory disorders and cancer are the most common causes of death in Asia, with a substantial proportion of these diseases
being caused or aggravated by tobacco use. If current smoking patterns persist, by the time the young smokers of today reach middle or old age, there will be ten million deaths a year from tobacco use, one death every three seconds. There will be three million deaths a year from tobacco in the 1990s, and an estimated 10 million deaths a year by the 2020s. About 1/2 billion of the world's population today will eventually die of diseases caused by tobacco use. About 1/4 billion of those will still be between 35 and 69 years of age, a loss of approximately 20 years of life.

Tobacco smoking is a major cause of lung, oropharyngeal, hypopharyngeal, laryngeal and oesophageal cancers. Tobacco smoking also substantially increases the cancer risk at many other sites.

There are many other adverse effects on health:

- Tobacco smoking reduces life expectancy

<table>
<thead>
<tr>
<th>Number of cigarettes/day</th>
<th>Number of years lost</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 10</td>
<td>4.6 years</td>
</tr>
<tr>
<td>10-20</td>
<td>5.5</td>
</tr>
<tr>
<td>20-40</td>
<td>6.2</td>
</tr>
<tr>
<td>&gt;40</td>
<td>8.3</td>
</tr>
</tbody>
</table>

- Smokers experience levels of atherosclerotic disease similar to non-smokers 10 to 15 years older.

- Chronic obstructive pulmonary disease, including emphysema, is caused by smoking.

- Tobacco smoking increases the risk of chronic respiratory disease, particularly among children.

- Tobacco smoking before and during pregnancy may cause birth defects.

- Tobacco smokers are more likely to develop cancer and reach the “cancer age” at least 15 years earlier than non-smokers.

- Tobacco smokers are more susceptible to ulcers, and smoking impedes healing.

- Tobacco smoking is associated with a reduced age of onset at menopause.
Tobacco or Health

- Tobacco smokers are generally less physically fit compared with non-smokers, become exhausted more readily during physical exertion and derive less benefit from training.

- Tobacco smoking depresses the immune system, increases vulnerability to damage from toxins and high energy radiation, and lowers resistance to infection.

- Smoking increases the mortality rates for many diseases that characteristically occur in old age.

- Tobacco smoking is associated with an increased risk of developing autoantibodies and various of serological abnormalities.

- Smoking causes premature facial wrinkling, and weathered and aged appearance.

Passive smoking
(Involuntary smoking)

The short-term effects of exposure to tobacco smoke in an enclosed place are eye irritation, allergic exacerbations of the upper and lower airways, and annoyance due to the offensive smell. Living or working with a smoker is even more dangerous. Pooling all studies to give the largest sample sizes, the relative risks of cancer and heart disease for persons exposed to sidestream smoke are about 1.3 for lung cancer, 1.3 for coronary heart disease, and 1.16 for cancer other than of the lung (applies only to women).

Some important findings on the effects of environmental tobacco smoke (ETS, secondhand smoke, sidestream smoke) are:

- ETS has been classified as a Group A carcinogen or cause of cancer in humans by the US Environmental Protection Agency (EPA).

- Healthy adults, exposed to passive smoke over a period of time, have been shown to have reduced lung function with similar changes to those seen in light smokers.

- In healthy adults, the short term effects include bad breath and body odour, annoyance, irritation of the eyes, nose and throat, headache and cough. Irritation of the eyes is the side effect most commonly reported.
• People working in restaurants, bars and other places with increased exposure to passive smoke are likely to have an increase in occupational risk of lung cancer of at least 50%.

The summary and major conclusions of the US EPA are:

In adults:

• ETS is a human lung carcinogen.

In children:

• ETS exposure is causally associated with an increased prevalence of fluid in the middle ear, symptoms of upper respiratory tract irritation, and a small but significant reduction in lung function.

• ETS exposure is causally associated with additional episodes and increased severity of symptoms in children with asthma.

• ETS exposure is a risk factor for new cases of asthma in children who have not previously displayed symptoms.

• There are small but significant effects on overall growth, and lung growth may be permanently limited. Lung function development in children is retarded.

Adverse effects on the environment

The major ecological impact of tobacco production is wood consumption:

• Annually, one hectare of tobacco yielding an average of 1250 kg requires 80 tons of wood for flue-curing.

• Average yields of flue-cured tobacco range from about 750 to 2,750 kg per hectare, sufficient to produce between 940,000 and 3.44 million cigarettes.

• Estimates of the amount of wood required to cure one kg of tobacco range from about 5 kg to 230 kg.
• Cutting trees on one hectare of land for flue-curing tobacco for one year may require as much or more than the total amount of wood on a hectare of virgin forest which may have taken hundreds of years to grow.

Other effects on ecology are:

• Deforestation, soil erosion and depletion of soil nutrients. Wood resources for housing, cooking, household heating become limited, pushing up cost and adversely affecting the local economy.

• Due to the regular and increased demand, fertilizers and biocides find their way into the water supply.

• Effect on climate, reinforces drought.

• Where tobacco is being grown, other food crops are not.

Negative economic effects are:

• Tobacco cultivation displaces the growing of foodstuffs, which then have to be imported.

• Use of expensive chemical fertilizers results in harmful crop contamination and an imbalance in the composition of the soil.

Obstacles to tobacco control

Tobacco control is one of the most important public health issues currently confronting governments worldwide. Tobacco control measures are also very difficult to implement, and health workers should understand the many social, cultural, economic and professional constraints that contribute to this difficulty.
Cultural factors

- Tobacco use is a long-established habit.
- Tobacco is used as a social gesture and to alleviate boredom.
- Young people often perceive smoking as an "adult" and socially desirable behaviour.

The health profession

- Many doctors focus on the cure of disease rather than the prevention of illness.
- There is a reluctance among many health professionals to become involved with political issues.
- Medical societies are much poorer than the tobacco industry.
- Health educators often use depressing, boring and ineffective messages. In contrast, the tobacco industry uses powerful and attractive pro-smoking images.

Governments and politicians

- Governments are often concerned about losing tax revenue from the sale of tobacco products. (However, the costs of smoking may be greater in terms of medical and health care, sick leave and smoking-related fires.)
- Governments may wish to preserve the freedom of smokers to continue their habit. (However, non-smokers should also have the freedom to breathe clean air, and governments have a responsibility to protect and promote the health of their populations.)
- Governments fear that a reduction in smoking will lead to unemployment among farmers, manufacturers, retailers and advertisers. (However, a slow decrease in demand will not have an immediate impact on tobacco-related employment.)
• Governments often believe that smoking only kills old people. (However, middle-aged, and even younger people, are also affected by smoking-related illnesses and deaths.)

• International tobacco companies put political pressure on many governments.

The Tobacco Industry

• The international tobacco industry is the largest, most determined and strongest opposition to tobacco control. The industry is organized globally and is backed by substantial resources.

• The industry often denies and challenges all health evidence that smoking is harmful to health and is responsible for a high number of deaths.

• There is misquoting and quoting out of context of scientific evidence about the dangers of active and passive smoking.

• The tobacco industry may persuade governments to adopt anti-smoking policies and measures which are less effective because they are less controversial.

• The industry calls for more research on the effects of smoking on health to delay the formulation of anti-tobacco policies.

• The tobacco industry has the financial resources to use the full power of legal system to fight health measures which may be seen as affecting personal freedom.

• The industry uses sophisticated and expensive promotion techniques, direct and indirect advertising, "brand stretching" and encourages smoking in films. All these techniques portray smoking as adult and sophisticated and are very attractive to young adults and children.
Tobacco control measures

The World Health Organization, the International Union Against Cancer, and many other expert organizations which have examined the relationship between tobacco and ill-health, have made numerous recommendations about how tobacco should be controlled in order to reduce disability and premature death from tobacco-related disease.

Specifically, legislation should:

• ban all advertising and promotion of tobacco products, trademarks, brand names, logos;

• create and expand smoke-free environments in enclosed public places, including health premises, restaurants, cinemas, theatres, public transport and indoor places of work, and especially all areas frequented by young people;

• ban the importation, manufacture and sale of smokeless tobacco;

• prohibit sale of tobacco products to minors;

• prohibit cigarette-vending machines in public areas;

• reduce the level of harmful substances in tobacco products;

• ensure that all tobacco products and packages (and any advertisements) are labelled with strong, factual and varied warnings:
  • in large, visible lettering;
  • covering at least 50% of the front and back surface areas, or 50% of the total area of an advertisement;
  • in black and white;
  • in the principal languages; and
  • in pictures, particularly in countries with low literacy rates.
From 1970 to 1996, the World Health Assembly adopted fifteen resolutions, all without dissent, in favour of tobacco-control measures. Several of the resolutions called for comprehensive tobacco-control programmes and policies. In particular, resolution WHA39.14, adopted in 1986 urges Members States to consider a comprehensive national tobacco-control strategy containing the following nine elements:

- measures to ensure that non-smokers receive effective protection, to which they are entitled, from involuntary exposure to tobacco smoke, in enclosed public places, restaurants, transport, and places of work and entertainment;

- measures to promote abstention from the use of tobacco to protect children and young people from becoming addicted;

- measures to ensure that a good example is set in all health-related premises and by all health personnel;

- measures leading to the progressive elimination of those socioeconomic, behavioural, and other incentives which maintain and promote the use of tobacco;

- prominent health warnings, which might include the statement that tobacco is addictive, on cigarette packets and on containers of all types of tobacco products;

- the establishment of programmes on education and public information on tobacco and health issues, including smoking cessation programmes, with active involvement of health professionals and the media;

- monitoring of trends in smoking and other forms of tobacco use, tobacco-related diseases, and effectiveness of national smoking-control action;

- the promotion of viable economic alternatives to tobacco production, trade and taxation; and

- the establishment of a national focal point to stimulate, support and coordinate all the above activities.
In 1990, the World Health Assembly passed resolution WHA43.16, which urged all Member States to give special attention to:

- implementing multisectoral comprehensive tobacco strategies which, at a minimum, contain the nine elements outlined in Resolution WHA39.14;

- considering including in their tobacco control strategies, plans for legislation or other effective measures at the appropriate government level providing for:
  
  - effective protection from involuntary exposure to tobacco smoke in indoor workplaces, restaurants and other enclosed public places and public transport, with special attention to risk groups such as pregnant women and children;
  
  - progressive financial measures aimed at discouraging the use of tobacco; and
  
  - progressive restriction and concerted actions to eventually eliminate all direct and indirect advertising, promotion and sponsorship concerning tobacco.

### Public information and health education

#### Public information

The most important characteristic of the public information programme is the fact that it makes use of radio, television, newspapers, magazines and other news media, to convey information to very large numbers of people. The success of such a programme therefore depends on a good understanding of the way the press and broadcasting organizations operate. It is helpful to maintain good relationships with journalists, to be readily available to supply information and comments and to have suitable experts available to assist journalists whenever necessary.
The objectives of a public information campaign include the following:

- to increase public awareness of the health consequences of tobacco use;
- to influence young people not to start smoking;
- to create an atmosphere in which it is realized that using tobacco is unhealthy behaviour;
- to establish the rights of non-smokers to breathe smoke-free air;
- to publicize specific policy objectives in order to mobilize sympathetic public support for them — e.g. with regard to tobacco taxation;
- to analyse and criticize aspects of tobacco industry activity;
- to counter inaccurate and misleading information from the tobacco industry with true facts and figures about tobacco use; and
- to discuss, emphasize and reinforce the importance of anti-tobacco programmes.

Various elements of public information work are of particular interest to press and broadcasting media. For example:

- the medical and scientific case against tobacco;
- changes in trends in tobacco consumption;
- tobacco use among exemplar groups, such as doctors, teachers and athletes;
- ways of giving up tobacco use;
- government action against tobacco;
- what schools are doing about tobacco;
- the rights of non-smokers;
• the special problems of women and tobacco; and

• special non-smoking days or weeks, such as the WHO's World No-Tobacco Day.

Health Education

Among the main objectives of health education campaigns are:

• to maintain the behaviour of those who do not use tobacco and to change the behaviour of those who do;

• to change the cultural background of society against which tobacco use may be viewed as a normal activity, and to establish the realistic view that tobacco is dangerous to health; and

• to establish not using tobacco as normal and desirable behaviour; and

• to ensure the right of the non-smoker to smoke-free air.

The design of a tobacco education programme may be considered as a series of steps:

1) analysing the problems to be tackled;

2) identifying target groups;

3) designing materials suitable for each group;

4) pre-testing the material on small groups and correcting any faults;

5) coordinating all the groups, such as teachers, who will deliver the programme, and ensuring that suitable materials are available to them;

6) delivering the programme to the target group, e.g. the teachers actually conducting sessions with the pupils; and

7) evaluating the effectiveness of the programme.
Programmes aimed at children and adolescents should be of two types:

- a national programme involving all segments of society with the aim of ensuring that children grow up in a tobacco-free environment; and

- specific school or community programmes to reach special target groups and to attack specific problems.

**Recommended policy on smoking cessation**

The overall aim of the following policy is to reduce smoking in a community and thereby save lives and reduce unnecessary suffering.

**Specific Objectives**

- to promote awareness in the community of the effects of smoking on health; in particular, to ensure that health professionals, teachers, and other community leaders are sufficiently well-informed to give their support to action;

- to help smokers who wish to give up;

- to restrict smoking in health-care premises and in the workplace, and to encourage medical staff to recognize their role in setting an example to the community in this matter;

- to press for appropriate national policies aimed at the reduction of smoking; and

- to promote local research and development projects on smoking.
Expected Results and Evaluation

Progress in implementing the policy will be reviewed and studies undertaken to assess its effect and monitor its costs.

It is expected that the programme will achieve the following objectives:

• increase the number of people who give up smoking;

• reduce smoking by health-care staff and in hospital premises;

• reduce smoking in all places of work and in public places in the community;

• reduce premature death and disability from lung cancer, chronic bronchitis, coronary heart disease and other smoking-related conditions;

• reduce perinatal mortality and the proportion of low-birth-weight babies resulting from mothers smoking during pregnancy;

• reduce absence from work from sickness associated with smoking;

• reduce considerably the risk of fires caused by smoking materials in hospital, homes, industrial, domestic and other premises;

• increase disposable income to those families who give up smoking; and

• reduce the burden that smokers put on the national health-care system.
The first Western Pacific Regional Working Group on Tobacco or Health was convened in Tokyo, Japan, in November 1987. The second regional Working Group met in Perth, Australia, in March 1990. The Group produced an Action Plan for Tobacco or Health, which was endorsed by the Regional Committee in September 1990 (WPR/RC41.R13). The Action Plan contained practical and realistic objectives and goals to be achieved within specific time periods.

The Third Regional Working Group was convened in Manila, Philippines, in April 1994, to assess progress on the 1990-1994 Action Plan, and to devise a further Action Plan on Tobacco or Health for 1995-1999. The objectives of the Action Plan for 1995-1999, together with targets and recommended activities, are given below. It should be remembered that this Action Plan was devised in 1994 and that some of the statements, therefore, may not reflect the present situation in the Region.

Objectives

The main objectives of the 1995-1999 Action Plan are:

• to develop, implement and strengthen comprehensive national policies and programmes on tobacco control;

• to collect data on tobacco use;

• to support health advocacy, education and information;

• to support the implementation of appropriate legislation; and
Objective 1. To develop, implement and strengthen comprehensive national policies and programmes on tobacco control

Rationale

Leadership and commitment by the national government is essential. National action is required, including coordinated cooperation between many parties, such as all government departments, nongovernmental organizations and citizens’ groups.

Experience has clearly shown that the countries most successful in decreasing tobacco consumption have had government commitment supported by the health profession and the general public. Tobacco control measures should be seen as prudent public health policy designed to help both smokers and non-smokers, not as being extreme or punitive.
Present status in the Region

Nine countries and areas in the Region have established comprehensive national tobacco control policies. Four of these countries and areas adopted the policies during the period of the 1990-1994 Action Plan on Tobacco or Health. As at July 1994, a total of 21 countries and areas had established a focal point for communication with the Regional Office to ensure coordination.

Recommended activities for priority target audiences

Governments

- Tobacco control should become a prominent focus in health promotion policy development. The link between tobacco and the environment should be emphasized in activities such as the follow-up to Agenda 21.

- A national coordinating agency on tobacco or health should be established. If this already exists, its activities should be strengthened.

- Each government should give a copy of its national policy on tobacco to the Regional Office. The focal point in the government for communication with the Regional Office should report activities and achievements on tobacco or health annually, so that the regional database on tobacco or health is kept fully up to date.

Nongovernmental organizations

- Community groups involving health, education, youth and women, religious groups and others should support the activities of the national policy on tobacco or health, if there is one. If not, such nongovernmental organizations should support the creation of a national policy.

Health organizations

- Health organizations, such as national medical councils, that have not previously articulated a policy on smoking should do so within the period of this Action Plan.
Objective 2. To collect data on tobacco use

Rationale

National prevalence and other data should be collected to provide the evidence and justification for action, as a basis for national policy and for regional coordination.

Action on tobacco control should start immediately, without repeating costly research on the harmfulness of smoking, as adequate scientific data already exist. However, there is still a need for research data for example on tobacco-related morbidity and mortality, on changing patterns of smoking among women, and the impact of pricing policies on smoking behaviour in youth. The data should be forwarded to WHO for inclusion in the tobacco-or-health database and the historical-record file established at the Regional Office. This information has to be updated annually. The collected data will also be made available to WHO headquarters for the global tobacco-or-health data bank. Feedback will be regularly provided to countries and areas.

Present status in the Region

National data have been collected in Australia, China, French Polynesia, Hong Kong, Japan, Macao, New Caledonia, New Zealand, the Philippines, the Republic of Korea, Samoa, Singapore, Tokelau, Tonga and Viet Nam.

Limited national data have been collected in Cook Islands, Fiji, Malaysia and Papua New Guinea.

No national data have yet been collected in American Samoa, Brunei Darussalam, Cambodia, Guam, Kiribati, the Lao People’s Democratic Republic, the Northern Mariana Islands, the Marshall Islands, the Federated States of Micronesia, Nauru, Niue, Palau, Solomon Islands, Tuvalu, Vanuatu and Wallis and Futuna.
Tobacco or Health

**Recommended activities for priority target audiences**

**Governments**

- All countries and areas should conduct a prevalence or consumption survey. As a minimum, prevalence surveys should be completed every three years. Countries and areas should use standardized survey questionnaires, available from the WHO Regional Office for the Western Pacific.

- Estimates of tax and price increases and the effect of these on tobacco consumption should be undertaken during the period of the Action Plan.

- Public opinion surveys should be conducted to gauge response to suggested tobacco control measures.

- Data on economic determinants of tobacco consumption, import and export of tobacco, tobacco tax and its proportion of total tax and, where applicable, information on agricultural use of land to grow tobacco should be collected.

- Questions on tobacco or health should be included in larger surveys, such as lifestyle studies or labour force surveys.

- Data to monitor the implementation of the Action Plan should be provided every year through a questionnaire designed by WHO.

**Scientific communities**

- Universities, research institutes, hospitals, WHO collaborating centres on tobacco use, substance abuse and health promotion and others should collect and provide data related to tobacco or health and forward them to WHO.

- Medical schools are requested to collect data on the use of tobacco among students and staff. This could form a basis for activities aimed at reducing smoking among these targets groups, who are, or will become, important role models during their professional life. Studies have demonstrated the high prevalence of smoking among medical students (44).
Nongovernmental organizations

- Media and public relations organizations, consumer groups, and employers’ and employees’ organizations should be supportive of data collection, to identify the most effective information strategies.

Objective 3. To support health advocacy, education and information

Rationale

Non-smoking is promoted through healthy lifestyle campaigns and addressed in programmes to prevent substance abuse.

Health education and information is an integral part of a comprehensive tobacco-control programme. This involves giving information to the decision-makers, leaders, the media, the medical profession and the population at large. It also plays a role in enlisting support for legislative and other measures on tobacco control.

Present status in the Region

Twenty-nine countries and areas celebrated World No-Tobacco Day on 31 May 1993.

Additional health education programmes are presently carried out in 23 countries and areas, and stop-smoking activities or courses are offered in six countries and areas.

Countries and areas that have undertaken major health education activities in addition to World No-Tobacco Day include Australia, Brunei Darussalam, China, Cook Islands, Fiji, French Polynesia, Guam, Hong Kong, Japan, Kiribati, Macao, Malaysia, New Caledonia, New Zealand, Papua New Guinea, the Philippines, the Republic of Korea, Samoa, Singapore, Solomon Islands, Tokelau, Vanuatu, and Viet Nam.
**Recommended activities for priority target audiences**

**Governments**

- Governments should provide resources for education programmes and ensure equal access to information and education for all groups in the society.

- Information on tobacco or health should be sent to the Regional Editor of Globalink for inclusion in the monthly Asia-Pacific News Bulletin.

**Nongovernmental organizations**

- Nongovernmental organizations can mobilize broad sectors of society. Through their initiatives they should complement and support the actions taken by different government sectors. They should ensure the participation of the public in programme design and implementation and build networks to offer services at the grass-roots level, for example, smoking cessation courses.

- A clearing house on tobacco or health should be established within the Region.

**Mass Media**

- Mass media programmes should become a natural part of governments’ efforts to communicate health-supportive information. They are particularly relevant in this Region because of the need to communicate very widely and cost-effectively to counter the promotion of tobacco use through advertising. Journalists should make more extensive use of the existing information sources.

- The celebration of World No-Tobacco Day and its wide publicity can be used to promote health by providing a positive image of non-smoking. It can help produce a social environment that favours non-smoking and lifestyles without tobacco.

**Schools**

- A "train the trainers" section on tobacco-or-health issues should be incorporated into teacher training (for instance, health information, the effects of advertising upon children, the need for healthy lifestyles, dangers of peer pressure).
• Information on tobacco or health should be part of school health education curricula. Programmes should be positive and can be fun. Children need to be aware that tobacco use is an addiction and not a freedom; to understand commercial pressures to smoke; that most adults do not smoke; and how to develop skills to deal with peer pressure. Sporting images and personalities can also be used to promote non-smoking. These approaches should complement the factual approach focusing on illness and death.

Workplaces

• Workplace health promotion programmes should include information on tobacco or health and offer access to smoking-cessation programmes. The introduction of smoke-free workplaces should be accompanied by relevant information on passive smoking.

Decision-makers and leaders

• Decision-makers, for example, politicians, health personnel, other key professionals and religious, youth and other community leaders, should become advocates in the campaign against smoking.

Health professionals

• Information on smoking should be incorporated into the medical and other health professionals’ curricula. This would include not only information on the harmfulness of smoking, but also information on preventive measures, such as legislation and pricing policies, and on countering the tactics of the tobacco companies. Doctors should be encouraged to become advocates of health and be positive role models.

• A study on medical students in three countries in the Region cites a “gross underestimation of tobacco’s causal role in a number of important diseases...”. Only 44% of final year students (26% of smokers) thought increased taxation an important preventive measure (45).
Objective 4. To support implementation of appropriate legislation

Rationale

Comprehensive and coordinated legislative and administrative measures are a critical part of an anti-tobacco programme.

Present status in the Region

Eleven countries and areas currently have legislation which includes some elements of the following three crucial areas: health warnings; smoke-free areas in public places; and a tobacco-advertising ban. These countries and areas are Australia, China, Cook Islands, French Polynesia, Hong Kong, Macao, Malaysia, New Zealand, Papua New Guinea, the Republic of Korea and Singapore.

Actions are under way for legislation in Fiji, the Philippines and Samoa.

Recommended activities for priority target audiences

Governments

• All governments should implement health-oriented tobacco-control policies and legislation.

• All governments should implement a ban on direct and indirect tobacco advertising and other promotion.

• All government buildings should be smoke-free.

• All governments should endorse the International Civil Aviation Organization resolution on no-smoking on international flights. Smoking on all flights should be banned by 1996.

Nongovernmental organizations

• The introduction and expansion of tobacco-control legislation should be supported and encouraged by a wide range of nongovernmental organizations. Voluntary agreements with the tobacco industry
should be avoided, as in practice they are less effective than legislation and are frequently circumvented.

- International and national sporting organizations and arts and cultural organizations should reject tobacco sponsorship. Committees for the Olympic Games, Asian Games and other major sporting events should make their games smoke-free, including a complete ban on advertising and promotion of all tobacco products.

**Schools**

- Schools (and other educational institutions) should be smoke-free.

**Workplaces**

- No worker should be involuntarily exposed to environmental smoke from tobacco.
- Employers' and employees' organizations should work together to agree on increasing smoke-free areas and aim at having smoke-free workplaces.
- Legislation to support these measures should be introduced in each country.

**International communities**

- Consideration should be given to strengthening international agreements on tobacco control. For example, existing World Health Assembly resolutions should be consolidated into an international convention, similar to International Labour Organisation conventions.

**Objective 5. To achieve pricing policies in the Region that deter tobacco use**

**Rationale**

An increase in the tax on cigarettes results in a reduction in smoking, especially among youth and the poor. It also leads to an increase in government revenue. Such policy benefits the public health interest and government income.
**Recommended activities for priority target audiences**

**Governments**

- Governments should adopt a policy of regularly increasing tobacco tax at least 3% above increases in the cost of living.

- The health benefits of tax increases should be explained, so that these are not seen as anti-smoker or simply to raise revenue.

- A percentage of tobacco tax should be used to fund health promotion activities (including those designed to reduce tobacco use), and sponsorship of sports, arts and other events, as an alternative source of sponsorship.

**The role of the WHO Regional Office**

The Regional Office will play a supportive and coordinating role in these recommended activities, providing technical support as required and resources as feasible.

Practical support will be provided to the Region through the Tobacco or Health Programme, for example, through the recruitment of short-term consultants. The feasibility of establishing a regional clearing house on tobacco or health will be explored. Information will be provided through the computerized database and the country-specific historical record established in 1993-1994 at the Regional Office. Liaison and coordination will be an important aspect of support, particularly with the Tobacco or Health Programme at WHO Headquarters and with nongovernmental organizations such as the International Union against Cancer, International Union against Tuberculosis and Lung Disease, the International Organization of Consumers Unions, etc. WHO will establish expert teams made up of members of several government and nongovernmental agencies as required to provide on-site support to strengthen tobacco-control activities in the Region. Linkages with other health programmes, such as health promotion and noncommunicable diseases control, will also be encouraged and supported.

The Regional Office will organize and support meetings and research on tobacco or health in the Region, monitor and evaluate the implementation of the Action Plan, and organize the fourth Working Group meeting.
Supplementary regional meetings on tobacco or health should be held at the APACT meeting in 1995, and in Beijing at the time of the 1997 World Conference or alternative occasions.

**Timetable for the action plan on tobacco or health for 1995-1999**

**Annually**

The Regional Office will update the tobacco-or-health database and the country-specific historical record and will publish a regular update of information.

All countries and areas will submit details of surveys, pricing policy, legislation and other tobacco control information to the Regional Office.

All countries and areas will observe World No-Tobacco Day or their national equivalent and use it for broad-based action around the theme of the World No-Tobacco Days. These are: 1995 - The economics of tobacco; 1996 - Sports and the arts without tobacco; and 1997 - The United Nations and specialized agencies against tobacco. Details of such activities will be submitted to the Regional Office. In addition, all countries and areas will have accomplished one other major health educational activity.

**1995**

The 1995-1996 Action Plan will have been received by all countries and areas and will be widely distributed to the priority target audiences.

The priority recommendation of "A Tobacco-Advertising-Free Western Pacific" will have been communicated throughout the Region.

Countries and areas without comprehensive national tobacco control will be requested to adopt and implement such policy.

All medical societies will be requested to endorse a statement to the effect that smoking is harmful to health.

All health facilities will be smoke-free.
All countries and areas will endorse the International Civil Aviation Organization resolution on no-smoking on international flights. Smoking on all flights will be banned by 1996.

All medical and other health professional schools will have appointed a focal committee on incorporating teaching on tobacco into their 1996 curricula.

A clearing house on tobacco or health will be established.

1996

Most countries and areas will develop draft legislation.

All countries and areas with national airlines will ban smoking on all flights.

Each country and area with medical and other health professional schools will incorporate teaching on tobacco into the curriculum.

1997

All countries and areas will report progress on comprehensive tobacco control legislation, especially on promotional bans and the establishment of major smoke-free areas.

Policies on smoke-free workplaces will be incorporated into industrial and other workplace legislation.

A regional meeting to monitor progress in the implementation of the Action Plan will be held.

1998

Comprehensive legislation on tobacco or health will have been adopted.

A national prevalence study on tobacco use will be carried out in countries and areas which have not yet collected such data.

Data required for calculating tobacco-attributable mortality and morbidity (in collaboration with WHO collaborating centres and international institutes) will be collected.
Economic analysis on tobacco costs will be carried out in most countries and areas.

**1999**

Comprehensive national tobacco-control policies will be implemented in all countries and areas which do not yet have such policies.

Data on economic determinants of tobacco consumption, import and export of tobacco, tobacco tax and its proportion of total tax, and, where applicable, information on agricultural use of land to grow tobacco will be collected in all countries and areas which do not yet have such data available.
References and suggested readings


5. Diet, nutrition, and the prevention of chronic diseases

Introduction

Changes in dietary factors and lifestyle that accompany economic development are now known to influence the increasing incidence of chronic non-infectious diseases like cerebrovascular disease, coronary heart disease, diabetes mellitus, gallstones, dental caries, gastrointestinal disorders, some forms of bone and joint disease and various cancers. With improvements in the ability to produce and store food during the first agricultural revolution 10 000 years ago, food became more available to the human population. The industrial revolution 200 years ago, led the introduction of radical changes in methods of food production, processing, storage and distribution. Since then, a variety of food preparations have offered man better access to more varied forms of sustenance.

Recent technological advances and changes in lifestyle have allowed the exercise of dietary preferences, leading to major changes in the nutritional composition of the diet. The increased and assured supply of food has led to the elimination of many nutrition deficiency diseases in many countries. This general improvement in nutritional status, with its
associated increase in childhood growth rates, has brought an increased resistance to infectious disease. The overall effect has been a substantial increase in life expectancy. As life expectancy has increased, however, so has the incidence of cardiovascular disorders and cancers. This reflects the coexisting effects of the demographic "ageing" of the population, and of newly acquired risks related to the diets and lifestyles that have accompanied economic development.

Most countries and areas in the Western Pacific Region had nutritionally sound traditional diets. They tended to be monotonous, low in fat and meat and high in complex carbohydrates, fruits and green vegetables. There was little free sugar. There have been periodic food shortages and micronutrient deficiencies in some populations. Fat and meat, including fish and poultry, were sparingly used to accompany rice, wheat and other staples such as yams and sweet potato, and were considered to be highly desirable foods. Their consumption has therefore increased with greater affluence. With increasing urbanization, traditional foods, especially vegetables, have become expensive and less available.

The "affluent diet," characterized by an excess of energy-dense food, rich in fat and free sugars, but a deficiency of complex carbohydrate foods, is the prevailing diet in developed industrialized countries. Although the attainment of an adequate food supply and the elimination of specific nutritional deficiencies remain the priorities for many developing countries, the shift towards the “affluent diet” is now occurring everywhere, including some sectors of developing nations. There is scientific evidence to support the view that the emergence of the "affluent diet" is related to the development of a range of chronic non-infectious diseases including cardiovascular disease and various cancers, which are the most common causes of premature death in developed countries and are rapidly increasing in developing countries. While the evidence for cancer is not as strong as that for cardiovascular diseases, it makes good sense to adopt the same dietary guidelines in order to prevent many noncommunicable diseases, including cancer.

*It is estimated that between ten and seventy per cent of cancers are caused by dietary factors.* For example, an excess intake of fat has been linked to an increased incidence of cancer of the colon. This however, is only one aspect of diet which may increase risk.

There is evidence, however, that a reduced consumption of some dietary risk factors, combined with regular consumption of protective foods, can lower the incidence of diet-related chronic diseases. Many premature deaths are therefore potentially preventable, not by preferentially consuming individual foods and food constituents, but through the total healthy diet advocated by WHO guidelines.
Diet, nutrition and the prevention of chronic diseases

There is an almost universal increase in fat and sugar consumption among urban dwellers compared with those living in rural communities in the same country. At the global level, there are social and economic pressures for developing countries to shift to the diets of affluent societies, often perceived as a symbol of improving economic status. The perception that consuming more animal products, fats and sugar is an indicator of improving economic conditions is sustained by the food industry, both local and multinational. There is massive promotion of the consumption of softdrinks, meat products, confectionery, snack foods and other convenience foods rich in fats and free sugars. As the economic elite in developing nations experience higher rates of cardiovascular disease and cancer, there is an increase in the demand for the kind of treatment practised in affluent nations. The ensuing demand for the provision of high-technology, hospital-based medical care distorts both the perception and pattern of health care, escalates costs, and reduces efficiency in the use of meagre resources.

Prevention is both a social responsibility and an economic necessity. The public health approach to disease prevention requires health-oriented nutrition and food policies. Also called "mass intervention," this approach aims to design nutrition policies that will lead to a decrease or prevention of diet-related chronic diseases. This decrease in chronic diseases will eventually curb the social and economic costs of premature deaths in middle age, at the same time improving the quality of life of the older persons.

In order to achieve a population-based dietary change, WHO urges national governments of both developing and developed countries to:

1) be aware of the relationship between the changes in a population's diet that tend to accompany economic development and consequent changes in the health of the population;

2) recognize that it is both possible and desirable to seek an optimum national diet, in association with economic development, that maximizes health benefits and minimizes health hazards;

3) develop nutrition-based policies that are intersectoral. These should involve many government departments, and be supported by the activities of nongovernmental organizations, health workers and the community at large. Such widespread involvement is needed in order to ensure a favourable influence on the production, processing and marketing of foods conducive to health, and to increase public health awareness of the relationship between food and health.
The difficulty of developing intersectoral public policies is well recognized. It must, however, be strongly considered in order to arrest the population shift towards a high intake of saturated fat, sugar and salt, and a decrease in the consumption of vegetables, fruits and whole cereals. This intervention will minimize the future social and economic costs of diet-related chronic diseases.

**Diet and chronic diseases - the scientific evidence**

Evidence linking diet and chronic diseases continues to increase from both epidemiological investigations and laboratory experiments. It is now estimated that **30 to 40 per cent of cancers in men and up to 60 per cent of cancers in women are attributable to diet**.

Drinking alcoholic beverages, for example, has been clearly established, together with smoking, to be causally related to cancer of the mouth, pharynx, oesophagus and upper part of the larynx. Stomach cancer is associated with diets comprising large amounts of smoked and salt-preserved foods and low levels of fresh fruits and vegetables. Several studies have demonstrated positive associations between the risk of colorectal cancer and high dietary fat and low vegetable intake. Analyses across countries show positive correlation between mortality from prostate cancer and per capita intake of total fat. Increased weight or obesity has also been positively associated with the risk of prostate cancer.

Table 5.1 summarizes the strength of association between dietary components and cancer in various sites. A review of the evidence indicates that a high intake of total fat, and in some cases also saturated fat, is associated with an increased risk of cancer of the colon and prostate.

There is strong evidence that breast cancer incidence is low in populations where the diet is high in vegetables and cereals and low in animal fat, but women in these populations often also have late menarche, early menopause, lower body mass index, higher energy expenditures, and higher energy intake, all factors related to nutrition and to lower breast cancer incidence.

**Table 5.1. Associations between selected dietary components and cancer**

(Reference 2).
Repeated and consistent findings of an association between specific dietary factors and a disease suggest that such associations are real and indicative of a cause-and-effect relationship. Taken as a whole, the evidence supports the view that a range of chronic diseases such as cancer and cardiovascular disease can be prevented to a substantial extent by lifestyle changes, among which diet plays an important role. Diets high in plant foods, especially green and yellow vegetables and fruits, are associated with a lower occurrence of cancers of the lung, colon, oesophagus and stomach.

A reduction in risk is likely when fat intake is reduced to less than 30 per cent of dietary energy, especially if this dietary change is combined with a change in other dietary components. A diet that is low in total and saturated fat, high in plant foods, especially green and yellow vegetables and total fruits, and low in alcohol and salt-pickled, smoked and salt-preserved foods is consistent with a low risk of many of the current major cancers, cardiovascular diseases, obesity, diabetes and many other diseases.

Other diseases for which increasing global incidence is associated with an "affluent diet" are obesity, non-insulin-dependent diabetes mellitus, diverticular disease of the colon, haemorrhoids, chronic constipation,
appendicitis, gallstone and dental caries. Consequently, it is important to integrate such current knowledge into a coherent public health policy. The experiences of some countries in the promotion of a healthy diet as assessed by a WHO expert committee offer helpful insights.

In Finland, for example, where the rate of heart disease was highest in the world, local political initiative has led to a major community-based campaign involving schools, the media, public education and numerous lay organizations. Throughout Finland, there has been an increased awareness of nutrition and health promotion, accompanied by a country-wide decline in death rates.

Norway is unusual in having published dietary recommendations for the prevention of cardiovascular disease as early as 1963. With government-initiated action, the fat content of the Norwegian diet fell from over 40 per cent in 1975 to 36 per cent in 1988. Death rates from ischaemic heart disease also fell by 14 per cent in males and 23 per cent in females from 1970 to 1985.

Qualitative guidelines advocating a reduction in fat and sugar intake were issued in 1974 by the British government in response to the new concepts of diet and health. Almost all health districts have now adopted their own local food and health policies.

The United States of America was one of the first countries to engage in a public health campaign to lower intakes of fat and saturated fatty acids. Reduction in smoking, increase in exercise, and emphasis on dietary changes to limit increases in cholesterol were apparent among the educated group in the society before they were observed elsewhere. The USA has seen a reduction of over 40 per cent in the death rate from coronary heart diseases.

Australia and New Zealand also benefited from a substantial decrease in heart diseases between 1970 and 1985 of between 31 per cent and 51 per cent in both men and women. In these countries, where health consciousness was high, the success of health campaigns depended on the effectiveness of health education.

Unfortunately, in most developing countries government policies that impact on food, diet and nutrition are still patterned after the thinking that prevailed in developed societies after the second world war. Such policies were established to promote the home production and sale of food, and very rarely did they have a nutritional basis with the consumers’ welfare in mind, particularly as far as chronic diseases were concerned (Table 5.2).
Table 5.2. Government food policy objectives for 21 developing countries
(Reference 3)

<table>
<thead>
<tr>
<th>Country</th>
<th>Consumer welfare</th>
<th>Producer welfare</th>
<th>Government revenue</th>
<th>Foreign exchange</th>
<th>Self-sufficiency</th>
<th>Stable prices</th>
<th>Food security</th>
<th>Specific nutrition objective</th>
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<tr>
<td>Africa</td>
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x indicates that this type of objective is specified.

Source: Adapted by FAO from reference 3, reproduced by kind permission of the Food and Agriculture Organization
No specific nutrition objectives were identified.
Clearly, the relationship between specific dietary components and a variety of chronic diseases, including cardiovascular disease and cancer, appear to be significant. Changing to a "good" diet lowers the incidence of cardiovascular disease and other chronic diseases. There is a presumption that this will also happen for cancer. The promotion of health consciousness and individual consumer responsibility is, however, greatly affected by government efforts to develop relevant policies, and the support of nongovernmental organizations, health workers and the community at large for such policies.

There are several conclusions that can be derived from examining the experiences of some developed and developing countries in attempting to promote healthy nutrition in a modern context.

1) Government economic policies affecting food production, processing, distribution and sales, if specifically organized to promote food production, are often based on outmoded ideas about what constitutes a healthy diet. As such, they may be an impediment to dietary change and health promotion.

2) Once a public health problem has been identified by a government, or by medical research workers, major changes in dietary behaviour are rarely promoted by the medical profession. Nevertheless, knowledge, understanding and promotion of new concepts in healthy nutrition could provide an important stimulation to community change. The medical profession can play a more active role in promoting good diet.

3) The greater the consumers' sense of responsibility for their own health, the greater the speed of behavioural change, e.g., in diet, smoking and exercise. Populations with access to a free health-care system that is effective and widely available for treating disease may be more inclined to rely on medical advice and less likely to initiate behavioural changes themselves.

4) Despite the apparent confusion in dietary messages in many developed countries, and the advertising of foods high in fat, sugar and salt, a reasonably well educated public seems able to distinguish these contradictory messages from information on prevention given by health promoters and unbiased sections of the media. Nevertheless, the slower rate of change in lifestyle seen among the less affluent and less well educated may reflect the impact of these contradictory promotional efforts. The initiation and maintenance of successful health promotion campaigns often seem to depend on voluntary organizations or on small groups of activists.
5) Preventive measures have not had a high priority with any government. Few health departments yet have the effective working relationships with other departments involved in food production, e.g., agriculture, trade and finance, that will be needed when an integrated nutrition and food policy is introduced.

6) Following health promotion initiatives at the national level, there seems to be a delay of at least five years before appreciable changes are observed in national statistics on health and disease, even though special studies show that definite dietary changes can lead to rapid effects.

7) In developing countries, the need to develop a nutrition and food policy appropriate to the prevention of the chronic diseases observed in affluent societies is a high priority because the current economic planning (including agricultural policies, subsidies, etc.) may adversely affect the health of the community over the next five to ten years.

Key principles for action - the control programme

Health care systems are as varied as government economic policies. The traditions for confronting public health problems related to diet range from an almost exclusive concentration on public education to a perception that the availability, price and nutritional value of foods are a major responsibility of the national government and will have a profound effect on food and nutrient consumption. This last view was held by many governments during the second world war and remains an acceptable principle in many countries.

Factors for a successful nutrition and food policy

Many non-nutritional factors can lead to the success or failure of nutrition and food policies. In addition to being physiologically sound, nutrition and food policies must be politically viable, economically feasible and culturally acceptable.
To achieve this, food and nutrition policies must have the credibility provided by scientific and epidemiological evidence and political and technical support, and be regarded as necessary and convenient by the consumer. Multisectoral government actions need to be coordinated in order to be effective.

Multisectoral and multidisciplinary approach

The development and implementation of food and nutrition policies in a country require the participation of government sectors involved in health, agriculture, economics, education, social welfare, planning and development.

Cultural and social acceptance of the policy by the population is also crucial. In order to ensure that the formulation and implementation of the policy is made in a way that benefits the consumer, community leaders, educators, communicators, marketing specialists, anthropologists and other social scientists should be consulted.

Formulating specific nutrition and food policies

The formulation of suitable nutrition and food policies varies according to the country’s political, social, economic and health situation. It is suggested, on the basis of experience in several countries, that a board or council for nutrition and food policy should be established by the government to allow a fully integrated approach to the prevention of chronic diseases. This will require to draw on many government departments and disciplines to be fully effective.

Initiatives and proposed responsibilities of the Ministry of Health

In order to undertake responsibility for data collection and policy analysis, there must be information on:

- current state of, and trends in, the nutritional status of the population;
- health statistics relating to nutritionally linked diseases; and
• data on the current state and trends in food supply plus, if available, dietary survey data.

Once a public health problem on diet has been identified, knowledge, understanding and the promotion of new concepts in healthy nutrition could provide an important stimulus to community change.

Ideally, nutrition surveillance should include:

• monitoring of a random sample of the population for obesity and risk factors for coronary heart diseases;
• monitoring children’s weight and height;
• monitoring anaemia; and
• monitoring salt intake.

Policy Development: the formulation of food goals

Policy should, ideally, be developed by the nutrition and food board but, in its absence, the Ministry of Health can initiate the process by developing food goals. Food goals are those related to the consumption of specific foods such as vegetables, fruit, meat and dairy products. Food supply and consumption data will establish consumer patterns of eating that are disadvantageous.

The nutrient goals indicate that the health needs of the population are best met by a high-carbohydrate, low-fat diet, rich in starchy foods (e.g., cereals, tubers, and pulses) and including a substantial intake of vegetables and fruit. Only small quantities of essential fats are required.

Implementation of a nutrition and health policy by the Ministry of Health

The WHO expert committee suggests that the Ministry of Health should play a crucial role by:

• developing national action plans;
• encouraging community organization for health education;
• supporting youth involvement in education;
• promoting the use of mass media in the community-based health education programmes;
• defining the role of physicians, other health workers and medical and voluntary organizations; and
• developing demonstration projects.

It is essential to involve the community at every stage in the process of implementing a nutrition policy.

Recommendations to national governments

1) Governments are recommended to establish a National Board for Nutrition and Food Policy involving, in addition to the Ministry of Health, other Government ministries whose policies affect food production, distribution, and consumption.

2) Governments should ensure that experts are available to the Ministry of Health to monitor the nutritional status of the population, as assessed by a national surveillance system.

3) Ministries of Health should initiate or strengthen professional training programmes, at both undergraduate and postgraduate levels, to ensure that the role of diet in the prevention of chronic diseases is understood by the medical profession and other health care workers.

4) Each Ministry of Health should, as part of its health promotion programme, establish regular contact with nongovernmental organizations, consumer representatives and the media to develop jointly a community-based programme. This activity should be in addition to any government-sponsored health promotion campaign.

5) Governments should ensure that adequate nutritional competence exists within the Ministry of Agriculture to allow full participation in a National Board for Nutrition and Food Policy.

6) Governments should consider their investment and subsidy policies in both the agriculture and food industry to ensure that such policies are
geared to promoting the growing of plant foods, including vegetables and fruits, and to limiting the promotion of fat-containing products.

7) As part of a national policy, each government should set its own goals and strategy for reducing the incidence of chronic diseases.

8) Governments are recommended to establish appropriate food standards, to ensure the nutritional quality of foods that are substantial contributors to the national diet.

9) Each government should consider all new legislation bearing on agriculture and food, to ensure that it is compatible with the prevention of chronic diseases.

10) Governments are recommended to establish, where possible, compulsory labelling of food products. Labelling should be clear and consistent and, to be understandable as well as scientifically correct, information should be simply presented and expressed both graphically and numerically.

11) Discussions should be encouraged between the government, the food industry and the consumers to ensure the development of food products that are low in fat, free sugars and salt.

12) Each government should examine its animal production policies and incentives to ensure that they do not promote the production of excessive quantities of saturated fats.

13) Ministries of Education should ensure that, as part of nutrition and health education for teachers and children, due attention is given to the prevention of diet-related chronic diseases.

Public education - what the health workers should do

Despite the apparent confusion in dietary messages in many countries, brought about by advertising of foods high in fat, sugar and salt, a reasonably well-educated public seems able to distinguish these contradictory messages from information on prevention given by health promoters.
The major health benefits from a nutritionally adequate and hygienic diet are:

- elimination of dietary deficiency diseases;
- reduction of acute and chronic foodborne diseases;
- improvements in overall nutritional status, including increased childhood growth rates;
- increased resistance to bacterial and parasitic infectious diseases; and
- reduction in chronic diseases, particularly cardiovascular disease and cancer.

Community-based health workers are very important to the attainment of nutrient goals.

**Nutrient goals**

The health needs of the population are best met by a high-carbohydrate, low-fat diet, rich in starchy foods (e.g., cereals, tubers, and pulses) and including a substantial intake of vegetables and fruit. Only small quantities of essential fats are required.

A reduction in risk of a wide range of chronic diseases, including cardiovascular diseases and cancer, is likely when fat intake is reduced by 30 per cent, and intake of high-salt, pickled, smoked and salt-preserved foods is minimized. A diet that is high in plant foods, especially green and yellow vegetables and citrus fruits, and a moderate amount of protein is consistent with a low risk of many of the current major cancers, cardiovascular diseases, obesity, diabetes and other diseases.

Population nutrient goals must be an integral component of the national food policy. In relation to the proportion of food groups as sources of daily energy requirements, it is suggested that 50 per cent to 70 per cent of energy be derived from complex carbohydrates, 15 per cent to 30 per cent from fat, 10 per cent to 15 per cent from protein, and an upper limit of 10 per cent from free sugar (Table 5.3).
Table 5.3. Population nutrient goals (Reference 2)

<table>
<thead>
<tr>
<th>Limits for population average intakes</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total energy*</td>
<td>see important footnote³</td>
<td></td>
</tr>
<tr>
<td>Total fat (% total energy)</td>
<td>15</td>
<td>30°</td>
</tr>
<tr>
<td>Saturated fatty acids (% total energy)</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Polyunsaturated fatty acids (% total energy)</td>
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<td>7</td>
</tr>
<tr>
<td>Dietary cholesterol (mg/day)</td>
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<td>300</td>
</tr>
<tr>
<td>Total carbohydrates (% total energy)</td>
<td>55</td>
<td>80</td>
</tr>
<tr>
<td>Complex carbohydrate^c (% total energy)</td>
<td>50</td>
<td>70</td>
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<tr>
<td>Dietary fibre d (g/day)</td>
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<tr>
<td>As non-starch polysaccharides</td>
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<td>24</td>
</tr>
<tr>
<td>As a total dietary fibre</td>
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<tr>
<td>Free sugars e (% total energy)</td>
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</tr>
<tr>
<td>Protein (% total energy)</td>
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<td>15</td>
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<tr>
<td>Salt (g/day)</td>
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</tbody>
</table>

*Energy intake needs to be sufficient to allow for normal childhood growth, for the needs of pregnancy and lactation, and for work and desirable physical activities, and to maintain appropriate body reserves of energy in children and adult. Adult populations on average should have a body-mass index (BMI) of 20-22 (BMI=body mass in kg/[height in metres])

°An interim goal for nations with high fat intakes; further benefits would be expected by reducing fat intake towards 15 per cent of total energy.

^A daily minimum intake of 400 g of vegetables and fruits, including at least 30 g of pulses, nuts and seeds, should contribute to this component.

dDietary fibre includes the non-starch polysaccharides (NSP), the goals for which are based on NSP obtained from mixed food sources. Since the definition and measurement of dietary fibre remain uncertain, the goals for total dietary fibre have been estimated from the NSP values.

eThese sugars include monosaccharides, disaccharides, and other short-chain sugars produced by refining carbohydrates.

fNot defined.

The population nutrient goals can be achieved only if the health and education community, the agricultural and food processing industry, policy makers and the general population can understand the goals in meaningful and practical terms. The nutritional plan of action should include:

- clearly specified interim and long term population nutrient goals, and the manner by which the attainment of targets can be monitored;
• a list of the common locally available food sources of the various nutrients; and

• simple and practical ways of measuring foods, and suggesting easy “recipes” using these measures so that the population nutrient goals can be reached.
References and suggested readings


6. Health education

Overview of health education and health promotion

Cancer is a result of exposures to carcinogenic agents that are mostly conditions outside the human body. These conditions are largely social in origin. They are influenced by where people live, their workplace, and their lifestyle. Many forms of everyday behaviour, such as eating, smoking, exercising, recognizing changes in the body, seeking timely professional help, and participating in screening programmes can influence the prevalence of noncommunicable diseases, including cancer. These modes of behaviour and their determinants can therefore be the foci of prevention and control strategies for cancer, specifically through health education and health promotion.

Health education provides the consciousness-raising, concern-arousing, action-stimulating impetus for public involvement and commitment to social reform. It is aimed at the voluntary actions people can take as citizens, either on their own individually or collectively, to look after their own health. It is the “empowerment of the people,” component of health promotion.

Health promotion is the combination of educational and environmental (social, political, economic, organizational, policy and regulatory) support for actions and conditions of living conducive to health. Health education is any designed combination of methods to facilitate the voluntary adaptation of behaviour conducive to health.
Health education

Health promotion encompasses health education and is the process of activating communities, policy-makers, professionals and the public for health supportive policies, systems and ways of living. It is illustrated through acts of advocacy, empowerment of people, and building social support systems that enable people to make healthy choices and live a healthy life.

Health promotion is an integral part of a comprehensive national cancer control programme. It is not simply an education campaign. It is a comprehensive programme of support for behaviour and environmental changes that provides:

- improved access to the services and products people need to reduce the risk of cancer;
- appropriate and persuasive messages to inform and motivate people to reduce the risk of cancer; and
- interpersonal, community, organizational and environmental support to overcome the barriers that people experience in trying to adopt and maintain positive health-promoting lifestyles.

Principles of health education/
health promotion

The following principles are enumerated to guide the health worker in planning the health promotion/health education component of their cancer control programme.

1) Planning must be based on relevant information such as the needs, interests, attitudes and beliefs of the target population and on factors that influence behaviour and health-related outcomes.

2) The relative importance of the environmental factors surrounding specific individuals and groups must be clearly determined.

3) The target population must be involved in the planning process.
Basic types of cancer education programmes

The basic types aim to either a) promote cancer awareness, b) change risk behaviours, c) learn skills or d) promote early detection.

A) Cancer awareness

There is a widely recognized need for people to learn about cancer so that they can take better care of their own health and initiate health support actions for their community. Cancer awareness programmes are not only the responsibility of the health sector. They can be implemented in different settings by different types of professionals. Health professionals should be able to coordinate with other sectors and agencies to be able to reach different target groups in several settings.

Settings for cancer education programmes can be the school, community, work sites and health care facilities. The specific population groups in these settings include school-age children, youth, at-risk groups, women, workers and the community at large.

School setting

Schools can promote learning about cancer. Cancer education in schools should not only be confined to teaching inside the classroom. The school offers many settings where learning about cancer can take place. These include the school environment, buildings and other facilities; the canteen that provides nutritious food, and the meals brought by students from homes; the school health services, including the early detection of health problems by the teachers and health staff; recreation and group activities such as sports and clubs; and a social environment that encourages good relationships and the creation of a social norm for positive health behaviour.
**Strategies**

Integration of cancer-related concepts in the curriculum

On a national level, cancer-related concepts (types of cancer to be included will depend on the prevalent cancers in the country) can be integrated into both the elementary and secondary school curricula. Integration is the method of choice because more often health is not taught as a separate subject. Appropriate entry points in certain subjects/topics like sciences, values and environment can be identified.

The ideal grade or level for integrating cancer in the curriculum is determined by the health concepts, attitudes and skills to be learned. For example, oral hygiene and proper nutrition should be taught to primary school children. Information on sexual hygiene should be given to adolescents. For this group, strategies to be utilized should aim at increasing self-esteem, improving decision-making skills, teaching how to say no to social, especially peer, pressure, and increasing the ability to cope with psychological distress.

Several studies have shown that planned cancer education programmes in schools have been successful in raising awareness about cancer, in developing positive habits, and in changing beliefs about the disease.

Use of other opportunities in the school setting

In the school setting, other opportunities exist for cancer education.

- **School health programme/services.**

  The activities under the school health programme can serve as learning opportunities for cancer concepts. The school health personnel can discuss primary prevention of common cancers during their encounters with the school population.

- **Promotion of healthy environment in the schools.**

  Smoking inside school premises should not only be prohibited among the student population but also among the school teachers and staff. In this way the school can provide a supportive environment for non-smoking.
• **Healthy diet in the school canteen.**

Positive attitudes towards proper nutrition should be promoted both in the curriculum and during meals in the school setting. School canteens' activities and atmosphere should enhance the promotion of healthy diets for cancer prevention and control.

• **School garden activities.**

In certain countries, students are taught simple agricultural principles and techniques in the school. Practicum is also provided by allowing students to cultivate school gardens. The non-use of pesticides can be stressed during these activities.

• **Group activities like sports, and clubs.**

Group activities that will promote positive behaviour and attitudes, such as sports, the arts and cultural shows, should be enhanced to replace unhealthy and non-productive periods for students.

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**Implementors in the school setting**

Cancer education in the school can be implemented by the teachers, school health personnel, nutritionists and other students who can be trained as peer educators. However, teachers and other staff who are expected to handle cancer education activities should be properly trained and provided with necessary teaching materials/aids. Educational materials that can be prepared for teachers' use in cancer education may include kits, posters, puzzles, games and structured learning exercises. The International Union Against Cancer (UICC) has prepared a manual containing relevant information for teachers.

School administrators can formulate and implement policies in the schools that can serve as environmental support for cancer education and as barriers to risk behaviours. Examples may include policies on non-smoking inside school premises; non-use of pesticides in gardening activities; promoting the sale of nutritious food in school canteens; and providing the logistics for cancer education activities.
Community setting

Experience has shown the positive effects of reaching specific population groups in the community. However, this is a big challenge.

Strategies

A comprehensive and multidisciplinary approach can be utilized for public education programmes. Efforts should be directed towards raising the level of consciousness about:

- the different types of cancer;
- the known cancer risks; and
- the methods of prevention.

Interpersonal and mass-media approaches should be utilized to increase coverage of the target populations. Mass-media "reach" can be improved through the following measures:

- developing public service announcements for radio and television broadcast on a paid or unpaid basis;
- persuading broadcasters to include materials supporting cancer education in regular programmes (news, public affairs, talk shows, entertainment);
- producing original materials for cancer education for broadcasting by radio and television;
- writing letters, articles and essays for publication in newspapers and magazines;
- staging events and arranging for television, radio and newspaper coverage (conferences, press functions, public statements); and
- including representatives of radio, television and the press in public information organizing committees.
**Specific population groups**

Specific target groups for each type of cancer education need to be identified. Examples of specific population groups include:

- women;
- youth;
- smokers;
- non-smokers;
- mothers;
- policy makers; and
- at-risk groups.

**Implementors**

Public information programmes for cancer can be implemented by both government and nongovernmental organizations. However, *coordination of all activities and standardization of messages* is essential to avoid confusion among the target audience. Professional societies can also help in this kind of endeavour.

**Health care setting**

Any health care setting, such as the hospital outpatient department, inpatient ward, clinic, health station and village health satellite, can serve as an important venue for cancer education activities. Health professionals, including village health workers, can serve as credible and influential sources of cancer-preventive messages.

The mass-media component of cancer education can be supplemented and complemented by interpersonal approaches (group or individual) to be undertaken by the health worker. Reinforcement and clarification of messages received through the mass media can be done in health care settings.
Workplaces

Occupational cancers are now becoming more prevalent in countries with increasing industrialization. Workers who are exposed to potentially carcinogenic materials and processes should be alerted to these hazards. Sufficient evidence of carcinogenicity to humans of certain industrial processes and chemical groups has been established.

Strategies

1) **Cancer education at the workplace should start with identifying and assessing hazards that exist or may be arising in the work setting.**

2) **Employees should be given education on hazardous chemicals or processes present in their workplace.**

3) **Methods to be utilized should include both individual and group techniques.**

4) **Educational interventions should include the development of skills to reduce exposure (e.g. use of protective equipment).**

5) **Cancer prevention concepts can be integrated with related messages on occupational health and safety.**

6) **The use of printed materials like posters and signs at strategic places in the workplace can serve as reminders to workers.**

7) **Educational interventions about the carcinogens found in the workplace and advantages of a less hazardous environment should be undertaken for the employers.**

8) **Advocacy efforts should also be directed towards employer/management so that policies will be formulated and implemented to reduce exposure of workers to carcinogens. Policies can involve either the:**

   8.1. redesigning a process mechanically;

   8.2. substitution of carcinogenic material; or

   8.3. introduction of protective measures when zero-level exposure to carcinogens is not practical.
9) Training of health professionals in the workplace in order to equip them with some scientific background on cancer prevention.

10) A number of workers can be trained to serve as peer educators in the workplace.

B) Changing risk behaviours

There are several types of risk behaviour for cancers. The most important is smoking. In order to maximize effects, tobacco control programmes must prioritize their target audience. There are two target groups for the primary prevention of cancers associated with tobacco use. These are: those who have not adopted the habit yet; and those who already use tobacco. Prevention and cessation both have an important place in tobacco control.

Strategies

Education of individuals/groups

- Educating people about the hazards of smoking is necessary but is not sufficient to ensure that they do not start using tobacco. Evidence has shown that knowledge about the harmful effects of tobacco is not enough to make smokers stop or to prevent non-smokers from taking up the habit.

- Methods to be utilized should be able to cultivate attitudes that will work against tobacco use. It is necessary that specific attitudes important for the target groups should first be identified before efforts to cultivate them are undertaken. Examples of these attitudes may be personal values such as concern for appearance, concern for acceptance by certain groups, and concern for children’s health. Identification of these attitudes can be undertaken through group discussions with target groups. Once identified, these concerns can be made to work against tobacco use.

- The interventions should also provide for the development of skills needed by the target audience to resist peer pressure.
• **Tobacco control programmes should consider that nicotine is classified as an addictive substance, so that voluntary action is always complicated.**

• **The favourable aspects of non-smoking should be emphasized more than the unfavourable effects of smoking.**

• **The rights of non-smokers, especially children and pregnant women, to be protected from involuntary exposure to tobacco smoke should be emphasized.**

### Smoking cessation programmes

Smoking cessation activities are those efforts directed towards the reduction of tobacco consumption. These programmes focus on smokers with the goal of stopping the tobacco-use habit.

There are three types of smoking cessation programmes based on:

i) *aversion* - strategies utilized create an attitude of dislike for tobacco that becomes the basis of cessation;

ii) *self-control* - strategies utilized allow for the development of certain psycho-social skills that will enable individuals to resist the habit; and

iii) *pharmacological strategies* - utilize certain drugs to relieve the smokers of the abstinence symptoms when smoking is discontinued.

In terms of effectiveness, all three types exhibit a similar pattern: dramatic immediate success, fast decrease of cessation rate up to the third month after the programme, and a levelling off of the cessation rate until the end of the first year. It is also interesting to remember that 90 per cent of those who give up smoking do so of their own volition. Cessation can also be reinforced by policies to restrict smoking on public vehicles, and in public places and workplaces.

To maximize the effect of cessation programmes, measures should be instituted to provide ex-smokers with different types of support such as social, emotional, organizational/environmental and informational.
C) Learning self-examination skills

People empowerment in the philosophy of health promotion concerns not only the provision of knowledge but also the necessary skills to allow the execution of positive behaviour by individuals. In certain types of cancer, experts have advised the teaching of a number of self-examination test skills to at-risk individuals to facilitate the early detection of the disease. These skills are especially important in developing countries where resources are scarce. Self-examination may contribute to meeting the objectives of secondary prevention.

Breast self-examination (BSE)

There is good evidence that screening women of age 50 or more, by mammography alone or mammography plus physical examination, reduces mortality from breast cancer. However, mammography-based screening programmes are out of reach for developing countries. The increasing public health importance of breast cancer dictates that alternative approaches be evaluated. A cohort study in Finland has produced suggestive evidence of the benefit of BSE at all ages.

For breast cancer screening it is recommended that women aged 35 or more should be taught to perform BSE regularly and correctly. BSE can be taught at the workplace and in clinic settings. The best way to teach skills is by demonstration. This can be done either on an individual basis or during groups encounters. Printed materials can be distributed to target groups for reinforcement. Emphasis should be placed on the regularity and correctness of BSE. Discussions on the importance of BSE can be integrated during the target group’s visits to health facilities for consultation.

Oral self-examination

The natural history and the site of oral cancers provide excellent opportunities for early detection. The majority of these cancers are preceded by precancerous lesions such as leukoplakia, which can be detected for up to 15 years before their change to an invasive cancer. A screening programme in Sri Lanka has demonstrated that primary-health-care workers, under field conditions, can examine large numbers of people and can detect and classify precancers and cancers of the oral region.
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with acceptable accuracy. Individuals can take an active part in the early detection of the disease by learning how to examine the oral cavity and to recognize precancerous lesions.

D) Promoting early cancer detection

Participation in a screening or early detection programme will not influence cancer incidence but may reduce cancer mortality. Although several screening methods are in place, participation rates of at-risk groups may still be below what is desirable. Cancer education programmes should be instituted to encourage at-risk groups to participate. However, planners of these educational programmes should understand the underlying reasons or the factors that influence participation of these groups.

Major predictors of attendance at a BSE class have been found to be vulnerability, general control over health, and personal health behaviour. In a probability sample of 619 women in Detroit, it was found out that beliefs about benefits and costs had reliable direct effects on the practice of BSE. In another study, it was established that non-participation in cervical cytology screening was related to low responses on the value of early detection and in the efficacy of cancer treatment. Other variables affecting participation rates in different studies are: knowledge of the cancer and its symptoms; the accessibility of screening services, the acceptance of the screening test; and the attitudes of health workers.

In Green's PROCEED-PRECEDE model for health promotion planning, all these variables were acknowledged to be important determinants of behaviour that should be considered in the planning of the health education and health promotion component.
Planning the cancer education programme

Cancer education programmes are developed to attain behavioural objectives. These include primary and secondary preventive behaviours that to a great extent influence the morbidity and mortality of the different types of cancers.

In planning the cancer education programme, the planner should analyse the behaviour being promoted (e.g. BSE, having a Pap smear or smoking cessation). The analysis should include identifying the different determinants of the behaviour being promoted. Green categorized these determinants as:

**predisposing** a group of factors/determinants that are inherently present in individuals/groups susceptible to the disease. Examples of this group are level of knowledge about the programme; attitudes towards the behaviour or the screening procedure; existing beliefs that may be inconsistent/consistent with the behaviour; and related values or concerns.

**enabling** these include factors present in the environment that will allow the individual to perform the behaviour. These include: accessibility of the screening procedure or service; availability of the service or materials needed for the behaviour; and appropriate skills needed by the individual or groups to perform the behaviour.

**reinforcing** these are factors that can either cause maintenance or the discontinuance of the behaviour being promoted. Positive reinforcing factors when present will ensure the maintenance of the behaviour; negative ones will cause the termination of the behaviour being promoted. These factors include attitudes and skills of health workers and influential people like peers, and the presence or absence of policies to support the behaviour.
Once this kind of analysis is undertaken, the planner will be able to formulate the appropriate approaches/strategies to ensure the attainment of the behavioural objectives. The cancer education programme will utilize a combination of different strategies that will address specific groups of determinants. In this way, it is not only the knowledge component that is addressed by the educational programme. Strategies are also planned to address the enabling factors that will allow the behaviour to take place as well as the reinforcing factors that will provide for the maintenance of the behaviour.

Developing appropriate messages

Messages are designed to convey new facts, alter attitudes, change behaviour or encourage participation. Some of these purposes overlap. More often they are progressive. For a change in behaviour to take place, the public should first receive the information, understand it, believe and agree with it and then adopt it. Several factors that will improve acceptance of the message include.

**clarity**
messages must convey clear information to ensure understanding by the target audience. Clear messages contain as few technical/scientific terms as possible. Unnecessary information which is not needed by the audience to act on the message should not be included.

**consistency**
all messages on a particular topic should be consistent.

**main points**
main points of the message should be emphasized and repeated and should never be hidden in less important information.
taste and appeal a message should be reassuring, alarming, challenging or straightforward, depending upon the desired impact and the target audience. Messages should also be truthful, honest and as complete as possible.

credibility the source of the information and the spokesperson should be believable and trustworthy.

public need for messages to break through the "information clutter" of society, they should be based on what the target audience perceives as most important to them, and what they want to know.

Messages should be drafted following these considerations prior to pretesting. Message concepts should first be developed based on the analysis of the audience and the communication objective. Message concepts are the messages in "rough draft" and represent different ways of presenting the information to the target audience. Two or more message concepts can be prepared using different:

- spokespersons (e.g. physician; peer);
- appeals (e.g. humour, fear, factual);
- styles (photographs, graphs); and
- formats (e.g. audiovisual with music, instructional poster).

Testing alternative concepts with the target audience may:

- help identify which concept has the strongest appeal and potential for effect;
- identify new concepts;
- identify confusing terms or concepts;
- identify language used by the target audience; and
- help eliminate weaker concepts and reduce production costs.

After testing the message concept, draft materials should be prepared. Draft materials should resemble the final product as closely as possible but without expensive production. At this stage the draft materials should be
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pretested with the target audience. Pretesting should ascertain whether the materials are:

- understandable;
- relevant;
- attention-getting and memorable;
- attractive;
- credible; and
- acceptable to the target audience.

Testing of the message concept and pretesting of draft materials should involve a few persons chosen as representatives of intended target audiences. Focused group discussions, self-administered questionnaires and readability testing are some methods to be used for pretesting.

Selecting media for communication and learning

A combination of methods (i.e. the use of mass media and interpersonal communications) has been found to be more effective in creating the behavioural changes expected from educational programmes. Interpersonal communication, whether group or individual, and mass media have their own strengths and weaknesses as channels for communication and learning.

The use of mass media will satisfy the objective of raising awareness about cancer risks, giving the public correct facts about cancer, creating a positive climate of opinion, reaching large numbers of people in a short period of time, and reinforcing a newly-established behaviour. However, it has some limitations in teaching new skills or in creating complex behavioural changes.

Interpersonal communication, either on a group or individual basis, has been found to be more effective in motivating specific behaviour,
teaching new skills, clarifying concepts and obtaining participation and regularity in screening procedures.

Going back to the four types of cancer education programmes, the interpersonal group techniques have been found to be more effective in promoting the acquisition of self-examination skills and changing risk behaviours; interpersonal individual techniques are more effective in promoting early cancer detection through participation in screening procedures; and mass media channels in cancer awareness programmes.

A combination of methods is still the most effective way and should be strongly considered in developing a cancer education programme.

**Evaluation of the cancer education programme**

The indicators to be used for impact evaluation of cancer education programmes are the behavioural (life-style) and environmental changes that have taken place as a consequence of the intervention. Examples of this kind of indicator are:

- the percentage of women of 35 years and above who regularly and correctly practice BSE;
- the percentage of women aged 35-59 submitted for a Pap smear at least once;
- the percentage of smokers who stop smoking after a cessation programme;
- the percentage of workers who wear protective devices regularly and correctly; and
- the number of laws on tobacco control that have been passed.

Following the categories of determinants of behaviour identified in the planning process, another set of indicators can be used to assess the effect of the educational intervention. These will include the changes that occurred as a result of intervention on the three sets of factors - predisposing, enabling and reinforcing. Measurable changes in the
knowledge and attitudes of target groups, health workers and of influential others and in skills of individuals are some of the indicators that can also be used to measure the effects of the intervention.

Process evaluation can also be conducted by assessing how the activities/strategies of the programme were implemented. The quality and quantity of these activities serve as process measures for evaluation. Various designs can be used to evaluate the educational intervention. Threats to internal validity can be controlled through the use of particular evaluation designs.

What the health worker should do

For the Western Pacific Region, a Core Cancer Health Education Module should be integrated at the primary health care level and all community-based health workers should be trained to implement the programme. The messages of the core module are aimed at: preventing the most common preventable cancers in the Region; detecting early the most prevalent cancers for which cure can be achieved; and delivering cancer pain relief and palliative care. The strategies employed are based on the general principles mentioned in the chapter, and the manner of presentation will depend on local sociocultural, economic and demographic characteristics.
Core Cancer Health Education Module

A) Promoting cancer awareness

Cancer is now an important killer, and increasing numbers will die of cancer because:

- more people will adopt unhealthy lifestyles such as tobacco consumption and unhealthy eating habits;
- fewer people will die of communicable diseases; and
- more people will live longer, and the risk of cancer increases with increasing age.

At least one third of all cancers can be prevented by the following measures:

Controlling tobacco consumption

Hazards of active smoking

- Tobacco smoking causes lung cancer, chronic bronchitis and chronic obstructive lung disease.
- Tobacco use also causes other cancers such as of the mouth, tongue, larynx, pharynx, oesophagus, urinary bladder, pancreas and kidney, and increases the risk of cervical cancer.
- Tobacco smoking causes cardiovascular diseases, and many other diseases.
- Nicotine in tobacco is addictive.
Hazards of passive smoking

- If a pregnant mother smokes, damage to the foetus can occur, and there is a high likelihood of miscarriage, stillbirth, premature delivery, low-birth-weight infants, death and illness during infancy.

Hazards of Environmental Tobacco Smoke (ETS)

- Children are very susceptible to ETS and it can cause respiratory infections, middle ear effusions, sudden infant death syndrome and asthma.
- Children exposed to ETS may suffer impairment of mental and physical development, and decreased respiratory function.
- In adults, ETS causes lung cancer and cardiovascular diseases.
- Passive smoking commonly occurs at home, in restaurants, offices, workplaces, public transport, cinemas and other enclosed spaces.

Hazards of smokeless tobacco

- All forms of tobacco are addictive.
- Chewing tobacco, with or without betel quid, causes oral cancer, tooth problems and other diseases.

Economic effects

- The economic benefits derived from the tobacco industry are usually outweighed by the costs, which include:
  - increased demand for medical and health care;
  - lost productivity;
  - fires caused by careless smoking;
  - importing and purchasing foreign cigarettes, equipment for tobacco factories, employment of expatriates;
• deforestation from the use of wood for tobacco curing; and
• misuse of land for growing tobacco instead of nutritious foods.

International tobacco companies

• target women and the young;
• strongly oppose government measures against tobacco;
• lobby and influence politicians with campaign contributions;
• influence the media and advertising agencies;
• use sophisticated and glamorous advertisements;
• sponsor sports, pop events, discos, and pro-tobacco research; and
• instigate unilateral trade sanctions against countries unless they allow marketing and promotion of foreign tobacco products.

Promoting healthy eating habits

• A healthy diet is the most important factor in promoting health.

• The health needs of a population are best met by a high-carbohydrate, low-fat diet, rich in starchy foods (e.g. cereals, tubers, pulses) and including a substantial intake of fruits and vegetables.

• An unhealthy diet is one that is high in fat, salt and free sugars, and/or in smoked, salt-pickled and salt preserved foods.

• A healthy diet protects against cancer, cardiovascular diseases, diabetes, haemorrhoids and many other diseases. On the other hand an unhealthy diet promotes cancer, cardiovascular and many other diseases.
**Limiting alcohol consumption**

- Heavy alcohol consumption causes cancer of the mouth.
- Heavy alcohol consumption is a major cause of crime and violence, traffic accidents and workplace accidents.

**Hepatitis B virus infant vaccination**

- Liver cancer is one of the most common cancers in the Region and is mainly caused by HBV infection.
- Including HBV vaccination in the expanded programme of immunization (EPI) will prevent liver cancer and other liver diseases caused by HBV.
- All infants and young children should receive HBV vaccination.

**Control of sexually transmitted diseases**

- Cancer of the cervix is a complication of an infection caused by an agent, e.g. human papilloma virus (HPV), which is transmitted through sexual contact.
- Safe sexual practices for the prevention of HIV/AIDS and other sexually transmitted diseases, especially the use of condoms, will also prevent cancer of the cervix.

**At least one third of all cancers can be cured if they are detected early. The following cancers can be detected early:**

**Cervical cancer**

- Cytology screening (Pap smear) can detect early cervical cancer and precancerous lesions.
- Early cervical cancer can be cured by radiation therapy or surgery.
• Women of 35 to 59 years old (or 30-59 years old in countries with younger populations) should have a Pap smear at least once, or if possible every 5 years.

**Breast cancer**

• Women of 35 years and older should develop the habit of breast self examination (BSE).

• Women who detect lumps or masses in their breast should consult a health worker.

• Early breast cancer is curable by surgery and/or radiation therapy.

• When mammography is available, women of 50 years and older should be screened at least every 3 years.

**Oral cancer**

• Everyone should periodically examine their mouth for suspicious lesions, and consult a health worker if they are detected.

• Suspicious lesions are:
  • reddish plaques or patches;
  • whitish plaques or patches;
  • non-healing sore;
  • bleeding in the mouth even with slight trauma;
  • ulcerations;
  • fungating mass; and
  • restricted opening of mouth.

• Early oral cancer is curable by surgery and/or radiation therapy.
Cancer's warning signs

• Most cancers can be cured if detected early. The following are warning signs and symptoms: (CAUTION US)
  • Change in bowel or bladder habits;
  • A sore that does not heal;
  • Unusual bleeding or discharges;
  • Thickening or lump in breast or elsewhere;
  • Indigestion or difficulty of swallowing;
  • Obvious change in wart or mole;
  • Nagging cough or hoarseness;
  • Unexplained anaemia; and
  • Sudden unexplained weight loss.
• Consult a health worker as soon as a sign or symptom is detected.

B) Changing risk behaviours

Modifying another person’s behaviour is not an easy task. The health worker should be aware of the determinants or factors that influence behaviour. Different strategies should be utilized to address these factors.

On an individual level, counselling is an appropriate method to motivate a person to change behaviour. Counselling is utilized to encourage an individual to think about the risk behaviour and come to an understanding of its risk. As a result of this understanding, the individual will commit himself/herself to take action i.e. change to reduce the risk. The change in behaviour becomes a person’s own decision, guided by the health worker as a counsellor.
There are basic rules that a health worker has to remember in counselling:

- the counsellor should show concern and care;
- the counsellor should develop empathy: understanding and acceptance of a person’s feelings but not horror, pity or sympathy;
- the counsellor should help the individual identify the problem;
- the counsellor should share information and ideas that the person needs to make a sound decision; and
- the counsellor should ensure privacy and confidentiality.

Working with groups is another strategy which the health worker can utilize to change risk behaviours. There are several advantages in using the group approach. Changing and maintaining behaviour is not easy. In a group one finds the support and encouragement needed to change behaviour and maintain a healthy practice. Another advantage is that experiences and skills are shared in a group. People learn from each other's experiences.

*Intersectoral coordination* is another strategy that the health worker should utilize to ensure a change in risk behaviour. One of the important considerations in changing behaviour is the presence of enabling factors in the environment that will allow the adoption of a new type of behaviour. This is where intersectoral coordination is important: between local officials, the agricultural sector, education, business and others.

**Stop smoking**

At the primary health care level health workers can undertake strategies to encourage target groups to stop smoking.

**At the individual/group levels**

- counselling on a one-to-one basis with the smoker in a clinic setting;
- organizing groups of smokers for smoking cessation programmes;
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- organizing activities in the school setting which will actively involve students e.g. discussion groups, debates, slogan/poster contest; and
- engaging in follow-up activities.

At the community level

- working with local authorities towards the passage and strict implementation of anti-smoking measures/ordinances; and
- coordinating with groups in the community to create a favourable environment for non-smokers and an unfavourable one for smokers.

Change to a healthy diet

It should be underscored that dietary consumption patterns can be changed provided that the necessary factors influencing eating behaviour are taken into consideration e.g. cultural norms, food availability, capacity to purchase, correct information. At the community level health workers can target several groups and implement strategies to motivate people to change to a healthy diet.

- Mothers, who are the decision-makers in terms of purchasing and preparation, can be targeted by:
  - providing the necessary information in terms of what constitutes a healthy diet (in providing this type of information be sure that the foods recommended are available in the community);
  - developing mothers’ skills in preparing healthy diets by demonstration and actual experience; and
  - together with mothers’ groups, developing and experimenting with new recipes that are healthy but acceptable to local taste.
- Health workers can also collaborate with agricultural workers and food suppliers in the community to ensure a supply of healthy foods.
- Health workers can coordinate with local officials to ensure proper handling of food e.g. use of preservatives, food colouring.
• They can also work with school authorities to undertake activities that will enhance the change to a healthy diet through:

  • formal activities - integrated in the school curriculum, e.g. home economics sessions;
  • non-formal activities programmes, presentations, contests, nutrition month activities;
  • assisting school cafeteria personnel to provide healthy foods.

• Nutrition education can be integrated into clinic activities.

• Health workers can ensure adequate information materials are always available.

Stop unsafe sexual practices

Health workers should:

• determine groups practicing unsafe sex and at risk of cervical cancer;

• provide necessary information regarding the dangers of unsafe sex and safe sexual practices;

• ensure confidentiality about personal information gathered;

• ensure privacy during the interpersonal communication process to foster open communication;

• not be prejudiced against people practicing unsafe sex; and

• ensure availability and access to condoms.

Stop excessive alcohol consumption

To be able to motivate people to limit alcohol consumption, it is imperative for the health worker to have statistics to back up his claim that heavy alcohol consumption is a major cause of accidents, crime and violence. The health worker should:
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- gather information about alcohol-related incidents in the community;

- identify individuals/groups practicing the behaviour;

- if possible, undertake individual counselling for those identified;

- organize and implement small group activities e.g. alcoholics anonymous sessions;

- identify and involve individuals/groups who will provide support to excessive drinkers in modifying their behaviour;

- coordinate with local officials in the strict implementation of ordinances regarding alcohol consumption;

- provide referral for other services the excessive drinkers will need that are beyond the capabilities of the community health worker; and

- provide follow-up activities to ensure maintenance of the modified behaviour.

C) Teaching skills for early detection

Breast self-examination

Breast self examination is a skill that has to be learned, undertaken properly and done regularly to ensure its effectiveness. Demonstration is the most appropriate method in teaching this skill either to individuals or small groups. Some of the rules a health worker has to follow to utilize this strategy effectively are:

- demonstrate the skill personally, or if you cannot do it, find someone who can help you;

- show posters and photographs at the same time to reinforce the demonstration;

- provide space so that everyone is able to see the demonstration;
• ensure that the size of the group allows everyone to practice the skill or ask questions;
Health education

- follow the steps in a demonstration by:
  - explaining the idea and the skill to be demonstrated;
  - doing the demonstration;
  - asking one person to repeat and ask the group to comment; and
  - allowing everyone to practice the skill.
- check that everyone can practice the skill correctly before leaving; and
- utilize follow-up visits to check on the skill.

D) Promoting participation in early detection programmes

Cervical cytology (PAP smear) screening

The level of participation in an early detection programme such as cervical cytology screening is affected by several factors. These factors include the level of knowledge about cancer and its symptoms, accessibility to the screening procedures/services, acceptance of the procedure and attitudes of health workers.

At the community level the health worker can organize a screening programme and maximize participation of the risk group by taking into consideration the following:

- Participation of the risk group should be sought, even during the planning of the screening programme.
- The rationale/purpose and efficacy of the screening programme should be made clear to the risk group.
- The presence of the screening programme should be communicated to all members of the risk group by using different communication channels to improve reach.
- The time, cost and place of the screening/programme/service should be made accessible to all members of the target group.
• The health worker should work with different sectors who can provide support (logistical, medical and other types).

• The experience should be made as pleasant as possible, especially to initial adopters, to prevent a negative campaign against the programme.

• Follow-up activities should be planned to ensure the participation of hard-to-reach groups.

• Results of screening programmes should be provided and explained to participants as soon as possible.
References and suggested readings


7. Cancer pain relief and palliative care

Introduction

The number of cancer patients worldwide is increasing. Of the estimated ten million new cancer cases every year, more than half are in developing countries. The disease is incurable for the majority of these patients by the time it is diagnosed.

Medical care is a continuum, ranging from complete cure at one end to emphasis on symptom control at the other. Hence, a major decision in the treatment of cancer patients is determining whether the aim of the therapy is curative or palliative.

Cure in cancer does not imply the total eradication of cancer cells in the patient, but rather the occurrence, following treatment, of a reasonably long period when the patient is clinically free from cancer. Cure rate may be expressed as the probability of patients attaining a disease-free state for a certain number of years, usually five or ten, following treatment. When a great majority of patients survive the predetermined number of years following a specific interventional treatment, it is considered curative.

To illustrate, 80-90 per cent of women who have breast cancer with a tumour diameter of less than 2 cm and whose ipsilateral axillary nodes do not contain metastasis are expected to be alive ten years after undergoing a modified radical mastectomy or a tumourectomy with therapeutic breast and axillary irradiation. This particular stage of breast cancer is thus curable with these curative interventions. While a small proportion of
women in this subset of patients will die of breast cancer within ten years, this does not detract from the curability. On the other hand, less than a third of women with locally advanced breast cancer are expected to live five years after any kind of interventional treatment, singly or in combination, and many less after ten years. Thus, in this set of patients, the therapeutic aim is to palliate, and not to cure, even if for some reason or another a few women do survive for long periods of time. Therefore, it is the known probability of surviving within a determined period that determines curability or non-curability.

Palliative care, on the other hand, is the active total care of patients whose disease is no longer responsive to curative treatment. The goal of palliative care is achievement of the best possible quality of life for patients and their families. Control of pain and of other symptoms, and alleviation of psychological, social and spiritual problems are paramount.

Palliative care affirms life and regards dying as a normal process; neither hastens nor postpones death; provides relief from pain and other distressing symptoms; integrates the psychological and spiritual aspects of patient care; offers a support system to help patients live as actively as possible until death; and offers a support system to help the family cope during the patient’s illness and in their own bereavement.

Cancer pain relief

A major requirement of palliative cancer care is cancer pain relief. Many types of primary cancer therapy span the entire spectrum of care, notably radiotherapy, and to a lesser extent chemotherapy and surgery. Such techniques as well as pharmacological and non-pharmacological interventions can provide adequate relief to the vast majority of patients (Table 7.1).

In palliative care, symptom control should be as complete and as long as possible. Optimizing the quality of life for the patient and the family requires integrating the physical, psychological and spiritual aspects of patient care, and taking into account the prevailing local, social, cultural, and economic realities and their implications.
Table 7.1. Roles of the primary therapies in the management of cancer pain (Reference 1).

<table>
<thead>
<tr>
<th>Primary therapy</th>
<th>Major pain indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiotherapy</td>
<td>painful bony metastases, epidural spinal cord compression, cerebral metastases, tumour-related compression or infiltration of peripheral neural structures</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>nociceptive or neuropathic pain syndromes caused by tumours likely to respond to chemotherapy</td>
</tr>
<tr>
<td>Surgery</td>
<td>stabilization of pathological fractures, spinal cord decompression, relief of remediable bowel obstructions, drainage of symptomatic ascites</td>
</tr>
<tr>
<td>Antibiotic therapy</td>
<td>Overt infections (eg. pelvic abscess, pyonephrosis), occult infections (e.g. in head and neck tumours or ulcerating tumours)</td>
</tr>
</tbody>
</table>

It is important to keep the therapeutic aim clearly in mind when employing treatment of any kind. The aim of palliative surgery, for example, is the rapid, efficient, and long-lasting relief of symptoms due to locoregional disease. Like surgery, radiotherapy is directed at locoregional disease. The relief of pain due to localized bone metastasis is an indication for palliative radiotherapy. Systemic therapies include chemotherapy, hormone therapy and immunotherapy. Their indications are shown in Table 7.2. The WHO Essential Drug List of Antineoplastic and Immunosuppressant drugs is shown in Appendix 2. They, however, infrequently result in immediate relief of symptoms.

Successful pain management is characterized by the implementation of the techniques with the most favourable therapeutic index for the prevailing circumstances and a continuity of care that responds quickly to the changing needs of the patient. The key points to bear in mind are: (1) the patient’s biological prospects; (2) the therapeutic aim of each treatment; (3) the unwanted effects of treatment; (4) the benefits of treatment for the patient; and (5) the need not to prescribe a lingering death.

The philosophy of palliative cancer care stresses that illness should not be regarded as an isolated aberration in physiology, but considered in terms of the suffering that it causes. While unrelieved cancer pain may be the greatest factor causing distress to patients, the relief of pain by itself does not necessarily bring about an acceptable quality of life.
Table 7.2. Capabilities of systemic anticancer therapy; a summary of situations (Reference 7).

<table>
<thead>
<tr>
<th>Capability</th>
<th>Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cure achievable in &gt;50 per cent of patients despite wide-spread metastases</td>
<td>Testis cancer, Gestational trophoblastic disease, Non-Hodgkin's lymphomas (NHL) with unfavorable histology, Hodgkin's disease, Childhood acute lymphocytic leukemia (ALL)</td>
</tr>
<tr>
<td>Increased cure rate augmented when systemic therapy is added to definitive local therapy</td>
<td>Breast cancer, Colorectal cancer, Wilm's tumor, Neuroblastoma, Osteosarcoma, Ewing's sarcoma, Ovarian cancer</td>
</tr>
<tr>
<td>Definite tumour mass reduction in disseminated disease, complete remission and unequivocal palliation achievable, cure not possible or infrequent (&lt;20 per cent)</td>
<td>Breast cancer, Acute myeloid leukemia (AML), &quot;Favorable histology&quot; NHL, Small cell lung cancer (SCLC), Prostate cancer, Renal cell cancer, Bladder cancer</td>
</tr>
</tbody>
</table>

This table is meant to be simply illustrative of human tumours in which systemic therapy is definitely useful. By inference, systemic therapy with currently available agents offers little major benefit in tumors not listed. (e.g., advanced colorectal cancer, soft-tissue sarcomas, non-small cell lung cancer, gastric, pancreatic, hepatocellular, cervical, and nasopharyngeal carcinoma).

The pain that a patient suffers has impact on the family, making the "unit of care" the family rather than the patient alone. This setting is regarded as most important. For this reason, inquiries from the family are encouraged and the family’s active participation in the care is expected. Ideal home care requires constancy of care between home and hospital. Members of the family should therefore be trained to select and prepare a suitable way of life for the cancer patient.

Whereas acute pain experienced by cancer patients is usually related to diagnostic and therapeutic interventions, chronic cancer pain is most commonly caused by direct tumour infiltration.

*Cancer patients need pain relief at all stages of their disease.* Severe, unrelenting pain without the hope of relief is incompatible with an acceptable quality of life. It interferes with the ability to eat, sleep, think,
and interact with others. The aim of treatment is to relieve the pain to the patient’s satisfaction as soon as possible so that he or she can function effectively and eventually die free of pain, if death is imminent.

Quality of life enhancement and cancer pain relief is applicable to all patients and not only to the terminally ill. A large number of patients with advanced incurable cancer are in fact not terminally ill and can still live meaningful and productive lives if their pain is relieved. There are simple and inexpensive methods that can provide relief to the majority of patients suffering from cancer pain.

Table 7.3 presents the strategy for the management of cancer pain.

<table>
<thead>
<tr>
<th>Table 7.3. Strategy for management of cancer pain (Reference 1).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1)</strong> Comprehensive assessment</td>
</tr>
<tr>
<td><strong>2)</strong> Primary therapy and systemic non-opioid and opioid analgesic therapy</td>
</tr>
<tr>
<td>a) Role of primary therapies</td>
</tr>
<tr>
<td>b) Selection of non-opioid and opioid analgesic agents</td>
</tr>
<tr>
<td>c) Practical aspects of administration:</td>
</tr>
<tr>
<td>* Routes</td>
</tr>
<tr>
<td>* Dose selection and titration</td>
</tr>
<tr>
<td>d) Management of side effects</td>
</tr>
<tr>
<td><strong>3)</strong> Non-invasive intervention for patients unable to attain an acceptable balance between relief and side effects of systemic opioid therapy</td>
</tr>
<tr>
<td>a) Reduce opioid requirement by</td>
</tr>
<tr>
<td>* Appropriate primary therapy</td>
</tr>
<tr>
<td>* Addition of non-opioid analgesic</td>
</tr>
<tr>
<td>* Addition of an adjuvant analgesic</td>
</tr>
<tr>
<td>* Use of cognitive or behavioural techniques</td>
</tr>
<tr>
<td>* Use of an orthotic device or other physical medicine approach</td>
</tr>
<tr>
<td>b) Switch to another opioid</td>
</tr>
<tr>
<td><strong>4)</strong> Invasive interventions for patients unable to attain acceptable balance between relief and side effects during systemic pharmacotherapy</td>
</tr>
<tr>
<td>a) Regional analgesic techniques (spinal and intraventricular opioids)</td>
</tr>
<tr>
<td>b) Neural blockade</td>
</tr>
<tr>
<td>c) Neuroablative techniques</td>
</tr>
<tr>
<td>5)</td>
</tr>
</tbody>
</table>
The main features of a cancer pain relief and palliative care programme are summarized diagrammatically in Figure 7.1.

**Figure 7.1. Relieving cancer pain**

*Implementation*
- Tailor treatment policy to predominant pattern of malignant diseases and available resources
- Identify patient groups suitable only for palliative therapy
- Establish national committee on guidelines for palliative care specific to cancer site
- Set up a threefold strategy based on the following:

*Drug Availability*
- Changes in health care regulations/legislation to improve drug availability (especially of opioids)
- Improvements in prescribing, distributing, dispensing, and administration of drugs

*Education*
- Of the public
- Of health care professionals (doctors, nurses, pharmacists)
- Of others (health care policy-makers, administrators, drug regulators)

*Government policy*
- National or state policy emphasizing the need to alleviate chronic cancer pain

*Process measures*
- >80% of cancer specialists instructed in the guidelines for cancer pain relief
- >50% of general physicians informed about cancer pain relief guidelines
- >50% of cancer patients and their relatives informed that relief of cancer pain is possible

*Impact measures*
- Oral morphine available for use in primary health care
- >80% of cancer hospitals have adopted WHO cancer pain relief guidelines
- >50% of general hospitals have adopted WHO cancer pain relief guidelines

*Outcome measures*
- Short term: >50% of patients with cancer pain receive oral morphine
- Medium term: >30% of cancer patients freed from peak cancer pain
- Long term: >80% of cancer patients freed from peak cancer pain

Cancer Pain Assessment

Assessment or evaluation of pain is the first step in cancer pain management. The main steps in the evaluation of cancer pain include the following:

1. **Believe the patient's report of pain.**

2. **Initiate discussions about pain.** The health worker should specifically ask the patient about pain rather than rely on spontaneous comment. To help assess the severity of pain, inquire about observations of care-givers, vocalizations (like groaning), facial expressions (like furrowed eyebrows), changes in physiological responses (like increase or decrease in blood pressure), and response to a trial dose of analgesic.

3. **Evaluate the severity of pain.** The health worker should find out whether activity is limited by the pain, whether sleep and appetite are disturbed, and the degree of relief obtained with medication or pain-relief procedures in the past and at present. Numerical scales for pain are easy to improvise and are helpful in adults. The Brief Pain Inventory (BPI) of the Pain Research Group has shown consistent cross-cultural validation between the intensity of pain and the impairment of certain aspects of quality of life. For both children and adults, it is often helpful to offer a choice of descriptors (e.g. pressure, aching, burning, stabbing) and to ask the patient to relate the present pain to past pain, such as toothache. Young children may be able to convey the intensity of their pain by using a set of drawings of faces ranging from smiling to crying, and selecting the face that best matches the pain. Alternatively, the child may be presented with four coins or pebbles and asked to indicate how many "pieces of hurt" are felt, with the four objects indicating the worst pain. A similar approach can be used with patients who cannot read or write and where communication is difficult because of the lack of a common language.

4. **Take a detailed history of pain.** Discover the pain’s characteristics such as its intensity, quality, location and distribution. It is also important to determine whether it is continuous or intermittent and what factors make it worse or better.

5. **Evaluate the psychological state of the patient.** While overt pain behaviour may be absent, it may be associated with psychological disturbance. Depression occurs in 25 per cent of cancer patients. The
diagnosis of manageable depression and/or anxiety is often missed in patients with advanced cancer.

6. **Perform a careful physical examination.**

7. **Order and personally review any necessary investigation.** Investigations should be reserved for cases where there is doubt about the cause of pain, or where a decision about further anticancer treatment depends on the precise localization of the disease. Nevertheless, analgesics should not be withheld while the cause of the pain is being established.

8. **Consider alternative methods of pain control.** Alternative methods are of considerable benefit for some forms of cancer.

9. **Monitor the results of treatment.** Physicians and other caregivers must establish regular and specific methods for sharing information about the effects of the treatment so that, when necessary, changes in treatment can be made quickly.

Evaluation should enable the clinician to appreciate the precise nature of the pain syndrome, its impact, and concurrent symptoms and problems that further undermine the quality of life. After the evaluation of pain, the physician should know whether the pain is caused by the cancer or by another disorder, constitutes a specific cancer pain syndrome, its mechanism, whether it is associated with a significant degree of psychological distress, or is having a negative impact on the patient’s family and/or care-givers.

**Systemic analgesic therapy**

The individual practitioner can effectively treat the majority of pain problems by attending to careful pain assessment and implementing analgesic therapy. The basic drug list recommended by WHO is shown in Table 7.4.
Table 7.4. A basic drug list for cancer pain relief (Reference 9)

<table>
<thead>
<tr>
<th>Category</th>
<th>Basic drugs</th>
<th>Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-opioids</td>
<td>acetylsalicylic acid (ASA)</td>
<td>choline magnesium</td>
</tr>
<tr>
<td></td>
<td>paracetamol</td>
<td>trisalicylate</td>
</tr>
<tr>
<td></td>
<td>ibuprofen</td>
<td>diflunisal</td>
</tr>
<tr>
<td></td>
<td>indomethacin</td>
<td>naproxen</td>
</tr>
<tr>
<td></td>
<td>diclofenac</td>
<td></td>
</tr>
<tr>
<td>Opioids for mild to moderate pain</td>
<td>codeine b</td>
<td>dihydrocodeine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>dextropropoxyphene</td>
</tr>
<tr>
<td></td>
<td></td>
<td>standardized opium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>tramadol</td>
</tr>
<tr>
<td>Opioids for moderate to severe pain</td>
<td>morphine</td>
<td>methadone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>hydromorphone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>oxycodone c</td>
</tr>
<tr>
<td></td>
<td></td>
<td>levorphanol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pethidine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>buprenorphine c</td>
</tr>
<tr>
<td>Opioid antagonist</td>
<td>naloxone</td>
<td></td>
</tr>
<tr>
<td>Antidepressants</td>
<td>amitriptyline</td>
<td>imipramine</td>
</tr>
<tr>
<td>Anticonvulsants</td>
<td>carbamazepine</td>
<td>valproic acid</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>prednisolone</td>
<td>prednisone</td>
</tr>
<tr>
<td></td>
<td>dexamethasone</td>
<td>betamethasone</td>
</tr>
</tbody>
</table>

For practical purposes, the opioids are divided into those for mild to moderate pain and those for moderate to severe pain, principally on the grounds of common patterns of use.

Codeine and some other opioids for mild to moderate pain are not scheduled drugs in most countries. This may make them more easily available.

Buprenorphine is a partial agonist (i.e. it has a pharmacological ceiling). At low doses (0.2 mg every 8 hours), it is an alternative to codeine. At higher doses (up to 1 mg every 8 hours), it is equivalent to about 30 mg of oral morphine every 4 hours.

Antidepressants and anticonvulsants are the drugs of choice for neuropathic pain. Of value in nerve compression and spinal cord compression pain, also for headache due to raised intracranial pressure. May be used as an alternative to, or in conjunction with a non-steroidal anti-inflammatory drug (NSAID) for bone pain. If used with an NSAID, there is an increased likelihood of adverse gastric effects and of fluid retention.
Drug treatment is the mainstay of cancer pain management. The WHO three-step analgesic ladder approach to systemic pharmacotherapy guides the care-giver in dealing with the different levels of pain the patient experiences: (Figure 7.2)
1. Patients with mild to moderate cancer-related pain should be treated with a non-opioid analgesic (Table 7.5), which should be combined with an adjuvant analgesic if a specific indication for one exists.

Table 7.5. Non-opioid analgesics (Reference 4)

<table>
<thead>
<tr>
<th>Chemical class</th>
<th>Generic Name</th>
<th>Half-life (hours)</th>
<th>Starting (mg)</th>
<th>Max. dose (mg/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-acidic P-aminophenol derivatives</td>
<td>Paracetamol</td>
<td>3-4</td>
<td>50 q4h</td>
<td>6000</td>
</tr>
<tr>
<td>Acidic salicylates</td>
<td>aspirin</td>
<td>3-4</td>
<td>50 q4-6h</td>
<td>6000</td>
</tr>
<tr>
<td></td>
<td>salsalate</td>
<td>-12</td>
<td>1000 q12</td>
<td>4000</td>
</tr>
<tr>
<td>Proprionic acids</td>
<td>Ibuprofen</td>
<td>3-4</td>
<td>400 q6h</td>
<td>2400</td>
</tr>
<tr>
<td></td>
<td>Naproxen</td>
<td>1-3</td>
<td>250 q12h</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>Ketoprofen</td>
<td>2-3</td>
<td>25 q8h</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Flurbiprofen</td>
<td>5-6</td>
<td>100 q12h</td>
<td>300</td>
</tr>
<tr>
<td>Acetic acids</td>
<td>Indomethacin</td>
<td>4-5</td>
<td>25 q12h</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Sulindac</td>
<td>14</td>
<td>150 q12h</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>Diclofenac</td>
<td>2</td>
<td>25 q8h</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Ketorolac</td>
<td>4-7</td>
<td>30 q6h</td>
<td>240</td>
</tr>
<tr>
<td>Oxicams</td>
<td>Piroxicam</td>
<td>45</td>
<td>20 q24h</td>
<td>40</td>
</tr>
<tr>
<td>Fenamates</td>
<td>Mefenamic Acid</td>
<td>2</td>
<td>250 q6h</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>Meclofenamate</td>
<td>15</td>
<td>50 q6h</td>
<td>400</td>
</tr>
<tr>
<td>Pyranocarboxylic acids</td>
<td>Etodolac</td>
<td>7</td>
<td>1000 q24h</td>
<td>2000</td>
</tr>
</tbody>
</table>

2. Patients who are relatively non-tolerant and present with moderate to severe pain, or who fail to achieve adequate relief after a trial of a non-opioid analgesic, should be treated with a so-called "weak" opioid (Table
7.6); this drug is typically combined with a non-opioid and may be co-administered with an adjuvant analgesic.
Table 7.6. Opioid agonist drugs customarily used to treat moderate pain -
Formally called "weak opioids" (References 1, 4).

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose (mg) equianalgesic to 10 mg morphine</th>
<th>Duration</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IM</td>
<td>PO</td>
<td>Half-life (h)</td>
</tr>
<tr>
<td>Codeine</td>
<td>130</td>
<td>200</td>
<td>2-3</td>
</tr>
<tr>
<td>Oxycodone</td>
<td>5</td>
<td>30</td>
<td>2-3</td>
</tr>
<tr>
<td>*Propoxyphene</td>
<td>100</td>
<td>50</td>
<td>2-3</td>
</tr>
</tbody>
</table>

* Not recommended for routine use.

3. Patients who present with severe pain, or fail to achieve adequate relief following appropriate administration of drugs on the second step of the analgesic ladder should receive a so-called "strong" opioid (Table 7.7), which may also be combined with a non-opioid analgesic or an adjuvant drug.

Following the WHO *Three-step analgesic ladder* (Figure 7.2), the non-opioid analgesics are useful alone for mild to moderate pain and provide analgesia when combined with opioid drugs in the treatment of more severe pain. *All non-opioid analgesics have a "ceiling" effect on analgesia* and do not produce tolerance or physical dependence. It is reasonable to initiate therapy at a relatively low dose and then explore the dose-response relationship through gradual escalation until the ceiling dose is reached.

The *opioid compounds* can be divided into agonist, agonist-antagonist, and antagonist classes. The *pure agonist drugs* are most commonly used in cancer-pain management. *They do not appear to have a ceiling effect on analgesia.* When the dose is increased, analgesic effects increase until either analgesia or sedation is achieved.
Table 7.7. Opioid agonist drugs customarily used to treat severe pain - Formally called "strong opioids" (References 1,4).

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose (mg) equi-analgesic to 10 mg morphine (SC)</th>
<th>Duration</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SC</td>
<td>PO</td>
<td>Half-life (h)</td>
</tr>
<tr>
<td>Morphine</td>
<td>10</td>
<td>30 repeated dose</td>
<td>2-3</td>
</tr>
<tr>
<td>Oxycodone</td>
<td>5</td>
<td>15</td>
<td>2-3</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>1.5</td>
<td>7.5</td>
<td>2-3</td>
</tr>
<tr>
<td>*Methadone</td>
<td>10</td>
<td>20</td>
<td>15-190</td>
</tr>
<tr>
<td>*Pethidine</td>
<td>75</td>
<td>300</td>
<td>2-3</td>
</tr>
<tr>
<td>Oxymorphone</td>
<td>1</td>
<td>10 (per rectum)</td>
<td>2-3</td>
</tr>
<tr>
<td>*Levorphanol</td>
<td>2</td>
<td>4</td>
<td>12-15</td>
</tr>
<tr>
<td>Fentanyl transdermal</td>
<td></td>
<td></td>
<td>48-72</td>
</tr>
</tbody>
</table>

* Not recommended for routine use.

The mixed agonist-antagonist opioids and the partial agonist opioids have limited use because of a ceiling effect for analgesia, and a high prevalence of dose-dependent psychotomimetic side effects.

A trial of opioid therapy should be administered to all patients with pain of moderate or greater severity. Patients with moderate pain are more commonly treated with a combination drug containing paracetamol or
aspirin plus codeine. The dose of these combination drugs can be increased as a single agent, or the patient can be switched to a "strong" opioid. Those with severe pain, on the other hand, should be treated with an opioid customarily used in Step 3 of the analgesic ladder from the start.

Selection of analgesic agents

The safe administration of non-opioid and opioid agents requires familiarity with their potential adverse effects.

Non-opioids like aspirin and other NSAIDs have a broad spectrum of potential toxicity and caution is required in the administration of these agents to patients with blood clotting disorders, predilection to peptic ulceration, impaired renal function or concurrent corticosteroid therapy, and to older persons. Paracetamol has fewer side effects than the acidic non-opioid analgesics but hepatic toxicity may occur. Patients with chronic metabolic and liver disease can develop severe hepatotoxicity when the drug is not taken in usual therapeutic doses.

In selecting an opioid, the younger patient without major organ failure can be started on any of the available agonist opioids. In this situation convenience of administration should be a major determinant, and morphine may be preferred. For older persons and those with major organ failure, short half-life drugs such as morphine are preferred because they are simpler to titrate and to monitor than long half-life drugs such as methadone. It is important to always review response to previous trials of opioid therapy. The report of side effects preventing adequate relief with a previously tried opioid may indicate the need for a trial of a different opioid drug to optimize the balance between analgesia and side-effects. Great caution is required in the use of propoxyphene, pethidine and morphine in patients with renal impairment.

Practical aspects of opioid administration

Route

Opioids should be administered by the least invasive and most convenient route capable of providing adequate analgesia for the patient. In routine practice, the oral route is usually the most appropriate.
Alternative routes should be used for patients with impaired swallowing and those with gastrointestinal obstruction.

Rectal suppositories containing morphine are available, and controlled-release morphine tablets can also be administered rectally. A transdermal formulation of fentanyl has also been developed. The sublingual route is effective for highly lipophilic drugs.

Parenteral routes of administration in the form of repeated bolus injections, which may be administered by the intravenous (IV), intramuscular (IM) or subcutaneous (SC) routes, may be useful in some patients but are often complicated by the occurrence of prominent "bolus" effects. Repetitive IM injections have been a common practice, but they are painful, impractical, and their use is not recommended. Repeated bolus doses, if required, can be accomplished without frequent skin punctures through the use of an indwelling IV or SC infusion device. Dosing by SC routes proceeds in a manner identical to continuous IV infusion.

Continuous infusions of drug combinations may be indicated when pain is accompanied by nausea, anxiety or agitation. An anti-emetic, neuroleptic or anxiolytic may be combined with an opioid provided it is non-irritant, miscible and stable in combined solution.

**Schedule of administration**

Patients with continuous or frequent pain generally benefit from scheduled "around the clock" dosing. Pain that breaks through the regular analgesic schedule should be managed with a "rescue dose." Rescue drugs provide a method for safe and rational step by step dose escalation and are applicable to all routes of opioid administration. They may be given as supplemental doses, up to every one to two hours for oral rescue doses, or up to every 15 to 30 minutes for parenteral doses. The following dose should be titrated according to the amount of rescue doses required.

Available controlled release preparations of morphine sulphate typically achieve peak levels three to five hours after administration and have a duration of effect of eight to twelve hours, thus lessening the inconvenience associated with "around the clock" drug administration. Regular morphine tablets or syrup are also available. Long-term patient-controlled anaesthesia (PCA), accomplished via the SC or IV route, is an ambulatory infusion device used to manage acute postoperative pain.
Dose selection and adjustment

Patients in severe pain should generally begin with one of the opioids used for more severe pain at a dose equivalent to 5-10 mg oral morphine every three to four hours. When morphine is used, an IM:oral relative ratio of 1:3 is generally recommended. When patients are switched from one opioid drug to another, the equianalgesic dose table is used as a guide to the starting dose.

Absolute dose is immaterial as long as the balance between analgesia and side-effects remains favourable. The development of inadequate pain relief should be addressed through a step by step escalation by a range of 30-50 per cent of the prior dose. Smaller dose increments do not significantly improve analgesia. Concern about tolerance should not impede the use of opioids early in the course of the disease. Since most patients who require an escalation in dose to manage increasing pain have demonstrable progression of the disease, analgesic tolerance is seldom the dominant factor in the need for opioid dose escalation. The worsening pain in a patient receiving a stable dose of opioids should generally be assessed as presumptive evidence of disease progression or, sometimes, increasing psychological distress.

Management of side effects

A detailed understanding of adverse opioid effects, their prevention, and management will improve patient outcome. The most common adverse side-effects of opioids are constipation, nausea and vomiting. Other important dose-limiting adverse effects include sedation, delirium, myoclonus and respiratory depression.

The likelihood of opioid-induced constipation is so great that laxative medications should be prescribed prophylactically to most patients. A combination of a softening agent (docusate) and a cathartic (senna, bisacodyl or phenolphthalein) is frequently used as necessary.

The incidence of opioid-induced nausea has been estimated to be 10-40 per cent and vomiting, 30-40 per cent. Tolerance to nausea and vomiting usually develops rapidly, and routine prophylactic administration of anti-emetics is usually not indicated except in patients with a history of severe opioid-induced nausea and vomiting. Table 7.8 outlines the management of nausea and vomiting.
Table 7.8. Mechanisms of opioid-induced nausea and vomiting, and their management (Reference 1).

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Suggestive clinical features</th>
<th>Anti-emetic drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stimulation of the medullary chemoreceptor trigger zone</td>
<td>Nausea and/or vomiting shortly after opioid administration.</td>
<td>metoclopramide, prochlorperazine, chlorpromazine, haloperidol, corticosteroid, or lorazepam</td>
</tr>
<tr>
<td>Enhanced vestibular sensitivity</td>
<td>Prominent movement-induced nausea and vomiting, or vertigo</td>
<td>scopolamine, meclizine, or lorazepam</td>
</tr>
<tr>
<td>Increased gastric antral tone</td>
<td>Early satiety, postprandial bloating or vomiting</td>
<td>metoclopramide</td>
</tr>
</tbody>
</table>

Sedation is often associated with the initiation of opioid therapy or significant dose escalation. In most cases, tolerance will develop to this effect after a few days to weeks. Some patients have a persistent problem particularly if other contributing factors exist, and will have to be actively treated (Table 7.9).

Table 7.9. Step by step management of opioid-induced sedation (Reference 1).

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Eliminate non-essential central nervous system depressant medications.</td>
</tr>
<tr>
<td>2.</td>
<td>If analgesia is satisfactory, reduce opioid dose by 25 per cent.</td>
</tr>
<tr>
<td>3.</td>
<td>If analgesia is unsatisfactory, try addition of a psychostimulant. (starting dose: methylphenidate 5 mg bid, dextroamphetamine 5 mg bid or pemoline 18.75 mg bid)</td>
</tr>
<tr>
<td>4.</td>
<td>If somnolence persists, consider:</td>
</tr>
<tr>
<td></td>
<td>- addition of a non-opioid or adjuvant that will allow reduction in opioid dose;</td>
</tr>
<tr>
<td></td>
<td>- switch to a different opioid drug;</td>
</tr>
<tr>
<td></td>
<td>- change to the intraspinal opioid (+) local anesthetic, or neurolytic techniques.</td>
</tr>
</tbody>
</table>

Opioid-induced cognitive impairment also appears to be transient in most patients. Although persistent cognitive impairment solely attributable to opioid use occurs, electrolyte disorders, neoplastic involvement of the CNS, sepsis, vital organ failure or hypoxemia usually contribute to its development. Again, a step by step approach to management is appropriate (Table 7.10).
Table 7.10. Management of Opioid-induced Cognitive Impairment (Reference 1).

1. Eliminate non-essential centrally acting medications.
2. If analgesia is satisfactory, reduce opioid dose by 25 per cent.
3. Evaluate patient for concurrent causes (e.g. sepsis, metabolic derangement, intracerebral leptomeningeal metastases) and treat if possible.
4. If delirium persists, consider:
   - trial of neuroleptic (Haloperidol);
   - switch to a different opioid drug;
   - change to the intraspinal opioid (+) local anaesthetic, or neurolytic techniques.

**Myoclonus** is a less common dose-related adverse effect of opioids which may resolve spontaneously. If the myoclonus is symptomatic and distressing, it can be treated empirically with a benzodiazepine, barbiturate or valproate. Switching to another opioid can be tried.

**Respiratory depression** is the most serious adverse effect of opioid therapy but it is uncommon if the opioid dose is properly titrated. Clinically significant respiratory depression is always accompanied by sedation and mental clouding. Due to the risk of systemic withdrawal and return of pain, naloxone should only be administered for symptomatic respiratory depression. If the patient is arousable and the peak plasma levels of the opioid have been reached, the opioid dose should be withheld and the patient should be monitored until improved. If, on the other hand the patient is unarousable, naloxone should be used to improve ventilation using small bolus injections of dilute solution (0.1 mg in 10 cc saline) which is titrated against the respiratory rate.

**Non-invasive intervention for patients unable to attain an acceptable balance between relief and side effects of systemic opioid therapy**

Even with optimal management of adverse effects, some patients do not attain an acceptable balance between pain relief and the side effects of an opioid. This can be resolved by non-invasive interventions such as (1) reduction of opioid requirement; (2) alternative pharmacological approaches (addition of non-opioid analgesic, addition of an adjuvant drug, switching to
another opioid); and (3) use of cognitive, behavioural or rehabilitative techniques.

**Adjuvant drugs** are drugs that have a primary indication other than pain, but which have analgesic effects in some painful conditions. Corticosteroids are the most widely used general purpose adjuvant drugs. They ameliorate pain and produce beneficial effects on appetite, nausea, mood and malaise. Raised intracranial pressure, acute spinal cord compression, metastatic bone pain, neuropathic pain due to infiltration by tumour, and hepatic capsular distention, are some of the painful conditions that commonly respond to corticosteroid treatment.

**Neuropathic pain** is due to nerve damage, and is described as burning, tingling, pricking or lancinating. Neuropathic pain may be nonresponsive to opioids but respond well to antidepressants and anticonvulsants. For continuous neuropathic pain low initial doses of antidepressants are useful - amitriptyline and imipramine (10-50 mg) may be given at bedtime and may be increased to a full therapeutic dose. For lancinating neuropathic pain, anticonvulsants are effective - carbamazepine (20 mg twice daily) and valproic acid (500 mg at bedtime).

**Metastatic bone pains** are optimally treated by combining opioids with an NSAID, or corticosteroids in difficult cases. Bisphosphonates, which inhibit osteoclastic activity, have also been shown to be effective in relieving malignant bone pain. Palliative radiotherapy should be strongly considered in addition to drug therapy for localized bone pain.

**Psychological interventions** also play a role in the management of cancer pain. Cognitive behavioural interventions help reduce the perception of distress caused by the pain through the development of coping skills and by the modification of thoughts, feelings and behaviour. Relaxation techniques reduce muscular tension and emotional arousal or enhance pain tolerance. Other therapeutic modalities include transcutaneous electrical nerve stimulation (TENS), heat and cryotherapy. Immobilization devices enhance comfort for patients with pain precipitated by weight-bearing or ambulation.

**Invasive interventions for patients unable to attain an acceptable balance between relief and side effects during systemic pharmacotherapy**

Patients who are unable to achieve a satisfactory balance between analgesia and side effects from systemic analgesic therapies may be
candidates for the use of invasive anaesthetic and neurosurgical techniques. These approaches, which include regional analgesic techniques (spinal and intraventricular opioids), neural blockade and neuroablative techniques, reduce the requirement for systemic opioids.

Intraspinal opioid and local anaesthetic administration may achieve a satisfactory balance between analgesia and side effects without compromising neurological integrity. The use of neurodestructive procedures should therefore be based on an evaluation of the likelihood and duration of analgesic benefit, the immediate and long-term risks, the likely duration of survival and the anticipated length of hospitalization.

**Use of sedation**

Sedation also plays a role in the management of intractable pain for patients who fail to benefit from other therapeutic methods. For some patients, adequate relief of physical symptoms can only be achieved at the cost of profound sedation.

Sedation can be accomplished through the use of systemic opioids, with either benzodiazepine (e.g. lorazepam or midazolam), a neuroleptic (e.g. chlorpromazine or methotrimeprazine), or a barbiturate (e.g. thiopental) in combination with an opioid. The patient with advanced cancer and uncontrolled symptoms may choose transitory use of sedating therapy while continuing trials of analgesics. Controlled sedation can be offered initially as temporary respite therapy using a short half-life drug which can be titrated down to re-establish lucidity after an agreed interval or for preplanned family interactions. Alternately, patients with persisting distress despite an initial respite, and those in whom death is imminent may elect to be deeply sedated until death ensues.

The ethical basis of the latter approach is based on the "principle of double effect," which distinguishes between the compelling primary therapeutic intent (to relieve suffering) and unavoidable untoward consequences (the potential for accelerating death). This approach recognizes the right of dying patients to adequate relief of pain, and the right of all patients to choose between appropriate therapeutic options. No patient should have to ask to be killed because of persistently unrelieved pain and no patient should be sedated without appropriate informed consent of the patient or proxy. It is the responsibility of the physician to ensure that the patient, family and attending staff have a comprehensive understanding of this intervention.
Successful long-term management requires continuity of care that provides an appropriate level of monitoring and responds quickly, flexibly and expertly to the changing needs of the patient. Patients with refractory pain, or unremitting suffering related to other losses or distressing symptoms, should have access to specialists in pain management, palliative medicine and psychooncology, who can provide expert assistance in the management of these complex problems.

Treatment should always begin with a straightforward explanation to the patient of the causes of the pain. The patient should also be enlightened on the benefits and risks of each method of obtaining pain relief. When patients equally prioritize optimal comfort and function, the therapeutic goal is to achieve an adequate degree of relief without compromising cognitive and physical function. When comfort is the overriding goal of care, it may be appropriate to continue therapies that may impair cognitive function, or even foreshorten life expectancy.

**Opioid Availability**

It is unfortunate that millions of people suffering from cancer pain are still not treated properly because of:

1) lack of concern by many governments, resulting in an absence of national policies on cancer pain relief and palliative care;

2) lack of professional awareness and education;

3) prevailing sociocultural perceptions that cancer is synonymous with suffering, and that nothing can be done about it;

4) overly restrictive regulations on the medical use of opioids, and an inadequate supply of drugs; and

5) fear of addiction.

Traditionally, opioid analgesics have been used to manage acute pain. Long-term use of opioids has been discouraged because of the fear of tolerance or physical or psychological dependence. Research into the management of cancer pain has produced new knowledge about pain and how opioids act in the body in relation to pain. In general, studies on the use of opioids to treat pain in cancer patients indicate that the public and professional expectations about relief from cancer pain should be much higher than they are at present.
According to the Single Convention on Narcotic Drugs (SCND), the principal international treaty regulating the availability of opioids, the medical use of narcotic drugs continues to be indispensable for the relief of pain. It also, however, believes that addiction to narcotic drugs constitutes a serious evil. The convention classifies opioids; requires registration of all handlers and the estimation of medical needs for opioids; establishes rules concerning production, manufacture and distribution of opioids; and requires statistical reports on opioid consumption. It also governs how opioids are shipped between countries and defines to some extent the requirements for safe distribution within a country. The broad purpose of the convention is therefore to prevent the abuse of narcotics or opioids while guaranteeing their availability for medical use. The International Narcotics Control Board (INCB) is responsible for administering the SCND.

A country obtains its supply of opioids for medical purposes by importation, domestic manufacture or both. These opioids are then distributed by manufacturers or wholesalers to hospitals and pharmacists, and subsequently dispensed to patients by health care personnel.

Communication between health workers and drug regulators is essential in order to ensure that each understands the other's aims. It is important for health workers to understand the opioid distribution system in their own country, to learn about the national estimate of opioid needs and to be aware of the concerns of regulators. Morphine consumption varies greatly from country to country. Consumption figures do not completely indicate the extent to which opioids are used for treatment of moderate to severe cancer pain; they do, however, probably provide the best single indicator available. Opioid abuse is a reality and health care workers must cooperate in the campaign to prevent the diversion of opioids for non-medical use.

Many countries have encountered difficulties in obtaining and distributing drugs for any type of illness. Inavailability of drugs may also be due to inadequate funding of health services, lack of health care delivery infrastructure and inadequate facilities for the storage and distribution of medicines.

It is also important for the regulators to understand the importance of pain relief, both for individual patients and for public health in general. Information about cancer pain, where and how cancer patients are treated, and the training of health care personnel will help regulators whose job is to ensure the integrity of the distribution system. The knowledge that opioid use needs to increase will help regulators to make appropriate changes in the annual estimate.
Health workers should make the following salient facts about pain relief familiar to regulators:

1) **Psychological dependence (drug addiction) is rare among cancer patients who receive opioids for pain relief.** Confusion about physical dependence and psychological dependence or addiction has largely contributed to the undertreatment of pain. **Physical dependence** is a pharmacological property of opioid drugs, defined by the development of withdrawal syndrome following either abrupt dose reduction or administration of an antagonist. Patients also become physically dependent on corticosteroids or beta antagonists, but are not considered addicted to these drugs. This problem is avoided by tapering of drug schedule if cessation is warranted, and if opioid antagonists are avoided. **Addiction** refers to the psychological and behavioural syndrome characterized by continued craving for an opioid drug to achieve a psychic effect and associated aberrant drug-related behaviour. Thus, the term addiction should never be used when physical dependence is meant.

2) **Oral forms of morphine are preferred** because the patient may be able to live at home and painful injections are eliminated. However, the oral dose needs to be two to three times higher than the injection dose to achieve the same degree of pain relief. Thus, the total amount of drug needed will increase significantly.

3) **Pethidine**, often relied upon for treatment of acute pain, is not recommended for patients with chronic pain because accumulation of a toxic metabolite may occur, causing myoclonus and seizure. Morphine and other opioids are preferred and should be included in the national estimate.

Health care workers should tell regulators exactly which opioids are needed, including the dosages and dosage forms required, in order to ensure that the estimate is adequate to meet the needs of the patients.

The use of opioids for patients may only be carried out by registered parties and only according to a physician’s prescription. Certain records must be kept, and reports of consumption must be filed with the national regulatory authority.

It is recommended that the hospice/palliative care governing body should adopt a formal policy that recognizes that pain and symptom management is a core purpose of hospice/palliative care, and that the availability of both opioid and non-opioid drugs must be ensured according to policies and procedures that are consistent with the WHO analgesic
method and legal requirements. The policy statement should assign specific responsibilities for implementation.

The following questions should be addressed in formulating hospice/palliative care policy and procedures on opioid availability:

1. **Responsibility for legal authorizations** (A copy of the national narcotics control law and regulations should be available).
   - What licences or registrations are necessary to fully comply with legal requirements?
   - Who is responsible for obtaining licences and maintaining compliance?
   - Who is responsible for maintaining communication with relevant government bodies?

2. **Responsibility for supply**
   - What drugs and what dosage forms are necessary?
   - If needed drugs are available at an affordable price in the country, who are the suppliers?
   - If not, who is responsible for seeking assistance from the government drug control authority groups?
   - Who is responsible for estimating the amounts needed?
   - Who is responsible for ensuring that all steps to obtain opioids are accomplished in a timely way?
   - Who is responsible for purchasing?

3. **Responsibility for safety and monitoring**
   - Who is responsible for receiving the supply?
   - Who is responsible for maintaining safe storage according to legal requirements?
   - Who is responsible for counting the drugs, calculating the balance, maintaining accurate records, monitoring consumption, and reporting and investigating any discrepancies?
4. Responsibility for prescribing

- Who is authorized to prescribe?
- Who is responsible for maintaining the supply of prescription forms?
- What are the restrictions on prescribing; for example, how much can go home?
- What records are required?

5. Responsibility for dispensing

- Who is responsible for dispensing drugs, especially during evenings, weekends and holidays?
- What records are required?

6. Responsibility for giving drug to patients

- Who is responsible for taking the drug from the supply to the patient?
- What records are required?

7. Responsibility for emergencies

- Who is responsible for providing the drugs for medical emergencies, increase in pain, vomited dose?
- Who is responsible for providing emergency supplies during evenings, weekends and holidays?

8. Responsibility for disposal

- Who is responsible for returning or disposing of "left-over" medications?
- What records are required?
9. Responsibility for informing patients and families about drug use

- How and when to take.
- How to keep safe.
- Who to contact if there are problems.
- What should be done with left-overs.

10. Responsibility for updating policy according to needs and changes

11. Responsibility for educating current and new staff about policy

Relief of other symptoms

Symptom management requires an understanding of underlying causes. Symptoms in advanced cancer are caused by the disease itself, either directly (e.g. intestinal obstruction due to cancer) or indirectly (e.g. decubitus ulcer due to debility); by the treatment given (e.g. adverse effects of anticancer drugs); or by a coexistent disorder (e.g. arthritis) that is unrelated to the cancer.

A patient may have multiple symptoms. An unrelieved symptom (e.g. pain) may give rise to, or worsen other symptoms (e.g. dyspnoea, anxiety, anorexia), symptoms which in turn can accentuate the perception of the dominant symptom (e.g. pain) thus creating a vicious circle.

Symptom management is often empirical (i.e. based on experience and observation) and evolves constantly in response to new research and clinical trials. There is already a large body of knowledge on how to successfully palliate the symptoms of patients with incurable cancer. Most of the methods can be implemented at home. Details on the management of individual symptoms can be found in the list of references and recommended readings.
General principles

- **Careful evaluation** is the essential basis for symptom management and is the responsibility of both doctor and nurse. The evaluation should include not only physical problems but also social, psychological and spiritual aspects. This approach aims to build a picture of the disease itself, of the patient as a whole and the effects of the illness on the patient’s quality of life.

The priorities of evaluation are:

- to identify the patient’s main symptoms and concerns;
- to listen carefully to what the patient is saying; and
- to believe what the patient is saying.

- A detailed history should be taken, which should include questions about the main symptom(s). Supplementary information from the patient’s relatives or care-givers is often invaluable.

**Routine questions to evaluate the nature and severity of a symptom include:**

- **How does the symptom affect the patient’s life?**
- **How does the symptom affect the patient’s physical function and mobility?**
- **What makes the symptom better? Any particular position, activity, food or medicine?**
- **What makes the symptom worse?**
- **Is the symptom worse at any particular time of day or night?**

The information obtained usually indicates one or more causes for the symptom(s) and provides a basis for effective treatment.

- **Teamwork.** As in other areas of medical practice, palliative care requires coordination and cooperation among health workers, patient and family.

- **Planning.** Effective palliative care is based on planning and, as far as possible, anticipation of crises (e.g. regular examination of the mouth and skin identifies problems at an early, often asymptomatic stage). Some problems are easier to treat if detected early. Many problems
may be delayed, and even prevented, when they are anticipated and proper precautions are employed.

Each patient needs an individual treatment plan which should be understood by all concerned: health workers, patient and family.

• **Preparation.** Crises can often be prevented by careful planning. Health workers should make sure that the family is aware in advance of the problems that could occur, and of how to deal with them.

• **Explanation.** Patients, families and care-givers should be informed about the likely cause(s) of the symptom(s) and what treatment options are available. Such information should be given clearly and concisely, in words that are easy to understand.

• **Education.** Health workers are trained mainly within hospitals and therefore tend to learn a hospital model of care. Palliative care, however, is often based at home. Treatment plans should be adaptable for home use and must include education of patients and their families.

• **Psychological distress** tends to make symptoms worse. For example, severe dyspnoea almost always causes anxiety, which in turn may worsen dyspnoea. Treatment must address both physical and psychological aspects of symptoms.

### Principles of Treatment

Symptoms such as pain can often be relieved completely. Others, such as dyspnoea or intestinal obstruction, may be only partly relievable. When complete relief of symptoms is not possible, the aim of treatment is to help the patient move from a feeling of helplessness to a feeling of supremacy over the symptoms. Practical advise and psychological support are crucial to achieve this objective.

Patients need help and support to maintain independence for as long as possible. Physical limitations may be reduced by treatment and mobility aids. Disease-specific treatment (e.g. radiotherapy for bone metastases to enable the patient to ambulate) may also be helpful, even if the illness is incurable. Such treatment should be given in combination with symptomatic treatment.

A successful treatment plan requires accurate evaluation of the patient as described above and should consider non-drug methods and/or drug
therapy. The two approaches are often used in combination (multimodality treatment).

Most symptoms can be improved by the following non-drug measures:

- explanation and reassurance;
- avoidance of factors that make the symptoms worse, and promotion of factors that make the symptoms better;
- correction of biochemical abnormalities (e.g. hypercalcaemia, hyponatraemia);
- treatment of concurrent disease (e.g. chest or urinary tract infections, cardiac failure);
- identification and treatment of psychosocial problems and disorders (e.g. anxiety, depression, delirium); and
- specific anticancer treatments (e.g. radiotherapy) which may be used to relieve symptoms, even in patients with incurable disease.

Drugs are the mainstay of management for many symptoms. Four principles underlie their use in palliative care:

"By Mouth" Drugs should be given by mouth when possible.

"By the clock" Drugs should be given at appropriate regular intervals to ensure continued relief of persistent symptoms. The timing of doses should take into account the pharmacology of the drug(s) and the metabolic state of the patient.

"For the individual" Drug doses should be adjusted to achieve maximum benefit with minimum side effects.

"Keep it simple" Treatment should be as straightforward as possible to ensure that the patient takes the right dose at the right time.

Before a new drug is prescribed, the patient's other medications should be reviewed to exclude the possibility of drug interaction which may cause new symptoms to develop or worsen existing symptoms. The relevant drugs may have to be changed or discontinued.
Social, psychological and spiritual support

Psychosocial aspects

Unless the considerable social and psychological needs of patients with advanced cancer are recognized and attended to, relief of pain and other symptoms may be difficult to attain. These needs are common to cancer patients in all cultures. Many patients, however, will not raise psychosocial concerns without prompting. Health workers and carers must not only develop an awareness of these concerns, they must also be willing to spend the time that is required for their detection, evaluation and alleviation.

The person closest to the patient may not be the next of kin, or even a relative. Health workers need to recognize and appreciate that the nature of close relationships varies widely. Lack of support for those caring for a patient at home is often the precipitating factor in the admission of a dying patient to hospital. The social worker should be an integral member of the palliative care team, providing additional psychological support for both patient and family and helping to identify and resolve practical, social and financial problems. Good support should include the following elements:

- **Practical support.** This should include, when indicated, instruction in skin care and the prevention of bedsores, how to lift a paralysed patient and how to cope with incontinence. Support of this kind can be provided by general medical practitioners, community nurses, physiotherapists, occupational therapists, social workers or welfare officers.

- **Emotional support.** Family carers should be the patient’s main source of psychological support and they can be helped in this role by appropriate counselling. They should be made aware of the patient’s psychological needs and of common reactions to life-threatening illness. Nurses, social workers and physicians will usually be responsible for this aspect of family support, but trained volunteers and community groups can effectively supplement family and professional support.
• **Day care and inpatient beds for respite care.** In some cases, a patient's attendance at a day care centre and/or admission to a palliative care centre or hospital as an inpatient may be necessary to provide respite for family carers.

• **Farewell leave.** In developing countries, most patients die at home in the care of the family. In developed countries, by contrast, death more often occurs in an institution, although much of the terminal care could be provided as effectively and more economically by the family. Countries with a health care structure that allows, for example paid maternity leave, should consider establishing paid leave for those who care for the terminally ill. Denmark has already introduced this concept: when a physician has judged that further anticancer treatment is futile, paid leave is granted to a close relative to care for the patient at home when possible and desirable. In 1989, Sweden introduced 30 days' paid leave for the principal carer. In Norway, although no official mechanism for paid leave has yet been established, a similar system frequently operates: the physician declares that a close relative or friend is the key carer and then arranges for standard sick-leave compensation.

• **Bereavement support.** There is evidence that those who lack support in their bereavement have a higher rate of morbidity. All relatives and friends will need to discuss the events surrounding the death of the patient. This can be encouraged by attentive listening by a professional health care worker or suitably trained volunteer. They may need to be followed up for several months, sometimes much longer, and this is particularly true for bereaved people with limited social support. To be effective, a bereavement programme must have defined goals and a consistent method of follow-up, and must concentrate its efforts on those individuals at greatest risk.

If the psychosocial care of cancer patients is to be satisfactory, professional health care workers must be trained in psychological assessment and counselling skills. Few physicians and nurses involved in cancer care receive any formal training in these areas and often have little time available in the working day for their application.
**Basic skills** that should be taught to and mastered by all physicians, nurses and social workers include:

- recognition of the nature and prevalence of the psychosocial distress associated with cancer and its treatment;

- knowledge of the signs and symptoms that distinguish morbid reactions, requiring special intervention, from normal reactions;

- ability to acknowledge, clarify and organize key verbal and nonverbal cues that patients and relatives give about their problems;

- ability to maintain the focus of an interview, helping patients and relatives stick to the point without alienating them;

- ability to explore highly emotive topics, e.g. worry about the future or the impact of illness on a personal relationship, in a way that is constructive yet allows the expression of feeling; and

- the use of open-ended (“How are you feeling?”) and non-directive questions (“How did you feel about having a stoma?”).

These skills can be improved through the provision of written and visual materials that make the methods more explicit. In addition, practice through role-play with videotape feedback of performance will enhance learning. Situations that are most commonly practised in role-play include:

- basic psychological assessment;

- breaking bad news;

- coping with a patient who has been misled about his or her prognosis;

- handling difficult questions;

- dealing with anger;

- challenging denial:

- establishing dialogue with a withdrawn patient; and

- facing relatives after the death of the patient.
Published data indicate that the acquired skills persist, but follow-up workshops within 6-12 months of the original teaching sessions would help consolidate learning and facilitate the discussion of difficulties encountered in clinical practice. Participants could then move on to more advanced counselling tasks.

**Training** within the working environment is an alternative approach. Ideally, it should be possible to offer training to staff at all major cancer centres with the help of suitably trained and experienced tutors.

More teachers will be needed if training in assessment and counselling is to be improved. Cancer specialists, psychiatrists, psychologists, specialist nurses and social workers already committed to improving psychological and social care are clearly valuable resources. Most of them, however, need training in the use of appropriate teaching methods.

**Spiritual aspects**

"Spiritual" refers to those aspects of human life relating to experiences that transcend sensory phenomena. This is not the same as "religious", though for many people the spiritual dimension of their lives includes a religious component. The spiritual aspect of human life may be viewed as an integrating component, holding together the physical, psychological and social components. It is often perceived as being concerned with meaning and purpose and, for those nearing the end of life, this is commonly associated with a need for forgiveness, reconciliation and affirmation of worth.

Patients should be asked about the spiritual aspects of their lives. Some find these areas vague, or even threatening, and questions must be asked gently, with full respect for the patients' rights to their own values and beliefs, and acceptance of their right to remain silent about them.

Information about patients' concepts of deity may be elicited by asking whether religion or God is significant to them and, if so, by asking for a simple description. Questions that focus on sources of hope and strength may also open up this area of care, (e.g. "To whom do you turn when you need help?").

It is important to enquire about religious practices, with special attention to those that impinge upon hospital life or health care. Questions that focus on the relation between spiritual beliefs and health may also be
helpful (e.g. "Has being sick made any difference to your beliefs or to the practice of your religion?")

Patients have the right to expect that their spiritual experiences will be respected and listened to with attention. The relating of such experiences, and the reflection on their meaning, frequently offer a kind of inner healing. When patient and carer have a relationship based on mutual respect and trust, there can be a place for the sharing of stories, conversations about the meaning of life and the purpose of suffering, and even participation in religious rituals. A caring relationship that is able to incorporate spiritual aspects has added potential for inner healing. Two premises must be borne in mind:

- Respect for people’s beliefs is imperative. Carers do not have to agree with people’s beliefs or practices in order to take them seriously. Non-believers can affirm their contribution to a sense of well-being and integrity in others.

- Supportive intervention in this area must be offered in ways that are non-sectarian, non-dogmatic and in keeping with the patient’s own views of the world. Patients who wish to participate in private or communal spiritual or religious activities must be enabled to do so. At times they may need privacy and access to spiritual advisers.

Cancer pain relief and palliative care in children

Cancer in children is a major health problem. Each year approximately one hundred and thirty million children between 0-14 years of age develop cancer. In developed countries it is the single leading cause of death from disease in 1-14 year olds. Approximately 67 per cent of children can be cured when they are diagnosed early and receive curative therapies. The specific cure rate depends upon the type of cancer. Unfortunately, however, most children with cancer do not receive curative therapies because the majority are in developing countries. Because their disease is too far advanced by the time they are diagnosed, because curative therapies are not available and because the treatment of childhood cancer has not been a priority in all countries, most children with cancer in developing countries will die. Thus, the emphasis of care for many children should be primarily palliation.
Almost all children with cancer experience some pain during the course of their illness: pain caused by disease; by invasive procedures; by treatments; and by psychological distress. At present, there are no accurate figures on the worldwide magnitude of different types of cancer pain in children, because countries differ widely in their diagnostic capabilities and reporting systems. However, recent documentation of childhood cancer pain within specific treatment centres in developed countries indicates that all children with cancer do experience pain related to their disease and/or treatment, with more than 70 per cent of children suffering from severe pain at some point. Unfortunately, children's pain is often not recognized and, if recognized, is often inadequately treated even when resources are available, and even though pain relief is an achievable goal.

Unrelieved pain places an enormous additional burden on children and families. Children become afraid of future pain and mistrust and fear hospitals, staff, needles and other procedures. With pain, children become irritable, anxious and restless. They may develop night terrors, flashbacks, sleep disturbance and eating problems. Children with uncontrolled pain may feel victimized, depressed, isolated and lonely. Pain may also impair the child’s capacity to cope with cancer treatment.

Families of children who are in pain often feel anger and distrust of the medical system, and depression and guilt for not being able to prevent their child’s pain. They may have conflicts with their child and will have disturbing memories of their child’s pain and suffering. Poorly-managed pain also affects health care workers. It numbs empathy, creates guilt and encourages denial that children are suffering. The effects of poorly-managed pain endure for the child and family. Children can suffer from post-traumatic stress symptoms, phobic reactions, depression and increased pain years after the end of treatment.

Several misunderstandings have fostered inadequate pain control in children with cancer. These include:

- unfounded fears of drug addiction, so that opioid analgesics are administered only as a last resort and children often do not receive the potent analgesics required to relieve severe cancer pain;
- misunderstanding of the pharmacodynamics and pharmacokinetics of opioid analgesics in children, so that drugs are prescribed at inadequate doses, inappropriate dosing intervals, and through painful or less effective routes of administration;
- lack of knowledge about the nature of a child’s perception, so that many individuals who treat children with cancer fail to evaluate and treat a child’s pain based on all causative and contributing factors; and
lack of information about the simple physical, behavioural, cognitive and supportive methods that reduce pain, so that health professionals do not teach practical methods that effectively reduce cancer pain and suffering to children and parents.

The nature of children's pain

From a very young age, children understand the basic concept of pain and can describe both its emotional and physical aspects. Yet, pain is a difficult sensation to define simply and precisely. The International Association for the Study of Pain (IASP) define "pain" as:

"An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage."

Pain is always subjective. Each individual learns the application of the word through experiences related to injury in early life. It is unquestionably a sensation in a part or parts of the body, but it is also always unpleasant and therefore also an emotional experience.

Health providers must recognize that each child, parent and sibling reacts to a potentially fatal illness individually, in a manner consistent with his/her own personality and past experience and the particular meaning of the disease. To support and assist children, one must know the children and their families, their beliefs about life and death and their current sources of emotional support. Such an approach represents the concept of palliative care.

Types of cancer pain in children

Almost all children with cancer experience pain at some point during their illness: pain caused by the cancer itself, by treatments, by invasive diagnostic or therapeutic procedures, and incidental pain from unrelated causes. Childhood malignancies differ from adult malignancies in that children suffer more commonly from haematologic neoplasms than solid tumours. When curative therapies are available, children's cancer often responds promptly to treatment and they experience prompt pain relief. However, some children may suffer persistent pain for a lengthy period. When curative therapies are not available, death is often rapid.
The most common childhood malignancies, such as leukaemia, lymphoma and neuroblastoma, often produce diffuse bone and joint pain. Leukaemia and lymphomatous disease, along with brain tumours and certain solid tumours, can produce headaches from meningeal irritation and obstruction with increased intracranial pressure.

Disease-related pain can be secondary to that caused by procedures or to treatment side effects. For many children, these pains are the worst part of their disease, account for the majority of the pains they experience, and intensify as repeated procedures are required. Procedures include (1) diagnostic and therapeutic procedures, such as bone marrow aspirations, lumbar punctures or venipunctures and (2) surgical procedures for diagnostic or therapeutic purposes such as amputations. Children can experience many types of pain caused by the side effects of chemotherapy, radiation and medications. These include: mucositis, neuropathies, radiation reactions, and infections from neutropenia.

In the developed world, the major sources of pain in children’s cancer are diagnostic and therapeutic procedures. In the developing world, the major source of pain is disease-related pain.

**Therapeutic strategies**

Comprehensive pain management includes active treatment of the cancer as well as pharmacological and non-pharmacological interventions to decrease pain and suffering. These methods can be incorporated into a flexible programme for children in which parents, siblings and significant family and community members assist the health care team.

The management of a child’s cancer pain begins with a comprehensive physical examination and pain assessment to determine the sensory characteristics of the pain (location, quality, intensity, duration), the primary underlying etiology and the secondary contributing physical and psychological factors. For effective pain relief, treatment must be targeted to the primary pain source and to the multiple secondary sources. The chronology of the disease, previous therapy and the child’s individual characteristics must be considered carefully, in order to select the most appropriate drug and non-drug therapies. *Children’s cancer pain can be controlled if basic principles of pain management are followed.* While complete relief of pain may not always be possible, this strategy will significantly improve pain control for all children.
Pain assessment

Pain assessment facilitates diagnosis and disease monitoring, and enables the health professional to alleviate needless suffering. Information about pain - location, quality, severity and duration - should be viewed as important clinical signs. A child’s pain may signal a change in the disease process. Pain assessment is a continuous process because the disease process and the factors that influence a child’s pain change over time. Thus, pain assessment must include not only measuring pain severity at a given point in time, but must also include an evaluation of how each of the health care, child and family factors may influence the pain. The responsibility for pain assessment should be shared by the child’s relevant carers, both health professionals and the concerned people surrounding the child.

The **ABC** of pain assessment in children:

**A**lways evaluate a child with cancer for potential pain, because children may experience pain even though they may not tell you in words. Infants and toddlers can only show their pain by how they look and act. Older children may deny their pain for fear of more painful treatments.

**B**e careful to consider pain as an integral part of the physical examination. Physical examination should include checking their muscles, bones, spinal areas and viscera for potential pain sites. The child’s reactions during the examination - grimacing, contracture, rigidity, etc. - may indicate pain.

**C**onsider the impact of family, health care and environmental factors on the child's pain.

**D**ocument the child's pain severity on a regular basis. Use a pain scale that is simple and appropriate for the developmental level of the child, and applicable within the cultural context in which it is used.

**E**valuate the effectiveness of pain interventions regularly and modify the treatment plan as necessary, until the child does not have pain.

There are many ways to document a child’s pain severity to obtain an accurate and ongoing record. It is possible to make some degree of assessment of any child’s pain, even the critically ill or cognitively impaired child. When children are unable to describe their pain in words
they must be carefully watched for behavioural signs of pain. Pain behaviour may vary depending on whether or not the pain is brief or persistent.

Many young children exhibit more obvious physical distress when a brief pain is strong. In contrast, children with persistent pain usually exhibit more subtle signs of pain. Thus, parents and significant family members have a particularly important role in their pain assessment because they know their children and recognize the very subtle changes in a child’s manner or behaviour that are caused by pain.

Younger children (under 6 years of age) will only be able to describe the general amount of pain they feel, while older children can also describe other aspects -- the severity, quality, location, duration, and changes in the pattern over time. Assessing pain severity as "there", or "not there," or on three levels, such as "small," "medium", and "large" can be adequate for a child. All pain scales are based on the concept of counting, which is universal. Thus, practical pain tools can be developed for all cultures. When possible, you should ask a child "how strong is your pain now?" Children could answer comparing their pain severity, for example, to the number of fingers they show (0-10), to the distance between their hands (close - far apart), or to units of the country's currency (e.g., number of rupees), or they could use tools, such as an abacus or ruler.

The same pain scale should be used to assess the child’s pain as their response to intervention. Appropriate pain control therapies should be adjusted until the child’s pain is controlled. A child’s pain level is an essential vital sign and should be regularly recorded on the child’s medical record.
Guidelines for non-drug pain therapy

Non-drug therapies must be an integral part of the management of children’s cancer pain, beginning at diagnosis and continuing throughout treatment. These therapies can easily be used in different settings and may modify many of the factors that usually increase children’s pain. In some situations they activate sensory systems that block pain signals. At other times, they trigger children’s own internal pain-inhibitory systems. Non-drug approaches supplement drug methods. They are not substitutes for appropriate drug treatment.

Non-drug pain therapies may be categorized as supportive, cognitive, behavioural or physical. Supportive therapies support and empower the child and the family. Cognitive therapies influence children’s thoughts. Behavioural therapies change behaviour and physical therapies change children’s sensory systems.

Supportive methods

Supportive methods are basically good psychosocial care of children. The first principle is that care is family-centred, in other words, based on the family’s and the child’s needs. An important aspect is parental involvement in decision-making and in providing comfort to children. Parents need a receptive environment and they may need instruction in how best to help their child. The importance of the family in ensuring the general health and well being of children was recognized in a World Declaration on the Survival, Protection and Development of Children at the World Summit for Children.

Another element of family-centred care is making the clinic or hospital environment friendly to families. This will include having liberal visiting hours and a physical atmosphere conducive to family participation. Even more important is making a child’s family and community feel welcome.

Throughout the world, culturally-specific pain-reduction techniques or folk remedies, are used. They reflect the traditional wisdom, loyalties, and trust of the family, and the social sanctions of the community. It is important to respect folk remedies and to establish their compatibility with treatment, taking care not to alienate the family.
If families are not accurately informed about the diagnosis and treatment plan, they cannot participate. Information is accepted best if it is tailored to the needs of the child and the family. Health care providers should individualize their approach, depending on the family’s style. Information is best given empathically, in small doses and repeated frequently as needed. Booklets, videos, drawings and dolls can be used.

Lying to children about painful procedures will cause them to distrust what will be done to them in the future. Some families will want greater involvement than others. In some settings the community will be able to provide support.

It is best to give the child choices about which techniques to use to control pain. Choice is also desirable for decisions which do not interfere with treatment such as which finger to stick.

Play is an essential part of every child's daily life and even the most seriously ill child can be supported to play. Therefore, all children must have the time and place to play, and painful procedures must not be done in play areas. Normal activities such as school, visits by friends, hobbies and work should be encouraged.

Cognitive methods

Cognitive methods involve influencing the child’s thoughts and images. Parents are often very skilled at using cognitive methods because they know their child’s preferences. Distraction actively absorbs children’s attention. The more involved the child is in the activity the more likely it is to distract from pain. Infants and young children require concrete events or objects to attract their attention. Interesting toys with things to see, hear and do are usually best. Older children benefit from concentrating on a game, conversation or a special story. Music, which can range from a mother's lullaby to a music recording on a tape recorder, is a universal soother and distractor. It is best to have the child select the music.

Imagery is the process in which a child concentrates on the image of a pleasant and interesting experience instead of the pain. Children can be helped by an adult to become absorbed in a previous positive experience or an imaginary experience or adventure. Storytelling is a powerful way to engage children’s imagination and to distract them.
**Behavioural methods**

Deep breathing is a simple way to help the child to reduce pain and gain self-control. Deep breathing focuses the child's attention, reduces muscular tension, relaxes the diaphragm and oxygenates the body. It is best to start teaching this by asking the child to breathe out, and let go the tension, or scary feelings, with each breath. Younger children can be taught to breathe deeply by blowing bubbles made from liquid soap or by using party blowers. Older children can use more sophisticated breathing techniques such as breathing in and out, each for the count of three.

Progressive relaxation is a useful technique for adolescents. Sequential tensing and relaxing of muscle groups is done while the teenager is lying down. Relaxation is often combined with suggestion and deep breathing. These methods can reduce anticipatory anxiety and help reduce nausea and vomiting.

**Physical methods**

Touch is important for all children, particularly the pre-verbal child, who understands the world through touching and feeling. Touch must be appropriate for the children’s needs, that is, not too invasive either physically or psychologically. Touching includes: stroking, holding and rocking, caressing, massaging hands, back, feet, head, tummy and swaddling. Vibration or tapping can also be comforting. When talking takes too much effort, touch can be the best form of communication. Cuddling is a form of touch that combines several different aspects and is a comfort to most children. When touching the child for medical purposes, e.g., palpating an abdomen, care must be taken to use warm hands, to proceed gently, talking quietly with the child about what is being done.

Heat and cold are often easily available. Ice wrapped in a cloth can be used for disease pain, inflammation, or for procedure pain such as intramuscular injection. Ethyl chloride spray offers some anaesthesia for the pain from needle punctures. Heat is useful for muscle pain. Cold and heat should not be used on infants.

TENS or Transcutaneous Electrical Nerve Stimulation consists of a battery operated device that delivers electrical stimulation trough electrodes placed on the skin. Children often experience TENS as tingling or tickling. It must not be painful. TENS is simple to use, effective and requires little preparation. Children and their families can often use TENS
after simple instruction and an explanation as to what the unit looks like and what the child may feel.

Guidelines for analgesic drug therapy

When analgesic drugs are used correctly, pain can be relieved in most children. The four concepts underlying the use of analgesics for relieving children’s cancer pain are "by the ladder", "by the clock", "by the appropriate route," and "by the child".

"By the Ladder"

The same principles of the WHO Three-Step Analgesic ladder described earlier for adult patients are also used for children.

"By the Clock"

Medications should be administered on a regular schedule by the clock, not on a pro re nata (prn) basis -- unless a child’s pain episodes are truly intermittent and unpredictable. On a prn basis, children must experience pain before they are able to obtain pain relief. They may fear that their pain cannot be controlled and may become increasingly frightened. In addition, the doses of opioids required to relieve existing or breakthrough pain are higher than those required to prevent the recurrence of pain.

"By the Appropriate Route"

Medications should be administered to children by the simplest, most effective and least painful administration route; this is usually by mouth. Analgesics may be administered optimally by the oral route in tablets and elixirs. Alternatively, the intravenous, subcutaneous and transdermal routes can be used.

In general, intramuscular injections should not be used unless absolutely necessary as they are painful and frightening to children who, as a result, may not request pain medication or may deny that they have pain when checked by the medical staff. Rectal administration is unpleasant for many children but is preferable to intramuscular administration. If injections are necessary, a mixture of
2.5 per cent lidocaine and 2.5 per cent prilocaine, in the form of a
cream, or other topical formulations of lidocaine, helps in reducing pain
caused by needles.

A new approach is patient-controlled analgesia (PCA), a method for
administering drugs either intravenously or subcutaneously, in which
children, over about seven years of age, push a button to give
themselves a rescue dose of drug for breakthrough pain. A pre-set
analgesic dose is delivered into an infusion line by a computer-driven
pump. For safety, there is a timed lock-out period after each dose so
that additional doses cannot be delivered for a specified time period.
PCA may be used alone or with concurrent continuous infusions.

"By the Child"

Doses of all medications must be based on each child’s circumstances.
There is no one definite dose that will be appropriate for all children
with pain. The goal is to select a dose that prevents children from
experiencing pain before they receive the next dose. It is essential to
assess and record the child’s pain regularly and adjust analgesic doses
as necessary to control pain. The effective opioid dose to relieve pain
varies widely among different children or in the same child at different
times. Doses must be based on the individual child’s pain level. Some
children require very large massive opioid doses at frequent intervals to
control their pain. If such large doses are necessary for effective pain
control and the side-effects are minimal or can be managed by
adjunctive medications so that children are comfortable, then the doses
are appropriate.

**Specific drugs for pain relief**

**Non-opioid analgesic drugs**

These drugs are used to relieve mild pain, or in combination with
opioids, to relieve moderate pain. All have analgesic and antipyretic effects
and, except for paracetamol, anti-inflammatory effects. Paracetamol is the
drug of choice because it has a very high therapeutic ratio for children.
The recommended dose is 10-15 mg/kg orally every four to six hours.

Unlike acetylsalicylic acid, paracetamol does not have gastro-intestinal
and haematological side effects or the possible association with Reye's
syndrome. Newborn and young infants tolerate paracetamol without
difficulty. The use of acetylsalicylic acid and other nonsteroidal anti-inflammatory agents (NSAIDs) is more restricted in children than adults with cancer: the potential for bleeding problems is a major concern, as children with cancer often have very low platelet counts. NSAIDs are useful for children with bone metastases who have adequate platelet counts. They should be used with caution in newborn infants. Ibuprofen (10 mg/kg orally every six to eight hours) and indomethacin (1-3 mg/kg orally every six to eight hours - not indicated in children of less than 12 years) are the examples in the WHO Model List of Essential Drugs.

Increasing the dose of non-opioids beyond the recommended therapeutic level produces an analgesic "ceiling effect" in that there is little additional analgesia, but a greater increase in side-effects and toxic reactions. If a non-opioid, with or without an adjuvant drug, fails to adequately relieve mild to moderate pain, an opioid for mild to moderate pain should be added. If the pain is severe, an opioid for moderate to severe pain should be added.

**Opioid analgesic drugs for mild to moderate pain**

Codeine is the drug of choice for children in this category. The recommended starting dose is 0.5-1.0 mg/kg orally every four to six hours for children over six months of age. As with strong opioids, the dose of codeine for children less than six months should be one-quarter to one-third the comparable milligram per kilogram dose for older children. Codeine is usually administered in fixed combinations with non-opioids (usually paracetamol). Parenteral preparations of codeine, if used, should be administered at two-thirds of the oral dose. If a child continues to have pain at this dose, codeine should be discontinued and a strong opioid administered because doses above this level may increase the side effects without greatly improving analgesia.

**Opioid analgesic drugs for moderate to severe pain**

Strong opioid analgesics are required to relieve severe pain in children with cancer. These drugs are simple to administer and provide effective pain relief in the majority of children. Opioids can be used alone or combined with non-opioids or adjuvant analgesic drugs, depending on the sources of a child’s pain. Pain relief can be enhanced by continuing the NSAID or paracetamol with the addition of an opioid.

Strong opioids have no fixed upper dosage limit. Thus, there is no maximum dose for strong opioids because there is no analgesic ceiling effect. The right dose is the dose that is adequate to relieve the child’s pain. Children may require extremely large doses to obtain pain relief,
sometimes as high as a thousand-fold escalation of the standard starting dose.

Anyone treated with opioids for more than seven days will develop physiological dependence. In these children, opioids should not be discontinued without gradual tapering to avoid symptoms of withdrawal. A typical tapering regimen might be a 50 per cent reduction of the dose for two days, followed by a 25 per cent dose reduction every two days until the child is taking an opioid dose which is equianalgesic to an oral morphine dose of 0.6 mg/kg/day if the child is under 50 kilograms or 30 mg/day if over 50 kilograms. At that time, the drug can be discontinued. Other side effects such as constipation, nausea, itching and sedation are common when using opioids and they should be anticipated and treated aggressively. Parents should be advised that there may be some sedation with initial dosing, which generally abates within a few days. If not prepared for this, they often worry unnecessarily that this somnolence is indicative of disease progression and infer that their child may be dying.

The pharmacokinetics of morphine in young infants differ from those in older infants and children and, as a result, initial opioid dosing on a milligram per kilogram basis in infants less than six months of age should be one-quarter to one-third the comparable dose for older children.

For infants, opioids should be administered in a setting where continuous observation and immediate intervention are possible, because opioids can cause delayed respiratory depression. Initial opioid dosing should also be reduced in patients with severe malnutrition, hepatic and renal dysfunction, multi-organ system failure or pre-existing sedation.

Non-opioid analgesics have a ceiling effect. Opioid drugs do not. The correct amount of opioid is the dose that relieves the pain to a tolerable level with an acceptable degree of side effect.

The strong opioid of choice included in WHO’s Model List of Essential Drugs is morphine. Alternatives are hydromorphone, methadone and fentanyl. Pethidine has no major advantage. Moreover, since a toxic metabolite, norphedidine, accumulates during therapy causing central nervous system excitation, myoclonus and seizures, it is not recommended for children with pain.

**Morphine**

Morphine is the drug of choice for controlling severe pain for most children. The recommended starting dose is 0.3 mg/kg orally every four hours, titrated individually until the child has pain relief. Oral
preparations of morphine sulfate and morphine hydrochloride are available. The aqueous solutions are bitter, so children prefer the drug mixed in a flavoured syrup. The morphine solution should be stored in a dark bottle, out of direct sunlight and in a cool place. An antimicrobial preservative is necessary, particularly in warmer climates.

If the oral route is not possible, continuous intravenous or subcutaneous infusions at 0.03-0.05 mg/kg/hr are effective methods for producing a constant analgesic effect. Alternatively, intermittent doses starting at 0.1 mg/kg can be given every two to three hours through an indwelling SC or IV line. During long-term administration, oral dosing of morphine requires two to three times the comparable parenteral milligram per kilogram dose.

If prolonged pain is anticipated, controlled-release oral morphine preparations are available. They may be given at eight-twelve hour intervals, so fewer daily doses are required and children can sleep without interruption. Tablets vary in strength from 10 to 200 mg, but are not available in all countries. Crushing tablets eliminates the controlled release properties. The recommended starting dose is 0.6 mg/kg every eight hours or 0.9 mg/kg every 12 hours. This preparation is more difficult to titrate to effect than regular morphine. Thus, to titrate the correct dosage, first administer regular oral morphine every four hours with appropriate upward titration to achieve pain control throughout a 24-hour period. Then, convert to the controlled-release preparation by administering half of the total 24-hour oral morphine dose that provided effective pain relief every 12 hours, or sometimes, a third of the total 24-hour dose every eight hours.

Adjuvant drugs

The role of adjuvant drugs is similar to that described earlier for adults. These adjuvant drugs should not be prescribed routinely. Instead, their role in cancer pain management should be based on the needs of each child. Continual reassessment of the indications for and the efficacy of the adjuvant drugs guides their use for children with acute or chronic pain.
Sedatives, hypnotics and anxiolytics

The benzodiazepines have a number of important indications for children with cancer. Diazepam and lorazepam are recommended for the short-term alleviation of acute anxiety and muscle spasms while midazolam is often used to pre-medicate children for painful procedures. Benzodiazepines cause sedation and can enhance opioid-induced sedation. The recommended dose of diazepam as an anxiolytic and muscle relaxant is 0.05-0.1 mg/kg PO to a maximum initial dose of 5 mg/dose every four to six hours, with gradual escalation as required. Lorazepam is dosed at 0.02-0.04 mg/kg IV or PO with a maximum initial dose of 4 mg/dose every four to six hours, given as needed. Side effects include sedation, depression, and dependence with prolonged use. Diazepam should be used with caution in neonates. The dose of midazolam is 0.05 mg/kg intravenously five to ten minutes prior to the procedures, and can be repeated twice. Although midazolam is available only as a parenteral solution in some countries, it can be administered orally by mixing the parenteral solution with flavoured syrup. The oral dose is 0.3-0.5 mg/kg with a maximum initial dose of 5/mg/dose 30-60 minutes prior to the procedure.

Corticosteroids

Corticosteroids are useful in relieving pain from inflammation associated with nerve compression, headache from raised intracranial pressure, and bone metastases. Prednisone, prednisolone, and dexamethasone are the most commonly used drugs; dosage depends on the clinical situation. The projected time course for continued steroid use should be carefully considered when planning use of a steroid as an adjuvant. Side effects include oedema, dyspeptic symptoms, and occasionally gastrointestinal bleeding. Gastrointestinal side-effects may be increased if corticosteroids are used in conjunction with nonsteroidal anti-inflammatory drugs. Hypertension, proximal myopathy, agitation, hyperglycemia, psychosis and opportunistic infections may result. The mood changes and weight gain can be profoundly distressing to children and teenagers. After prolonged use, adrenal suppression may occur and requires a gradual tapering of corticosteroids prior to discontinuation.

Anaesthetic and neurosurgical procedures

There is a limited role for anaesthetic and neurosurgical procedures in pain management in children with cancer. Epidural and intrathecal administration of opioids and local anaesthetics may be used to manage pain in children who do not receive adequate pain control from oral and
parenteral opioids combined with adjuvants and delivered in adequate doses, or who suffer unacceptable side-effects. Spinal routes eliminate the need for repeated needle punctures. These specialized techniques should be performed by experienced paediatric anaesthesiologists. Deep sedation or general anaesthesia may be used to relieve pain during invasive procedures.

**Procedure-related pain**

For children receiving curative therapies, the pain of required diagnostic and therapeutic procedures is often worse than the cancer itself. Aggressive approaches to the management of procedure pain are particularly necessary in children with cancer because these children may require multiple procedures in the future. Procedures performed with inadequate pain control can create a state of anxiety in the child which can significantly increase pain during subsequent procedures, alter relationships with health care providers and decrease compliance with medical advice.

Procedure-related pain should be treated prophylactically using both pharmacological and non-pharmacological approaches. The specific approaches used should be tailored to the individual child, depending on the specific procedure and the child's and family's needs and preferences.

Children must be adequately prepared for all invasive and diagnostic procedures - finger pricks, bone marrow aspirations, and imaging scans. They should know what will happen, how it will be done, and they should be prepared for any unusual sights, smells and sounds. If possible and culturally appropriate, parents should be present and involved in the procedures to provide comfort to their child. They should not be asked to restrain their child for the procedure. Procedures should take place in a specially designated treatment room and not in the child's room which should, if at all possible, remain a refuge from painful events. The competency of the person performing the procedure must be ensured. Inexperienced individuals should not learn how to perform procedures on fully aware children with cancer.

Aggressive pharmacological treatment of the first painful procedure is often necessary to prevent the cycle of fear that emerges when a painful procedure needs to be repeatedly performed. Behavioural approaches can be integrated into the plan after the initial diagnostic procedures are completed. If using pharmacological agents which produce conscious sedation, children should be carefully observed by an individual whose sole
responsibility is monitoring the child’s breathing and level of consciousness. Where available, pulse oximetry should be used to monitor the child. An individual who is skilled at airway management should be present along with resuscitative equipment and drugs.
References and suggested readings

8. Oral cancer

Magnitude, cause and prevention

Magnitude

In 1990, cancers of the mouth and pharynx were ranked sixth most common and comprised 6 per cent of all cancers. They were more common among males (7.9 per cent of all cancers in males) than among females (3.9 per cent of all cancers in females). Cancers of the tongue and mouth vary widely among countries in both current incidence rates as well as time trends. They are most common among Indian populations because of the well-established association with betel-quid chewing. Indian migrant populations who retain the habit (e.g. in Singapore) retain their high rates, while those who stop the habit (e.g. in Fiji) do not. Time trends observed in other populations, and among subsets of populations, either show an increase, a decrease, or a re-increase, depending upon the levels of betel-quid chewing, cigarette or pipe smoking, and alcohol consumption.

Table 8 shows the 1990 estimated age-standardized incidence rates (ASR) for oral cavity and pharynx cancers in ten countries and one area in the Western Pacific Region.
Table 8. Oral cavity and pharynx cancer: age-standardized incidence rates (ASR) per 100 000 in ten countries and one area in the Western Pacific Region (1990 Estimates, Reference 6).

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<th>COUNTRY/AREA</th>
<th>MALES</th>
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<tr>
<td></td>
<td>ASR</td>
<td>% ALL CANCERS</td>
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</table>

Among males, the highest rate was in Papua New Guinea (PNG) where betel-quid chewing is widespread, and the lowest rates were in the Republic of Korea and Japan where the practice does not exist. High rates were also observed in Hong Kong and Singapore, principally among Indians, and in Viet Nam, as chewing is also prevalent in these populations. Although not as high as the three betel-quid chewing populations, rates were also higher than many countries among Chinese, Filipinos, Australians, New Zealanders and Malaysians and the causative factors may be those other than betel-quid chewing.

The rates among females were two to three times lower than those seen in males, but followed the same risk pattern.
Cause

Reports on the association between oral cancer and the habit of betel-quid chewing date as far back as the late nineteenth century. The IARC Working Group Report (1985), after examining the accumulated data on exposure, animal experiments, and human epidemiological studies, concluded that there was sufficient evidence that the habit of chewing betel-quid containing tobacco is carcinogenic to humans. At that time the group also concluded that there was still inadequate evidence that the habit of chewing betel-quid without tobacco was carcinogenic to humans. Nevertheless, while some controversy still exists, all forms of betel-quid chewing should be discouraged.

The long-term use of "smokeless" tobacco, such as in chewing tobacco quids (plugs) or using snuff, is also associated with substantially increased risk (2 to 3 times higher) of developing oral cancer.

Cigarette smoking is also causally associated with oral cancer, and dose-response relationships between the number of cigarettes and oral cancer risk have also been demonstrated.

There is similarly overwhelming evidence that alcohol intake increases the risk of developing cancers of the oral cavity, pharynx, larynx, oesophagus and liver, also with demonstrated dose relationships. There is no indication that the effect is dependent on the type of alcoholic beverage. The risks for these cancers are multiplied in people who smoke.

Prevention

Primary prevention

The most obvious and efficacious primary prevention control measure in the Region would be the elimination of betel quid/tobacco chewing and smoking habits. Some intervention studies have shown that leukoplakia, precancerous lesions, regress rapidly after the cessation of betel chewing. Education programmes which successfully reduce the prevalence of chewing and tobacco smoking also seem to reduce rates of leukoplakia incidence.

Some reports estimate that three-quarters of oral cancer cases in the populations studied could have been prevented if exposure to tobacco and alcohol had not occurred.
While there are still conflicting reports from animal and human studies on the protective effects of specific dietary components (micronutrients), such as specific vitamins, minerals and trace elements, there is also very strong evidence that a healthy diet protects individuals from cancers. This indicates that several dietary components from whole grains, vegetables and fruits must be present in order to inhibit carcinogenesis. Considering that many betel-quid/tobacco chewers, smokers and alcohol drinkers also have unhealthy dietary habits, the addition of measures aimed at promoting a healthy diet is an attractive complementary strategy in the primary prevention of oral cancer.

**Secondary prevention - early detection**

The aim of early detection is to identify precancerous lesions and early stage cancers which are highly curable. The anatomical location of oral cancer provides good opportunities for early detection. While no randomized controlled trials have been reported, some screening programmes in high-risk areas have demonstrated that trained health workers are capable of accurately identifying precancerous lesions and oral cancer.

While population-based screening for oral cancer cannot yet be recommended as a general public health policy for the Region, some countries with very high incidence rates may consider self-examination and/or health worker examination. The decision to do so, and whom to identify as being of highest risk, will also depend upon available resources and the other objectives of the country’s cancer control programme.
The oral cancer control programme

Primary prevention

The incidence and mortality rate of oral cancer can be reduced by both primary and secondary prevention. Primary prevention is accomplished through tobacco control measures (see Chapter 14 - Lung cancer), and those directed against betel-quid/tobacco chewing, and excessive alcohol consumption.

Alcohol control should consider two important elements. First is the wide inter-country and intra-country variability in the many social forces that affect alcohol use. Second, excessive alcohol consumption, just like the unhealthy "affluent diet", is associated with many other health problems as well as domestic, social and industrial problems. Reducing individual alcohol consumption seems to be potentially the most powerful strategy against alcohol abuse. Health education should, as in tobacco control, prioritize the vulnerable young.

The main features of an alcohol control programme are summarized diagrammatically in Figure 8.1.

The promotion of a healthy diet (see Chapter 16 - Breast cancer) will also contribute to the primary prevention of oral cancer.

Secondary prevention

Secondary prevention of oral cancer is feasible because the oral cavity is accessible for routine examination. It has been shown in many countries that health workers can be trained to help in early detection of oral cancer and precancerous lesions.

The main features of early detection of oral cancer are summarized diagrammatically in Figure 8.2.
Oral cancer

Figure 8.1: Primary prevention - alcohol

Implementation
Establish collaboration with those interested in alcohol control at government and NGO level
Perform a sampling survey to identify current alcohol consumption and pricing trends
Set up a threefold strategy based on the following:

Legislation
Taxation
Change agricultural support to reduce alcohol production
Warning labels
Regulate distilling industry
Legislate for non-consumption of alcohol at work and by drivers

Education
Promote peer-to-peer programmes for adolescents
Mass education
Professional education
Link with other elements of a healthy lifestyle (e.g. exercise)
Integrate with related messages (e.g. on road traffic accidents and family violence)
Use the influence of the media

National leadership
Promote interdisciplinary and interministerial collaboration
Promote domestic and international collaboration, by government, addiction foundations, and NGOs

Process measures
>80% schoolchildren aged 10 years and over receive education on hazards of drinking
>50% of adults see an anti-alcohol publicity message each year
>2 anti-alcohol legislative measures introduced

Impact measures
>80% of schoolchildren aged 10 years and over aware of hazards of drinking
>50% of adults aware of link between alcohol and cancer (especially among smokers)

Outcome measures
Short term: >50% of adults reducing their alcohol consumption
Medium term: reduction in incidence of cirrhosis
Long term: reduction in incidence of cancers of the head and neck, oesophagus, and liver

Figure 8.2: Secondary prevention, downstaging for oral cancer

Implementation
Establish health education for awareness of the disease
Educate users of tobacco to examine their mouths and the
mouths of others to detect premalignant lesions
Train primary health care workers to examine the mouth and
identify premalignant lesions and oral cancer
Ensure link between identification of abnormality and referral
for diagnosis, treatment, and follow-up
Establish information system for monitoring and evaluation

Detectable preclinical phase (DPCP)

Birth Onset of sexual activity Dysplasia Carcinoma in situ Invasive cancer Death

Average age:
12 18 35 45 50 years

Examinations here unlikely to find cancers
~8% of cancers

Examinations here are cost-effective
~92% of cancers

Process measures
>80% of tobacco smokers and chewers receive education on examining
their own mouths
>80% of primary health care workers informed of the need to examine the
mouths of tobacco smokers and chewers

Impact measure
>80% of tobacco smokers and chewers aged 35-54 examined at least once

Outcome measures
Short term: >30% of oral cancers discovered by examination
Medium term: >30% reduction in proportion of cases of invasive oral
cancer with advanced (stage II+) disease
Long term: >30% reduction in oral cancer mortality

Screening

The accessibility of the oral cavity and the relative ease, affordability and acceptability of an oral examination make screening for oral cancer an attractive public health option, particularly in high incidence areas. Although no randomized trials have been completed, several screening programmes have demonstrated feasibility and success in detecting early cancer and even precancerous lesions. If efforts are to be spent in detecting oral cancer in asymptomatic individuals, concentration on high risk groups is suggested, namely those who are 40 years or older, chronic cigarette smokers, heavy alcohol drinkers and betel-quid chewers. Health education activities should be conducted at the time the oral examination is performed.

Early diagnosis and curative treatment

Every person who has complaints referable to the oral cavity should have a thorough oral examination. What the normal mucosa of the oral cavity looks like is familiar to most individuals and, with appropriate training, health workers can detect areas that "do not look normal". Depending on what the lesion looks like initially, the age of the patient and associated risk factors, the suspected lesion can be observed for progression or biopsied outright. Punch biopsy of oral lesions is simple, safe and affordable, and can be performed by properly trained health workers in the clinic. The majority of oral cancer are squamous cell carcinomas. The prognosis of oral cancer depends on the clinical stage (Appendix 3).

Surgery and radiotherapy are the major treatment modalities. Even large lesions (Stage III), when resectable, can result in long disease-free survival. Small lesions are curable by radiotherapy, which may be more beneficial for lesions in the tongue or in less accessible areas such as the back of the oral cavity.

Palliative treatment

Distant metastases are relatively uncommon. Large lesions which cannot be completely resected (T4 lesions) continue to pose therapeutic problems. A large number of individuals still present with locally advanced cancer in developing countries and among the urban poor in developed nations. Unfortunately, combinations of surgery, radiotherapy and chemotherapy have not consistently demonstrated a benefit in both locoregional control and survival. As current multimodal therapies for
advanced oral cancer are quite expensive, prolonged, and associated with high morbidity, their use outside ethical clinical trials is not recommended. Rather, the principles and practice of cancer pain relief and palliative care should be adhered to.

What the health worker should do

Health education

The Core Cancer Health Education Module recommended for the Region (see Chapter 6 - Health education) includes 1) promoting cancer awareness that tobacco smoking or chewing, betel quid chewing and heavy alcohol consumption causes oral cancer, and promoting a healthy diet, and 2) persuading cigarette smokers or chewers, betel-quid chewers, and heavy alcohol drinkers to stop the habit.

Early detection

Oral examination findings that should elicit a suspicion of malignancy are:

- reddish plaques or patches;
- whitish plaques or patches;
- non-healing sores;
- bleeding in the oral cavity even with slight trauma;
- ulcerations;
Oral cancer

- fungating masses (Figure 8.3); and

- restricted opening of the mouth.

The following are the steps in an oral examination:

1. Patient removes all dental prosthesis.

2. Patient is seated upright with back rest to stabilize the head during examination.

3. The examiner positions himself to one side of the patient.

4. Adequate illumination is provided by a headlamp, head mirror or strong flashlight.

5. Start by inspection of the oral cavity by area (e.g. lips, tongue, gum, cheek, hard palate, soft palate).

6. When a suspicious lesion is seen, a bimanual examination is performed, with a gloved hand in the oral cavity and the other hand on the patient’s face and neck. The finger tips of both hands are pressed simultaneously on the lesion, feeling for submucosal thickening, and assessing the size, depth and mobility of the lesion.
7. The back of the tongue is palpated with one sweep of the finger as part of the oral examination.

The following are the steps in the examination of the neck:

Examination of the neck can either be performed with the examiner behind or in front of the patient (or even alternately).

1. The patient is seated with the back straight and the shoulders level.

2. Inspection focuses on visible masses, ulcerations, discolorations or other skin changes while making the patient swallow a few times.

3. Palpation with the flat of the finger tips begins with the neck slightly extended, and the thyroid gland is examined for enlargement and nodularity during repeated swallowing.

4. The neck is then slightly flexed anteriorly to examine the areas under the jaws and chin, using the finger tips and applying firm pressure against the jaw bone, encompassing the whole area from the chin to the back of the jaw bone and behind the earlobe.

5. The neck may be extended, rotated and flexed anteriorly and laterally to relax muscles and facilitate the palpation of different areas under the jaw and the rest of the neck.

6. Palpation then proceeds to the areas underneath, in front and behind the sternocleidomastoid muscle.

7. The examination concludes with palpation of the supraclavicular areas.

The main areas of concern in a neck examination is the detection of thyroid nodules and lymph node enlargement. Many cancers spread to neck nodes with the most common being:

- oral cancer to any nodes under the jaw;
- nasopharynx cancer to nodes at the jaw angle, behind the earlobe and the upper portion of the sternocleidomastoid muscle;
- thyroid cancer to nodes in the vicinity of the middle and lower portion of the sternocleidomastoid muscle; and
Oral cancer

- lung, oesophagus, stomach, liver, colon and rectum cancer to supraclavicular nodes.

Palliative care

For most patients with locally-advanced unresectable oral cancer, relief of pain and other symptoms, with social, psychological and spiritual support, should aim to improve the quality of remaining life.
References and suggested readings


9. Nasopharyngeal cancer

Magnitude, cause and prevention

Magnitude

Nasopharyngeal cancer (NPC) is generally rare, and age-standardized incidence rates are usually less than 1.0 per 100,000. South China and South-East Asia are high risk areas. The highest incidence rates are in Hong Kong (30.0 per cent in males and 12.9 per cent in females). In China the highest mortality rates are seen in south-eastern provinces near Hong Kong: Guangdong, Guangxi, Fujian and Hunan. Chinese migrants to Hong Kong and Singapore retain the differentials in risk of regions of origin. Compared to most countries worldwide, NPC is also seen more frequently in the Philippines, Viet Nam, Indonesia, Thailand and in Malay residents in Singapore.

The age-specific incidence rates of NPC begin to rise in much younger people (15-29 years) compared with most other epithelial cancers. The increase with age is less steep, with little or no increase after the sixth decade. NPC risk in third-generation Chinese immigrants born in the USA is half that of first-generation migrants born in China. This strongly suggests environmental factors associated with traditional practices and exposure to a common virus at an early age in the causation of NPC.
Cause

Epidemiological studies in Hong Kong have provided strong evidence that salted fish intake, and some pickled foods, particularly during the weaning period, are associated with a high risk of NPC.

Another factor implicated is exposure to the Epstein-Barr virus (EBV). While EBV may also play an important role in causation, and antibody testing has been reported for early diagnosis, the evidence is not yet strong enough to recommend preventive strategies based on vaccination.

Prevention

There is no primary prevention measure specific to NPC. Nevertheless, the promotion of a healthy diet, beginning in infancy, is expected to lower the incidence rate. In areas where salted fish is a traditional component of food for babies who are being weaned, mothers should be encouraged to shift to more nutritious foods.

The nasopharyngeal cancer control programme

Primary prevention

A potential for primary prevention could exist within Chinese ethnic groups in China and South-East Asia where the incidence of NPC is the highest, and where it has been linked to the consumption of salted fish during weaning. Primary prevention may be in the form of improving dietary habits, particularly during weaning.
Secondary prevention

Screening

There is still no recognized screening method that has been shown to reduce mortality and can be recommended as public health policy in the Region. In high risk populations, studies on population-based screening should be encouraged. In Guangdong, China, a screening programme involving a population of around 100,000 was carried out between 1986 to 1995. Increased early detection and five-year survival has been observed with some indications that mortality may be decreased.

Early diagnosis and curative treatment

The early detection of nasopharyngeal cancer is difficult. Patients often consult because of metastasis to the jugulodigastric nodes in the neck. Recurrent nasal stuffiness leading to frank nasal obstruction, frequent epistaxis, earache and unilateral hearing impairment are common, but are often not taken seriously by patients and physicians.

Once suspected, the patient should undergo a complete head and neck examination. He should also have triple endoscopy (nasopharyngoscopy, bronchoscopy, oesophagoscopy) with biopsy of obvious or suspicious lesions. Even if no lesion is seen, a blind nasopharyngeal biopsy should be performed on all patients with suspicious lymph nodes in the upper neck, since often the primary lesion is not evident visually. The neck node should be biopsied if no primary lesion is found. A CT scan or MRI are complimentary procedures and are not ordered routinely. The clinical staging of nasopharyngeal cancer is shown in Appendix 4.

The curative treatment for nasopharyngeal cancer is radiotherapy using external radiation and brachytherapy. Cervical metastasis does not preclude radiotherapy since long-term locoregional control is still possible. Portals should include the nasopharynx and the neck. In some specialized centres, surgical resection of recurrent primary tumours has resulted in good long-term symptom control. Some recent reports describe induction or adjuvant chemotherapy as improving locoregional control, but survival is still a controversial issue.
Palliative treatment

Palliation should be given for advanced disease. In such cases, local and regional control through radiotherapy is helpful. In cases of recurrence after radiation, surgery in the form of excision of the recurrence in the nasopharynx, or standard radical neck dissection for cervical node recurrence may be helpful.

Relief of pain and other symptoms, with or without palliative radiotherapy and/or palliative surgery, should always be part of palliative care.

Chemotherapy may be used for radiosensitization but its role in prolongation of survival is still unclear.

What the health worker should do

Health education

The Core Cancer Health Education Module recommended for the Region (see Chapter 6 - Health education) includes 1) increasing awareness that a healthy diet protects against many noncommunicable diseases, including cancer, and 2) persuading individuals who have unhealthy dietary habits to change to a healthy diet. In addition, in high risk areas such as those in Southern China, the practice of including salted fish in the diet of infants during weaning should be stopped.

Early detection

The benefits of radiotherapy are greatest when the primary lesion and the cervical node metastasis are not yet bulky. Health workers should suspect nasopharyngeal cancer when an adult complains of recurring nasal stuffiness, epistaxis, earache or unilateral hearing impairment,
particular if there are enlarged lymph nodes in the upper neck. Refer early, when possible, for diagnosis and treatment.

**Palliative care**

When active treatment is no longer possible (i.e. radiotherapy), pain and symptom control with social, psychological and spiritual support should be given to improve the quality of remaining life.
References and suggested readings


10. Oesophageal cancer

Magnitude, cause and prevention

Magnitude

In 1980, oesophageal cancer was estimated to rank as the seventh most common cancer worldwide and would have comprised almost five percent of all cases. The incidence rate among males is generally double that of females. The cancer occurs less frequently in developed countries, where it was ranked fifteenth, than in developing countries where it was the fourth most common. Incidence rates vary widely between countries, and in some countries also between ethnic populations or regional distributions. Over half of the total annual cases in the world occur in China.

Migrants from high-risk to low-risk areas eventually attain the same risk level as long-time residents of the country of migration, indicating the important role of environmental agents.

In some Caucasian populations a decreasing incidence had been associated with decreasing alcohol consumption. In South Africa, increasing incidence has been linked to increasing alcohol consumption. Declining rates in Linxian county in China are probably greatly influenced by improved nutrition.
Table 10 shows the 1990 estimated incidence rates in ten countries and one area of the Western Pacific Region.

Table 10. Oesophageal cancer: age-standardized incidence rates (ASR) per 100,000 in ten countries and one area in the Western Pacific Region (1990 Estimates, Reference 6).

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<th>COUNTRY/AREA</th>
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<th>FEMALES</th>
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<td></td>
<td>ASR</td>
<td>% ALL</td>
<td>ASR</td>
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<td></td>
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<td>CANCERS</td>
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<td>Australia</td>
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<td>9.04</td>
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<td>2.12</td>
<td>1.53</td>
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Among males, the rate in China was far higher than the rest, followed by Hong Kong, Singapore, Japan and the Republic of Korea where the rates were about a third of that in China. The lowest rates were in the Philippines and Papua New Guinea.

The incidence rate was lower among females in China, being half of the rate in males. The rates for females in the other countries were similar, and were about a sixth of that observed in Chinese females.

**Cause**
The most common histological type of oesophageal cancer is squamous carcinoma. The presence of "oesophageal cancer belts", wide inter-country and intra-country incidence variability and marked changes in incidence among migrant populations, strongly indicate a major role for environmental factors in the causation of oesophageal cancer.

In many populations in high-incidence non-Asian countries the evidence for the role of alcohol is strong. Clear dose-response relationships have been observed with the amount of alcohol consumed daily. Risks are multiplied in heavy drinkers who are also heavy smokers.

Several correlation studies have provided indirect evidence that exposure to high levels of nitrates and nitrites in food and drinking water increase the risk for stomach and oesophageal cancer.

The drinking of hot beverages in general, frequently practiced in populations with very high incidence, has been associated with increased risk.

The risk of oesophageal cancer is also increased among smokers, and a dose-response relationship has been reported.

A theme common to the many analytical studies on oesophageal cancer is its association with poverty and a restricted diet. Regardless of whether the carcinogenic agent is alcohol, tobacco, nitrates and nitrites, salty and pickled foods or hot beverages, an underlying chronic deficiency in the intake of fruits and vegetables, which contain micronutrients that are known to protect against cancer, is present in high-risk populations.

In some Western countries with a high prevalence of chronic reflux oesophagitis, the incidence of adenocarcinoma of the oesophagus has increased and may even be higher than squamous carcinoma.

**Prevention**

The potentials for primary prevention of oesophageal cancer are great, as many primary public health measures aimed at promoting health and preventing many important diseases, such as tobacco control, alcohol control and promotion of a healthy diet, are expected to also lower the incidence of oesophageal cancer. Reports on populations where cigarette smoking and alcohol consumption has decreased, either singly or in combination, show a decrease in oesophageal cancer incidence. Populations whose diets have improved, including migrant populations, also demonstrate decreasing incidence.
No practical screening method is available for large scale early detection.

The oesophageal cancer control programme

Primary prevention

Three public health measures which are very important in general health promotion and in the prevention of many other diseases also lower the risk of oesophagus cancer. They are tobacco control (see Chapter 14 - Lung cancer), alcohol control (see Chapter 8 - Oral cancer) and the promotion of a healthy diet (see Chapter 16 - Breast cancer).

Secondary prevention - early detection

Screening

There is at present no effective method that can be recommended for population-based screening for oesophageal cancer.

Early diagnosis and curative treatment

Staging of oesophageal cancer is shown in Appendix 5. During the early stages (I, II) when the tumour is still small, cancer of the oesophagus is usually asymptomatic. In the large majority of cases, dysphagia is the presenting symptom and, unfortunately, this occurs when significant obstruction is caused by a large tumour.

The most important prognostic factor is the presence or absence of spread to the regional lymph nodes, which can only be determined with certainty from a surgical specimen. The overall actuarial five-year survival of node-negative cases ranges from 40-60 per cent and drops significantly for node-positive cases, ranging from 10-30 per cent.
Progressive dysphagia and weight loss in an adult should always elicit suspicion. A large number of patients are still amenable to palliative, and even curative surgery, if the diagnosis is made soon after dysphagia begins.

The diagnosis of patients suspected of having oesophageal cancer is established by contrast radiologic examination, (barium swallow) with or without fluoroscopy, and/or oesophagoscopy with biopsy.

Surgical resection remains the main modality of curative and palliative treatment for oesophageal cancer, and patients deemed operable should have the benefit of surgery. Resectability ranges from 50-85 per cent.

Randomized clinical trials, using combinations of surgery, radiotherapy and systemic chemotherapy, have been reported to result in improved survival, but there is still no consensus and no definite guidelines have emerged.

**Palliative treatment**

An obstructed oesophagus is accompanied by tremendous physical and psychological suffering. Inability to eat deprives an individual of a primal and universal source of satisfaction. Repeated aspiration of saliva adds to the suffering. Surgery is still the most effective method of palliative therapy, consisting of resection or by-pass of the primary tumour.

For the inoperable patient, several methods may be used for palliation. The insertion of long, firm plastic tubes through the tumour (Celestin tube stents) may restore eating but this is associated with tube migration or reobstruction with food or tumour. Laser vaporization of intraluminal obstructing tumours has been tried, but regrowth of the tumours, scar formation and tumour perforation are factors limiting its use. A recent variant of laser therapy is photodynamic therapy. Dihematoporphyrin is injected intravenously and the dye is selectively retained by the tumour which is destroyed when exposed to laser after 24 hours.

Other palliative modalities such as radiation (external beam or brachytherapy) alone or in combination with systemic chemotherapy have been employed but recurrence of the obstruction is quite fast.
What the health worker should do

Health education

The Core Cancer Health Education Module recommended for the Region (see Chapter 6 - Health education) includes 1) increasing awareness that cigarette smoking, excessive alcohol consumption and an unhealthy diet cause many noncommunicable diseases, including cancer, and a healthy diet protects against cancer, and 2) persuading individuals who smoke, drink alcoholic beverages excessively and have unhealthy dietary habits to give up these cancer-causing lifestyles.

Early detection

Oesophageal cancer should be suspected when an adult complains of progressive dysphagia and weight loss. Refer early for diagnosis and treatment whenever possible.

Palliative care

When active intervention measures (e.g. surgery, tube stent, radiotherapy) are not feasible or available, pain and symptom control with social, psychological and spiritual support should be given in order to improve the quality of remaining life.
References and suggested readings


11. Stomach cancer

Magnitude, cause and prevention

Magnitude

Stomach cancer has now been overtaken by lung cancer, but in 1980 it was the most common cancer and comprised 10.5 per cent of total cancers. Incidence rates in males were roughly double those in females, and total cases then were about equal in developed and developing countries. There are wide variations in rates between countries, and the highest rates occur in Japan.

There is now an almost universal decline in the incidence of stomach cancer. The decline has been occurring steadily but rather slowly, and there is also wide inter-country variation in the rate of decline. The decline in Japan has been less marked than elsewhere. The change in incidence among migrants is also slow. Table 11 shows the 1990 estimated age-standardized incidence rates (ASR) in ten countries and one area of the Western Pacific Region.

Among males, the rates were highest in Japan, the Republic of Korea and China. The rates were lowest in Fiji, Papua New Guinea, the Philippines, Australia and New Zealand. Intermediate rates were estimated for Singapore, Viet Nam, Hong Kong and Malaysia.

Among females, the rates were about half of those estimated for males, and followed a similar location ranking.
Table 11. Stomach cancer: age-standardized incidence rates (ASR) per 100 000 in ten countries and one area in the Western Pacific Region (1990 Estimates, Reference 4).

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<td>8.94</td>
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</tr>
<tr>
<td>Viet Nam</td>
<td>31.70</td>
<td>3.33</td>
</tr>
</tbody>
</table>

**Cause**

The factors involved in the causation of stomach cancer are not as clear as for other cancers. Many components of the human diet, including drinking water, contain nitrates and nitrates which can react with other substances in the stomach to produce compounds that are carcinogenic to experimental animals. Some studies have provided indirect evidence that exposure to high levels of nitrates and nitrates increase the risk of stomach and oesophageal cancer. Salt and salty foods have also been reported to increase the risk of stomach cancer, and some theories postulate that the combined effects of chronic irritation by excess salt and the high nitrite and nitrate contents of salt-preserved foods could be to blame.
There is also accumulating evidence that *Helicobacter pylori* infection also increases the risk of stomach cancer. It has been shown that *H. pylori* causes a chronic gastritis that has been intractable with anti-ulcer therapy. It has also been shown that treating these cases with antimicrobials, efficacious against *H. pylori*, has resulted in healing the chronic gastritis. It has been hypothesized that *H. pylori*-induced chronic gastritis, if untreated, leads to mucosal hyperplasia, then dysplasia and eventually carcinoma.

There is a growing body of evidence that a high consumption of vegetables and fruits lowers the risk for cancers of the nasopharynx and larynx, oesophagus, stomach, colon, rectum, lung and breast.

**Prevention**

There is no primary prevention measure specific to stomach cancer, although the promotion of a healthy diet, which should be a top public health priority in health promotion and disease prevention, is expected to also decrease the risk of stomach cancer.

The benefits of radiologic screening for stomach cancer have been well established in Japan, but the methods are difficult and costly.

The stomach cancer control programme

**Primary prevention**

While a primary prevention method for stomach cancer cannot be as dramatic as tobacco control for lung cancer, a large number of stomach cancers can be prevented by promoting a *healthy diet* (see Chapter 16 - Breast cancer). Important components of the healthy diet that will lower the incidence of stomach cancer are the avoidance of heavy and prolonged consumption of highly salted, pickled and smoked foods, and a concomitant increased intake of vegetables and fruits.
Secondary prevention - early detection

Screening

In countries where the incidence of the disease is very high (e.g. Japan) a special contrast radiographic technique, double contrast upper gastrointestinal series (UGIS), may be useful in screening for stomach cancer. Uncontrolled mass screening programmes in Japan (more than three million people each year) have demonstrated a shift in stage with early detection, an increase in five-year survival and a reduction in the risk of death in screened patients. To date, however, no randomized controlled trials have been completed and, because of the complexity and cost, its use as a screening tool cannot be recommended as policy for countries where the screening method is not yet in place.

Early diagnosis and curative treatment

There are no specific signs or symptoms of early stomach cancer but symptoms similar to those of a peptic ulcer may be present. Common signs, all suggestive of advanced disease, are epigastric mass, weight loss and an enlarged liver. Dysphagia (in the patient with cancer at the cardia) and vomiting (in the patient with pyloric or prepyloric cancer) may be present at an earlier stage. There should be a high index of suspicion for stomach cancer among individuals who are 40 years old or older who manifest with recurrent epigastric discomfort (often with several courses of anti-ulcer treatment), fullness, pain, and unexplained indigestion. Such patients should undergo endoscopy.

Doubled-contrast UGIS, fluoroscopy and endoscopy with multiple biopsies are the usual studies used to confirm the diagnosis of stomach cancer. In Japan, experienced radiologists use fluoroscopy with 90-95 per cent accuracy in diagnosing early gastric carcinoma. If biopsy and cytology studies are non-diagnostic and the clinical suspicion for cancer is high, repeated biopsies are necessary.

The staging system for stomach cancer at present utilizes the 1992 TNM system, which incorporates some important elements in staging from the Japanese system (Appendix 6). The two critical elements in prognosis are the depth of the penetration of the tumour through the stomach wall and the involvement by the cancer of increasing echelons of lymph nodes (primary, secondary and tertiary drainage nodes). The primary drainage nodes (i.e. within 3 cms) are different for different parts of the stomach.
Radical surgery, usually subtotal or total gastrectomy, is the only curative treatment for stomach cancer. When adjacent organs are involved, extended surgery is appropriate and may be curative if all disease can be removed. For a quarter of a century, many surgeons were reluctant to do total gastrectomies unless it was absolutely essential to resect gross disease, and they had little enthusiasm for the extensive lymph node dissection advocated by the Japanese. Recent reports however, have shown improvement in mortality, morbidity and survival with the Japanese approach and are leading to a re-evaluation of the concepts of optimal surgery for stomach cancer.

To date, adjuvant radiation and/or systemic chemotherapy have had minimal, if any, favourable impact on survival in stomach cancer cases.

**Palliative treatment**

Palliation of stomach cancer falls into three general categories: palliation of distressing symptoms, prevention of symptoms that will develop without treatment, and prolongation of a useful and comfortable life.

Effective surgical palliation can be achieved for obstruction, bleeding and perforation. Relief of obstruction at the cardia or pyloroantral areas can be accomplished by resection or bypass. Another approach, if available and feasible, is endoscopic vaporization of obstructing lesions with laser therapy.

**What the health worker should do**

**Health education**

The following should be the health education content for the prevention of stomach cancer:
Stomach cancer

- avoid prolonged and heavy consumption of salted, smoked and pickled foods
- eat a healthy diet, rich in fruits and vegetables

Early detection

Stomach cancer should be suspected when an adult complains of recurrent epigastric discomfort (particularly after repeated courses of anti-ulcer medication), vomiting, unexplained anaemia and weight loss. There should be early referral, when possible, for diagnosis and treatment.

Palliative care

When active intervention measures (e.g. surgery, laser therapy) are not feasible or available, pain and symptom control, with social, psychological and spiritual support should be given in order to improve the quality of remaining life.
References and suggested readings


12. Colonic and rectal cancer

Magnitude, cause and prevention

Magnitude

Colonic and rectal cancers were ranked fourth most common in 1980 and comprised nine per cent of all cancers. Both have been called the cancers of affluent developed countries, being then ranked in these areas second only to lung cancer and with double the number of cases found in developing countries, where they ranked eighth. Incidence rates for rectal cancer are generally lower than those for colonic cancer. Mortality from rectal cancer is also lower, and may be attributed to earlier detection and improved results of therapy.

Migrant studies suggest environmental factors play a major role, as the rates among migrants who move from low-risk to high-risk areas approximate the rates observed in the countries of migration. Table 12 shows the 1990 estimated age-standardized incidence rates (ASR) in ten countries and one area of the Western Pacific Region.

Among males, the highest rates were estimated for New Zealand, Australia, Japan, and Hong Kong, while the lowest were in the Republic of Korea and Papua New Guinea. Intermediate rates were estimated for Singapore, Viet Nam, China and Malaysia.

Among females, estimated rates were generally slightly lower than those for males, and followed the same ranking.
Table 12. Colon and Rectum Cancer: age-standardized incidence rates (ASR) per 100 000 in ten countries and one area in the Western Pacific Region (1990 Estimates, Reference 4).

<table>
<thead>
<tr>
<th>COUNTRY/AREA</th>
<th>MALES</th>
<th>FEMALES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ASR</td>
<td>% ALL CANCERS</td>
</tr>
<tr>
<td>Australia</td>
<td>39.40</td>
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</tr>
<tr>
<td>China</td>
<td>16.09</td>
<td>6.40</td>
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<tr>
<td>Hong Kong</td>
<td>34.00</td>
<td>10.63</td>
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<tr>
<td>Japan</td>
<td>34.62</td>
<td>13.00</td>
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<tr>
<td>Malaysia</td>
<td>22.30</td>
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<tr>
<td>New Zealand</td>
<td>5.86</td>
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</tr>
<tr>
<td>Papua New Guinea</td>
<td>10.91</td>
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</tr>
<tr>
<td>Philippines</td>
<td>12.63</td>
<td>8.29</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>8.85</td>
<td>4.18</td>
</tr>
<tr>
<td>Singapore</td>
<td>23.54</td>
<td>10.44</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>18.00</td>
<td>7.20</td>
</tr>
</tbody>
</table>

**Cause**

The main dietary factors implicated in colonic and rectal cancer are fat and fibre. Correlation studies of incidence and mortality from colonic cancer in different populations have shown a strong association with average per capita consumption of fat, particularly saturated fat. However, subsequent case-control and cohort studies have had variable results. Part of the difficulty is in the inherent limitations of current dietary assessment methods.

Secondary bile acids have been shown to increase cancer yields in some animal experiments, and these acids are increased when there is an increase in the number of anaerobic bacteria which metabolize primary bile acids into secondary bile acids. It has been postulated that high fat diets
modify bacterial flora directly, or indirectly, by increasing biliary secretion of acids and neutral steroids.

Although dietary fibre can protect from large-bowel carcinogenesis in experimental animals, its exact role in the causation of colonic and rectal cancers is still unclear, as high fibre diets are generally also high in protective micronutrients such as those contained in whole grains, vegetables and fruits. Colonic and rectal cancer risk levels are lowered by the protective effect of a diet rich in vegetables, fruits and whole grains.

**Prevention**

There is no primary prevention measure specific to colonic and rectal cancer, but there is good reason to expect that risk levels in a population will decline after a widespread shift to a healthy diet.

No population-based screening method can yet be recommended as a worldwide public health policy. Screening of faecal blood has not yet been shown to reduce mortality.

**The colonic and rectal cancer control programme**

**Primary prevention**

Like stomach cancer, the incidence of colonic and rectal cancer can be decreased by primary prevention, specifically by promoting a healthy diet (see Chapter 16 - Breast cancer). Important components of the healthy diet that will lower the incidence of colonic and rectal cancers are the decrease in fat consumption and the consumption of whole grain cereals and breads, vegetables and fruits.

The following guidelines are suggested for the primary prevention of colonic and rectal cancer in average and high risk individuals.
• Fat consumption should be low (both animal and vegetable) not exceeding 20 per cent of total caloric intake. Both animal and vegetable fat intake should be reduced.

• A balanced diet should be consumed, which includes at least 5 to 8 daily servings of fruits, vegetables, legumes, and whole grain cereals and breads in order to provide adequate fibre, vitamins and other components with anticarcinogenic effects.

• Dietary fibre from all sources should be at least 25 gms/day.

• The consumption of excess calories and being overweight should be avoided.

• Tobacco use should be avoided.

• Physical activities and exercise should be part of daily routine.

Secondary prevention

Screening

There is some evidence that secondary prevention may be effectively carried out by means of testing for faecal occult blood and sigmoidoscopy. There is still, however, not enough evidence to recommend population screening.

Early diagnosis and curative treatment

Colorectal cancer is suspected in the presence of rectal bleeding, changes in character of stools, unexplained anaemia, signs of obstruction or a palpable rectal or abdominal mass. The location of the lesion is established by means of proctosigmoidoscopy or colonoscopy, coupled with a barium enema. Although endoscopy and biopsy is highly desirable, its unavailability does not preclude surgery, especially in the presence of obstruction, a palpable rectal or abdominal mass or a mass lesion demonstrated through barium enema. A chest X-ray and liver ultrasonography or CT scan are important in order to determine the presence, number and location of lung or liver metastases. Other diagnostic examinations will depend on specific symptoms.
The prognosis for colorectal cancers is influenced greatly by the clinical stage (Appendix 7), which is determined mainly by the depth of tumour penetration of the bowel wall, and the presence of regional lymph node spread.

Radical surgical resection is the main treatment, and is curative for node-negative colonic cancer (TNM I, II, or Dukes A, B). Around three quarters of patients are expected to survive at least five years, and no form of adjuvant treatment has been shown to provide a survival benefit.

The probability of surviving five years following surgery for patients with node-positive colonic cancer (TNM III or Dukes C) drops to less than 50 per cent. Adjuvant treatment with 5FU and levamisole confers a survival benefit of 25-30 per cent on patients who either had surgery alone, or surgery plus levamisole.

For rectal cancer, patients whose tumours have penetrated beyond the bowel wall (TNM II, or Dukes B) or with positive nodes (TNM III or Dukes C) have been shown to benefit from adjuvant radiotherapy, plus 5-FU, in the form of increased survival and decreased local recurrence.

**Palliative treatment**

For physically fit individuals, surgical resection is the most effective active palliative treatment. Resection of solitary liver or lung metastasis also offers both palliation and survival benefits. Nevertheless, for the many patients for whom surgery is not possible, cancer pain relief and palliative care can in most cases improve the quality of life.
What the health worker should do

Health education

The health education contents for the prevention of colonic and rectal cancer are:

- Decrease dietary fat, which should not exceed 20 per cent of total caloric intake.

- Eat a healthy diet, with plenty of whole grain cereals and breads, fruits, vegetables and legumes.

- Avoid being overweight.

- Increase regular physical activity and exercise.

- Stop smoking.

Early detection

There is still no screening method that has been shown to decrease mortality. For symptomatic individuals of 50 years and older, or younger high-risk individuals (i.e. family history, colorectal polyps, inflammatory bowel disease), a digital rectal examination (DRE) should be done. A negative DRE, however, does not eliminate the possibility of cancer and the patient should be referred for additional investigations.

The following are the steps in a digital rectal examination:

- The patient lies on his side with buttocks protruding near the edge of the examination table. The buttocks are spread laterally to inspect the anal opening. Obvious masses, bleeding, and abscess should be noted.
Colonic and rectal cancer

- Palpation is done using a well lubricated gloved finger, starting at the peri-anal area and slowly inserted into the anal canal. Allow the patient to relax and accommodate the gloved finger.

- The finger is further advanced, palpating circumferentially for masses, tender areas and areas of narrowing, and anteriorly (prostate in males, uterus in females).

- The anal sphincter tone is likewise noted. The finger is examined for blood after it is withdrawn.

Palliative care

For the many patients suffering with advanced colonic and rectal cancer in whom active anti-cancer treatment is neither indicated nor possible, relief of pain and other symptoms, and social, psychological and spiritual support should be given in order to improve the quality of remaining life.
References and suggested readings


13. Liver cancer

Magnitude, cause and prevention

Magnitude

In 1980, liver cancer was the eighth most common cancer worldwide, comprising 4.0 per cent of all cancers. It was ranked seventh in developing countries, where there were four times as many cases compared with developed countries, where liver cancer was ranked fourteenth. Incidence rates were higher among males, with a ratio of about 3:1. Three-quarters of cases occur in developing countries, and closely correlate with the prevalence of chronic carriers of hepatitis B. Variations in incidence rates within several countries in Africa and Asia have also been shown to be correlated with local aflatoxin levels in foodstuffs. The great majority of primary liver cancers that occur in areas with a high prevalence of hepatitis B virus (HBV), particularly the carrier state, are hepatocellular carcinomas (HCC).

Table 13.1 shows the 1990 estimated age-standardized incidence rates (ASR) for liver cancer in ten countries and one area in the Western Pacific Region.

The lowest rates were in Australia and New Zealand, where liver cancer comprised less than one per cent of all cancers among males and females. The rates among males in seven other countries were high. In Singapore, the rate in males was three times the rates in Australia and New Zealand, but about one quarter to one fifth of that seen in China, Hong Kong, Japan, the Republic of Korea, Papua New Guinea, the Philippines and Viet Nam. Rates among females were lower, from around half to a quarter of those observed among males.
Table 13.1. Liver cancer: age-standardized incidence rates (ASR) per 100 000 in ten countries and one area in the Western Pacific Region (1990 Estimates, Reference 4).

<table>
<thead>
<tr>
<th>COUNTRY/AREA</th>
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<th></th>
<th></th>
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<tr>
<td></td>
<td>ASR</td>
<td>% ALL</td>
<td>ASR</td>
<td>% ALL</td>
<td></td>
<td>ASR</td>
<td>% ALL</td>
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Cause

Several epidemiological studies and laboratory investigations have established a strong and specific association between chronically active forms of HBV infection and HCC. This is characterized by the presence of HBV surface antigen (HBsAg) in serum, also referred to as HBV carrier state. Cohort studies have shown that the incidence of HCC among HBsAg carriers was seven to over a hundred times higher than among non-carrier control populations. The estimated relative risks are among the highest observed in cancer etiology (Table 13.2).

Laboratory investigations have shown that HBV can be integrated into the genome of liver-cell lines of HBsAg carriers. All the evidence indicates a causal association. The ultimate proof of causality will be the demonstration that the elimination of HBV infection by vaccination
Liver cancer

prevents HCC. In countries like Japan where HBV-induced hepatitis prevalence has decreased, hepatitis C virus (HCV) infection is now the dominant risk factor for HCC.

Table 13.2. Cohort studies of carriers of hepatitis B surface antigen (HBsAg) and hepatocellular carcinoma (HCC) (Reference 3)

<table>
<thead>
<tr>
<th>Population</th>
<th>No. of subjects</th>
<th>HCC riska</th>
<th>Attributable risk (%)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>HBsAg+</td>
<td>RR (95% CI)</td>
<td></td>
</tr>
<tr>
<td>Japan, Osaka</td>
<td>-</td>
<td>8646</td>
<td>6.6 (4.0-10.2)</td>
<td>Oshima et al (1984)</td>
</tr>
<tr>
<td>USA, New York City</td>
<td>-</td>
<td>6850</td>
<td>9.7 (2.0-28.4)</td>
<td>Prince &amp; Alcabes (1982)</td>
</tr>
<tr>
<td>England &amp; Wales</td>
<td>-</td>
<td>3934</td>
<td>42.0 (14.0-100.0)</td>
<td>Hall et al. (1985)</td>
</tr>
</tbody>
</table>

a RR, relative risk; CI, confidence interval
b On the basis of a prevalence of HBsAG in the general population of 2.0 per cent
c On the basis of a prevalence of HBsAG in the general population of 0.1 per cent

Prevention

There is no globally practical method of secondary prevention (early detection) for HCC which, like lung cancer, is usually fatal and accompanied by tremendous suffering. The best control measure is through primary prevention.

Several safe and effective vaccines against HBV have been developed and are currently used in both large scale trials and in vaccination campaigns in many countries with high or intermediate incidence rates. Most HBV infections occur early in life and maternal transmission is important. The risk of HCC is also higher the earlier in life the HBV carrier state occurs. This indicates that mass vaccination programmes should be aimed at all infants from high-risk populations, followed by booster doses at 12 months to increase the prevalence of immune individuals.
Blood for transfusion should be routinely tested for HBV. In countries with a high prevalence of HCV, blood donors and donated blood should also be tested for HCV.

The liver cancer control programme

Primary prevention

Control of liver cancer should focus on primary prevention, specifically in decreasing the prevalence of the carrier state of hepatitis B infection through HBV vaccination, which should be incorporated into a country’s Expanded Programme on Immunization (EPI).

The main features of an HBV vaccination programme are summarized diagrammatically in Figure 13.

Secondary prevention - early detection

Screening

Attempts have been made to screen populations for liver cancer, particularly in China and Japan. Serological tests on children and adults identified carriers (i.e. those who are HBsAG positive) who had more than a 100-fold increase in risk. The HBV carrier population were then tested annually or bi-annually for the tumour marker alphafetoprotein (AFP), combined with ultrasonography of the liver, raised titres suggesting hepatocellular carcinoma. Many tumours detected by such screening programmes were small enough to be treated with curative surgery or other local forms of treatment, and have been associated with decreased mortality. To date, no randomized controlled trials have been completed and it cannot be recommended as a public health policy for countries where such programmes are not yet present.
Figure 13. Primary prevention - viral hepatitis B

**Implementation**

- Establish collaboration with those interested in hepatitis control at government and NGO level
- Perform a sampling survey to identify current carrier rate and mode of transmission (horizontal or vertical)
- Set up HBV vaccination strategy if HBV carrier rate >10% of adults
- Set up a threefold strategy based on the following:

**Legislation**
- Integrate with other vaccination programmes (e.g. EPI)
- Standardization of biological effectiveness of vaccines
- Free vaccination

**Education**
- Mass education on need for and effectiveness of HBV vaccination
- Education of parents on need to vaccinate children early
- Education on high-risk groups (e.g. medical professionals) about vaccination

**National leadership**
- Promote interdisciplinary and interministerial collaboration
- Promote domestic and international collaboration, especially at the public health department level

**Process measures**
- >70% of adults of parental age receive educational message about vaccination against HBV
- >80% of primary health workers receive educational message about HBV vaccination

**Impact measures**
- HBV vaccination incorporated into EPI
- >70% of children under 1 year of age vaccinated against HBV

**Outcome measures**
- **Short term**: none
- **Medium term**: reduction in incidence of viral hepatitis B, reduction in HBV carriers to <10% of adults
- **Long term**: reduction in incidence of primary liver cancer

Early diagnosis and curative treatment

The great majority of early HCC cases are asymptomatic and most early cases are detected only through screening programmes as described. Among symptomatic cases, less than 5 per cent will be suitable for a curative procedure (i.e. surgical resection). Clinical staging of liver cancer is shown in Appendix 8.

The most specific laboratory indicator of hepatocellular carcinomas is an AFP level greater than 400 mg/ml, which is present in more than 70 per cent of cases. Liver function tests are abnormal in varying degrees but they are not helpful in the presence of cirrhosis and chronic hepatitis.

A diagnosis of hepatocellular carcinoma is further supported by imaging techniques such as ultrasonography and, if available, CT scans and arteriography. The diagnosis is confirmed by histological examination of tissue obtained by image-guided or laparoscopically-guided needle biopsy.

Resectability is initially determined through the use of ultrasound which can detect patients with contraindications for curative surgery, saving as much as 60 per cent of patients the discomfort of further investigation. Patients who appear to have resectable lesions are then subjected to more sophisticated imaging procedures before surgery is finally decided upon.

Surgical resection is the only curative measure available for hepatocellular carcinomas. This can be safely performed when the tumour is localized in the liver. The extent of resection depends on the extent of the tumour and usually the severity of the cirrhosis. Operations may vary from simple wedge excision to formal hepatic lobectomy or extended lobectomy. Unfortunately only 10-15 per cent of patients have resectable tumours.

Chemotherapy, either systemic or through intrahepatic arterial infusion, and total hepatectomy with liver transplantation has been tried but has shown no significant impact on the survival of most patients.
Liver cancer

Palliative treatment

The majority of liver cancers are in advanced stages at the time of presentation, with patients surviving less than six months. For these unfortunate patients, palliation is the primary objective of treatment. Pain should be relieved, pleural effusion drained, ascites controlled and anxiety reduced. The most important aim of therapy is to improve the quality of life by relieving pain with the use of oral opioids.

What the health worker should do

Health education

The Core Cancer Health Education Module recommended for the Region (see Chapter 6 - Health education) includes promoting cancer awareness of the fact that the great majority of liver cancer in the Region is caused by *Hepatitis B Virus*, and persuading mothers to have infants and young children undergo *HBV vaccination*.

Palliative care

As the majority of liver cancers are advanced at the time of diagnosis, health workers ought to be able to participate in the relief of pain and other symptoms, and to assist in social, psychological and spiritual support.
References and suggested readings


14. Lung cancer

Magnitude, cause and prevention

Magnitude

Lung cancer is currently the most common cancer worldwide and the number of new cases is increasing at a rate of about 0.5 per cent per year. In 1980, there were an estimated 660,500 new cases, which comprised 10.4 per cent of all cancers. The incidence rates varied among countries. This international variation was explained by different levels of exposure to the main cause of lung cancer - cigarette smoking. Higher incidence rates for males, compared with females, and among urban, compared with rural populations, are also explained by higher prevalences of cigarette smoking. Rates among females have been increasing rapidly as more women begin smoking.

Lung cancer was relatively rare at the beginning of this century, and trends in incidence rates among age and gender groups in different countries can be explained almost completely by national tobacco smoking habits. These trends reflect the prevalence of smoking among different generations and the tar contents of the cigarettes smoked.

Table 14.1 shows the 1990 estimated age-standardized rates (ASR) of lung cancer incidence in ten countries and one area in the Western Pacific Region.
Table 14.1. Lung Cancer: age-standardized incidence rates (ASR) per 100 000 in ten countries and one area in the Western Pacific Region (1990 Estimates, Reference 10).

<table>
<thead>
<tr>
<th>COUNTRY/AREA</th>
<th>MALES</th>
<th></th>
<th>FEMALES</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ASR</td>
<td>% ALL CANCERS</td>
<td>ASR</td>
<td>% ALL CANCERS</td>
</tr>
<tr>
<td>Australia</td>
<td>48.01</td>
<td>17.16</td>
<td>14.45</td>
<td>6.03</td>
</tr>
<tr>
<td>China</td>
<td>48.83</td>
<td>19.44</td>
<td>20.01</td>
<td>9.75</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>77.50</td>
<td>24.23</td>
<td>32.90</td>
<td>15.04</td>
</tr>
<tr>
<td>Japan</td>
<td>37.52</td>
<td>14.09</td>
<td>10.78</td>
<td>6.29</td>
</tr>
<tr>
<td>Malaysia</td>
<td>45.80</td>
<td>25.52</td>
<td>15.20</td>
<td>10.53</td>
</tr>
<tr>
<td>New Zealand</td>
<td>51.46</td>
<td>17.23</td>
<td>19.89</td>
<td>6.96</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>5.40</td>
<td>2.89</td>
<td>2.76</td>
<td>1.48</td>
</tr>
<tr>
<td>Philippines</td>
<td>37.26</td>
<td>24.46</td>
<td>10.58</td>
<td>7.44</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>24.35</td>
<td>11.49</td>
<td>6.18</td>
<td>4.16</td>
</tr>
<tr>
<td>Singapore</td>
<td>56.81</td>
<td>25.19</td>
<td>19.00</td>
<td>9.61</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>62.25</td>
<td>25.06</td>
<td>14.31</td>
<td>7.51</td>
</tr>
</tbody>
</table>

Among males, the highest lung cancer rates were estimated for Hong Kong, closely followed by Viet Nam, Singapore, New Zealand, China, Australia and Malaysia. The lowest estimated rates were for Papua New Guinea (PNG). In the middle were Japan and the Philippines, where estimated rates were similar and slightly less than half of those estimated for Vietnamese males.

Among females, the highest rates estimated were in Hong Kong, Malaysia, China, New Zealand and Singapore. Again, the lowest was among PNG women, while estimated rates among Vietnamese, Japanese and Filipino females were similar.

**Cause**

*Cigarette smoking causes lung cancer*, a fact that was recognized in the UK and the USA in the early 1950s and has been indubitably reinforced by subsequent and continuing evidence.
Numerous investigations, conducted in different countries on different population subsets and using different study designs, have consistently reported a greater increase in the occurrence of lung cancer among smokers compared with non-smokers. Major studies have shown a clear dose-response relationship between the amount smoked daily and the subsequent risk of lung cancer (Table 14.2). The risk has been assessed as about 20 times higher for smokers of one pack a day for 30 years or more, than for non-smokers.

Table 14.2. Risks for male cigarette smokers of dying from lung cancer, relative to nonsmokers, in some major cohort studies. (Reference 11).

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of subjects in study</th>
<th>Daily no. of cigarettes</th>
<th>Relative risk</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>122 261</td>
<td>0</td>
<td>1.0</td>
<td>Hirayama (1974)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-9</td>
<td>1.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-14</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15-24</td>
<td>4.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>25-49</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥ 50</td>
<td>5.7</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>27 342</td>
<td>0</td>
<td>1.0</td>
<td>Cederlof et al. (1975)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-7</td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8-15</td>
<td>7.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15-24</td>
<td>12.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥ 25</td>
<td>25.1</td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td>34 440</td>
<td>0</td>
<td>1.0</td>
<td>Doll &amp; Peto (1976)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-14</td>
<td>7.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15-24</td>
<td>12.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥ 25</td>
<td>25.1</td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>440 558</td>
<td>0</td>
<td>1.0</td>
<td>Hammond (1996)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-9</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-19</td>
<td>7.5</td>
<td></td>
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<td></td>
<td></td>
<td>20-39</td>
<td>13.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥ 40</td>
<td>16.1</td>
<td></td>
</tr>
</tbody>
</table>

a Ratio between the occurrence rate of cancer among smokers and that among nonsmokers

The association with cigarette smoking is present for all histologic types of lung cancer but is strongest for squamous cell carcinomas, the type that has increased dramatically. Cigarette smoking induces lung
cancer in experimental animals, and cigarettes contain chemicals which are known to produce cancer in animals and humans.

It has also been established that sidestream smoke, the smoke emitted into the air, contains higher concentrations of some carcinogenic substances than mainstream smoke, the smoke inhaled by smokers. Many epidemiological investigations, including three cohort studies, have demonstrated a relative increase of 20-50 per cent in the risk of lung cancer for non-smoking spouses of smokers.

Prevention

Since at present there is no effective method of secondary prevention (early detection) of this rapidly progressive and highly fatal affliction, the best approach is through primary prevention. The prevalence of cigarette smoking must be substantially decreased by: 1) preventing non-smokers from taking up the habit and becoming addicted to nicotine; 2) persuading and supporting smokers to give it up; and 3) encouraging smokers to reduce their consumption, although this is the least effective in reducing both the personal risk as well as the national risk of contracting lung cancer.

Successful tobacco-control programmes have demonstrated clear success in lowering lung cancer rates. Population time-trend studies have confirmed declines in Finland, the UK and the USA which were explained by changes in smoking habits.

### Table 14.3. Relative risk for developing lung cancer by time since stopping smoking and total duration of smoking habit (Reference 11).a

<table>
<thead>
<tr>
<th>Time since stopping smoking years</th>
<th>Duration of smoking habit (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-19</td>
</tr>
<tr>
<td><strong>Men</strong></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1.0^b</td>
</tr>
<tr>
<td>1-4</td>
<td>1.1</td>
</tr>
<tr>
<td>5-9</td>
<td>0.4</td>
</tr>
<tr>
<td>&gt; 10</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1.0^c</td>
</tr>
<tr>
<td>1-4</td>
<td>1.0</td>
</tr>
<tr>
<td>5-9</td>
<td>0.4</td>
</tr>
<tr>
<td>&gt; 10</td>
<td>0.4</td>
</tr>
</tbody>
</table>

a From Lubin et al. (1984a)
Lung cancer

- Baseline category: risk for men who had never smoked relative to that for current smokers who had smoked for one to 19 years was 0.3.
- Baseline category: risk for women who had never relative to that for current smokers who had smoked for one to 19 years was 0.6.

Epidemiological studies of ex-smokers have consistently shown lower risks of lung cancer compared with current smokers (Table 14.3), the risk progressively declining with the increase in the number of years since smoking stopped. However, the risk of lung cancer for ex-smokers does not decline to the same low level as for those who have never smoked, so that preventing individuals from ever smoking is still the best primary prevention strategy.

The lung cancer control programme

Primary prevention

Control of lung cancer should concentrate on primary prevention, specifically tobacco-control activities. The general objective is to reduce the incidence of lung cancer caused by tobacco.

More specific objectives might include the following:

- to reduce the number of young people starting smoking;
- to increase the number of people giving up smoking;
- to educate all schoolchildren about the effects of tobacco on health;
- to inform everyone in the population, smokers and non-smokers, of the risks associated with smoking;
- to inform smokers about the benefits of giving up smoking and the steps they can take to do so;
- to provide support to people who want to stop smoking;
• to create a smoke-free environment to minimize the effects of passive smoking.
The process should include:

- establishing education programmes, especially for school children;

- establishing a clear policy on legislative measures, particularly price increases and taxation on cigarettes;

- establishing a national, multidisciplinary tobacco-control committee, with members drawn not only from all concerned government ministries but also from nongovernmental organizations that can advise on strategies appropriate to national culture.

The following measures should be taken to assess the outcome of the control programme:

- In the short term, a prevalence study of smoking/chewing tobacco should be undertaken to determine the proportion of adolescents and adults who are regular smokers or chewers of tobacco. From the results of such a survey, or from other data, the following may be determined:

  - the percentage of school curricula and adult literacy programmes that include information on tobacco;
  - the percentage of health-professional education programmes and continuing-education programmes that include information on tobacco.

- In the medium term, assessment should be made of the changes in the incidence of tobacco-associated conditions other than cancer, such as coronary heart disease, and cardiovascular and respiratory diseases.

- In the long term, an assessment of the reduction in mortality due to lung cancer and other tobacco-linked cancers, and in chronic obstructive lung disease, should be made.
The main features of the tobacco control programme are summarized diagrammatically in Figure 14.

**Figure 14: Primary prevention - Tobacco**

**Implementation**
- Establish a national anti-tobacco council
- Appoint an administrator of the programme with appropriate support (e.g. NCCP coordinator)
- Perform a sampling survey to determine prevalence of tobacco use
- Set up a threefold strategy based on the following:
  - **Legislation**
    - Taxation
    - Regular price increases
    - Ban on advertising
    - Warning labels
    - Ban smoking in public places
    - Ban tobacco sales to minors
    - End subsidies to tobacco industry
    - Encourage alternative crops in tobacco-growing areas
    - Regulate tobacco exports
  - **Education**
    - Especially of schoolchildren from age 10 years
    - Promote peer-to-peer programmes for adolescents
    - Mass education
    - Integrate with related messages (e.g. heart and lung disease)
    - Use the influence of the media
  - **National leadership**
    - Promote domestic cooperation and advocacy by both government and NGOs
    - Collaborate internationally on non-smoking policies and reduction in tobacco trade

**Process measures**
- >80% schoolchildren aged 10 years and over receive education about smoking
- >50% of adults receive an anti-smoking message each year
- >4 out of 9 legislative measures to control tobacco are implemented

**Impact measures**
- >80% of schoolchildren aged 10 years and over aware of hazards of smoking
- >50% of adults aware that smoking causes lung cancer
- >30% of adult smokers intend to quit within one year

**Outcome measures**
- **Short term:** <30% of adolescents are regular smokers
- <50% of adult males and <30% of adult females smoke
- **Medium term:** reduction in incidence of diseases (e.g. cardiovascular, respiratory)
- **Long term:** reduction in mortality from diseases (lung cancer, etc.)

Secondary prevention - early detection

Screening

Screening for lung cancer has been attempted using radiologic and cytological methods. Unfortunately, studies have failed to establish the effectiveness of such screening techniques in decreasing mortality. This failure may be attributed to the aggressiveness of small lesions and their propensity to early distant metastasis.

Early diagnosis and curative treatment

The concept of detecting lung cancer early among symptomatic patients is usually futile since appearance of symptoms occurs late in the course of the disease. Due to the absence of pain fibres in the lung parenchyma, symptoms usually occur with advanced disease. Other symptoms are dependent on the size, location and degree of involvement of tissues at the primary or metastatic site. Centrally-located endobronchial tumours may manifest as a cough (70 per cent of cases), dyspnoea, haemoptysis, recurrent lower respiratory infections and dull pain on the chest. In contrast, peripheral tumours may exhibit stabbing pain, pleural effusion with dyspnoea or hoarseness due to vocal cord paralysis from recurrent nerve involvement in the mediastinum.

Nonetheless, patients with a chronic cough or any other of the above-mentioned symptoms should at least undergo a chest X-ray and sputum cytology to detect cancer, and it should then be determined if the patient could benefit from curative treatment. At present, only 10 per cent of all lung cancer patients may benefit from treatment at the time of diagnosis. In the United States in 1960, the overall five-year survival rate ranged between 5-10 per cent, and had increased only modestly to 14 per cent by 1993. The most significant advance has been in the proper selection of patients for curative resection through meticulous preoperative staging procedures.

Diagnosis and staging aims to determine the histologic nature of the disease and the possibility and extent of surgical resection. The signs and symptoms and a thorough physical examination are the most efficient guides to a systematic evaluation.
The chest X-ray is usually the first test that suggests lung cancer. As the majority are advanced on presentation, the chest X-ray will in many cases indicate that resection is no longer indicated. The next step is to determine histology, specifically whether small-cell carcinomas or non-small-cell carcinomas are present.

Sputum cytology can diagnose approximately 50 per cent of all bronchogenic cancers, particularly with good (induced or transtracheal) sputum collection in patients with centrally located lesions.

Bronchoscopy and biopsy is a very useful diagnostic procedure for centrally-located tumours seen on X-ray. It may also provide information on resectability by assessing the proximity of the tumour to the carina. Percutaneous needle lung biopsy (PNLB) provides a histologic diagnosis for peripherally located tumours. Tissue may be taken from the tumour, pleura or chest wall. In addition, pleural fluid may be cytologically assessed for malignant cells. Fine needle aspiration biopsy (FNAB) may be an alternative. Computerized axial tomography (CT) increases sampling accuracy.

CT scanning is a valuable tool for determining tumour location and lymph node involvement. Coupled with percutaneous biopsy, it may provide the most accurate information regarding histology and curability/resectability, short of an open procedure like a mediastinoscopy. CT scanning of the upper abdomen may be used to determine possible liver metastasis.

Mediastinoscopy and mediastinotomy are procedures used to assess mediastinal lymph node involvement. Contralateral nodes or extensive extranodal cancer is a contraindication to surgical resection. Some believe that in stage III-A disease (with positive mediastinal nodes) surgical treatment is of no further value.

It is very important to emphasize that curative treatment for lung cancer is to be considered only when adequate resources are available. Within the context of a national cancer control programme, active treatment of lung cancer has a lower priority than treatment of more curable cancers. Active treatment of lung cancer should be attempted only in institutions where multidisciplinary specialists and sophisticated facilities are present, bearing in mind that, even with the most expensive technology available, lung cancer is rarely cured.
TNM Staging for NSCLC is shown in Appendix 3. Surgical resection is the treatment of choice for physically fit patients with NSCLC limited to the lung parenchyma (Stage I), or with ipsilateral bronchopulmonary lymph node spread (Stage II). The five-year survival rate is 40 per cent, indicating that, in spite of a vigorous preoperative search for metastasis, the majority still die from distant spread within five years. The benefits of surgery for patients with Stage IIIA disease is still unclear.

Major contraindications to surgery include:

1) stages III-B or IV disease;
2) hoarseness with vocal cord paralysis;
3) superior vena caval syndrome;
4) inadequate pulmonary function;
5) severe cardiac disease (heart failure, arrhythmia, recent myocardial infarction).

Symptoms of patients who are not fit for surgical resection may be relieved by radiotherapy but survival is not improved. Radiation therapy and chemotherapy have not yet contributed to any significant improvement in cure rates - whether used alone, combined with one another, or adjuvant to surgical resection.

**Small-cell lung cancer (SCLC)**

SCLC is divided into "limited" and "extensive" stage categories. "Limited" means that the tumour is limited to one hemithorax including ipsilateral lymph nodes up to the N3 level, supraclavicular nodes, and a pleural effusion. Any spread beyond this is categorized as "extensive" disease.

Patients with both limited and extensive stages of SCLC are considered candidates for chemotherapy. If left untreated, death is expected within a few weeks and systemic chemotherapy unquestionably improves survival, with a marked reduction in symptoms and tumour regression in over 50 per cent of patients. Unfortunately, the duration of the remission is only six to ten months because of primary drug resistance. Combination chemotherapy is superior to monotherapy, with schedules containing platinum derivatives giving the best response. Complete remission of 40-50 per cent is achieved when the disease is limited, and only 20-30 per cent in
extensive disease. The overall remission rate is 90-95 per cent for patients with limited disease and 60-80 per cent for those with extensive disease. Radiotherapy is limited to decreasing local recurrence and brain metastasis when given prophylactically in these areas. Brain metastasis occurs in 50 per cent of patients without irradiation and is reduced to 15 per cent after brain radiotherapy.

Palliative treatment

Even in developed countries, 90 per cent of patients with lung cancer die of the disease. Symptoms referable to the thorax, such as chest pain and shortness of breath are the predominant sources of suffering. Pain control, particularly with morphine sulfate, is the mainstay of palliative treatment, together with radiation to bone, brain and spinal cord. Chemotherapy should be limited to SCLC which shows a significant response and improvement in symptoms. Dyspnoea secondary to effusion is relieved by repeated thoracentesis or thoracostomy. Pleurodesis utilizing agents that provoke a severe pleural inflammation such as talc or tetracycline, which heals by fibrosis and obliterates the pleural space, may prevent or minimize recurrent pleural effusion.

What the health worker should do

Health education

The Core Cancer Health Education Module recommended for the Region (see Chapter 6 - Health education) includes 1) promoting cancer awareness of the WHO Tobacco or Health programme, and promoting a healthy diet, and 2) persuading and supporting smokers to stop smoking.

Tobacco control and a healthy diet are the two most important primary prevention measures for many noncommunicable diseases including many types of cancer and especially lung cancer.
Early detection

When facilities for diagnosis, staging and treatment are present, the health worker should be on the lookout for adults, particularly those with a long history of cigarette smoking, who complain of dyspnoea, hemoptysis, recurrent pneumonia, chest pain and hoarseness. Particularly in developing countries, health workers must be able to accurately and rapidly distinguish probable lung cancer cases from those with pulmonary tuberculosis, and refer accordingly.

Palliative care

When active intervention measures (e.g., surgery, radiotherapy, chemotherapy) are not feasible or available, as they quite frequently are in a large majority of cases, pain and symptom control, with social, psychological and spiritual support should be given in order to improve the quality of remaining life.
References and suggested readings


15. Skin cancer

Magnitude, cause and prevention

Magnitude

In general, there is a lack of accurate incidence data on skin cancers other than melanomas (i.e. squamous cell carcinomas and basal cell carcinomas) as many cases are not registered. Patients with these cancers are usually treated as outpatients and many excised specimens are not submitted for histological diagnosis. As many skin cancers are cured by excision, cautery and other destructive methods, the necessity of histological diagnosis is not seen as important by the treating physicians and the real magnitude of the problem cannot be ascertained.

For most populations, skin cancer risk is inversely related to the individual’s skin colour, and directly related to exposure to sunlight. In the USA, the incidence of skin cancer is about 100 times higher for the Caucasian population than for the African American. Within Australia and the USA, residents of areas nearer the equator have a two to threefold higher incidence rate for skin cancer than those residing within latitudes farthest from the equator.

Males have about twice as many non-melanoma skin cancers as females, and the anatomical distribution of skin cancers reflects the typical clothing patterns of each sex.

A large US survey suggested that a 1 per cent increase in ultraviolet (UV) radiation would cause a 1-2 per cent increase in the incidence of skin cancer. The continuing depletion of stratospheric ozone, which is the main shield against UV radiation, will likely lead to an increasing incidence of skin cancer.
The registration of melanomas is more accurate. This may be partly because they are much less curable than non-pigmented skin cancers and are usually treated in hospital.

Table 15 shows the 1990 estimated age-standardized incidence rates (ASR) for melanoma in ten countries and one area in the Western Pacific Region.

Table 15. Melanoma: age-standardized incidence rates (ASR) per 100,000 in ten countries and one area in the Western Pacific Region (1990 Estimates, Reference 5).

<table>
<thead>
<tr>
<th>COUNTRY/AREA</th>
<th>MALES</th>
<th>FEMALES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ASR</td>
<td>% ALL CANCERS</td>
</tr>
<tr>
<td>Australia</td>
<td>23.23</td>
<td>8.30</td>
</tr>
<tr>
<td>China</td>
<td>0.54</td>
<td>0.22</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>0.80</td>
<td>0.25</td>
</tr>
<tr>
<td>Japan</td>
<td>0.48</td>
<td>0.18</td>
</tr>
<tr>
<td>Malaysia</td>
<td>0.40</td>
<td>0.22</td>
</tr>
<tr>
<td>New Zealand</td>
<td>25.90</td>
<td>8.67</td>
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<tr>
<td>Papua New Guinea</td>
<td>7.35</td>
<td>3.94</td>
</tr>
<tr>
<td>Philippines</td>
<td>0.47</td>
<td>0.31</td>
</tr>
<tr>
<td>Republic of Korea</td>
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<td>0.11</td>
</tr>
<tr>
<td>Singapore</td>
<td>0.81</td>
<td>0.36</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>0.62</td>
<td>0.25</td>
</tr>
</tbody>
</table>

The estimated incidence of melanoma in Australia and New Zealand was more than twenty times higher than in the other countries, with the exception of Papua New Guinea. Rates in these two countries were similar for males and females. In the low-risk countries, rates for both sexes were less than 1 per 100,000.

Basal cell carcinomas, with a very high incidence rate in Australia and New Zealand, also occur among Asians, mostly on the face. Squamous cell
carcinomas, more related to UV radiation exposure, have a very high incidence rate in New Zealand and are rare elsewhere in the Region, except on the legs of Melanesians with chronic tropical ulcers. Rates for melanomas are very high in Australia and New Zealand. They are very low elsewhere, with occurrence mainly on the feet.

**Cause**

Epidemiological data demonstrate a causal relationship between exposure to sunlight and cancers of the skin. It is the ultraviolet (UV) frequency range that is presumed to be the carcinogenic component of sunlight because of its known tissue-damaging and mutagenic effects. UV radiation produces skin tumours in experimental animals.

Skin pigmentation may be an important determinant of risk because it determines the amount of sun exposure at the level of the target cells. The incidence among similarly fair-skinned populations increases as the place of residence gets nearer the equator, but this is not so among darker-skinned populations.

Exposure to UV radiation is related to all forms of skin cancer, but the epidemiological evidence is more straightforward for non-melanoma skin cancers.

There is now evidence that intermittent exposure is more harmful than continuous exposure, at least for melanomas at some sites. Individuals who are able to maintain suntans have a lower risk compared to periodic "sunburners". Exposure in children and early adolescence may confer a greater risk than exposure in adult life.

**Prevention**

The most obvious primary prevention measure is sun avoidance and the use of hats and umbrellas during recreational and occupational activities in the middle four hours of the day. Fair-skinned Caucasians who live at low latitudes, such as in Australia, New Zealand and Papua New Guinea are at greatest risk. National lifestyles and habits are difficult to change, and it will be interesting to discover the long-term results of sun avoidance programmes, such as in Australia.

Secondary prevention can be accomplished by educating the population, particularly those at high risk, on the signs of skin cancer and the need to consult early when suspicious lesions are discovered.
The skin cancer control programme

Primary prevention

Skin cancer incidence can be reduced by primary prevention, specifically by avoiding excessive ultraviolet radiation from the sun, particularly among susceptible persons.

The key measures which should be undertaken are the following:

• Increase the number of people who are aware of their own risk factors for skin cancer.

• Persuade people at high risk to avoid exposure to the sun and artificial sources of ultraviolet radiation, and to adopt appropriate avoidance behaviour and sun-protection measures for themselves and their children. This will involve using hats, umbrellas and appropriate clothing. Where sun exposure is unavoidable, broad-spectrum sunscreen with high SPFs should be used.

• Effect changes in public attitudes to a tanned appearance.

The main features of a programme to reduce excessive exposure to sunlight are summarized diagrammatically in Figure 15.1.

Secondary prevention - early detection

Screening and early diagnosis

Screening and early diagnosis of skin cancer go hand in hand. Secondary prevention (early detection), targeted at susceptible populations should consist of educating the public and health workers on the suspicious features of pigmented and non-pigmented skin lesions, and training health workers on the proper biopsy technique for suspicious non-pigmented lesions.
Primary prevention - overexposure to sunlight

Implementation
Collaborate with those at government and NGO level interested in control of excessive sun exposure
Perform a sampling survey to identify current beliefs on dangers of sun exposure
Set up a threefold strategy based on the following:

Legislation
Regulate agents that deplete the ozone layer (e.g. chlorofluorocarbons)
Require employers to provide protection for workers at risk
Regulate solariums (tanning parlours)
Promote standards for protective devices (e.g. sun filters, sunscreens)

Education
Mass education
School education
Target health professionals
Link with other elements of a healthy lifestyle (e.g. exercise)
Target high-risk groups (e.g. outdoor occupations, certain recreational activities)
Use the influence of the media

National leadership
Promote interdisciplinary and interministerial collaboration
Promote domestic and international collaboration with governments and NGOs

Process measures
>80% of schoolchildren aged 10 years and over receive education on hazards of sun exposure
>50% of adults see educational message about hazards of sun exposure each year

Impact measures
>80% of schoolchildren aged 10 years and over aware of hazards of sun exposure
>50% of adults aware of link between cancer and sun exposure
Adopt regulations to ban use of chemicals that damage the ozone layer

Outcome measures
Short term: >50% of adults actively moderating their sun exposure
Monitor thickness of ozone layer and ultraviolet radiation level
Medium term: reduction in prevalence of sun-damaged skin
Long term: reduction in incidence of skin cancers

A health worker should be able to suspect skin cancer by its history and appearance. Early detection is achieved by adequate physical inspection by the health worker on a regular basis, particularly for those who are at high risk. These are persons who expose themselves to the sun by nature of work or habit. Caucasians are more predisposed to sun-induced changes leading to skin cancer because of the deficiency of melanin pigment. Health education should aim to prevent lesions as well as to detect them earlier, since these can be easily observed by the patients and their companions. The warning signs of skin cancer should be disseminated to the community in order to increase awareness and diagnose cases early.

The most common histological types of skin cancer are basal cell carcinoma (BCC) and squamous cell carcinoma (SCC). BCC is four times more common than SCC. Suspicious early lesions are the following:

- Persistent ulcers that heal intermittently or exhibit minimal bleeding.
- Bleeding, ulceration, or asymmetric nodularity in a patient with actinic (solar) keratosis.
- Ulceration or nodularity in previously irradiated skin, scar or sinus tract.
- Chronic reddish patches with erosions which are not healing.

While melanomas comprise only a small proportion of skin cancers, it is important to diagnose them even earlier in order to prevent distant metastases which are very hard to treat and cause death in a large proportion of patients. Melanomas may be distinguished from melanocytic nevi and other benign pigmented lesions on the basis of ABCDE. Melanomas may have:

**Asymmetric shape.**

**Border irregularity.**

**Colour variation within the lesion including brown, black, blue, red and white hives. Colour of lesion darkening or blackening**

**Diameter of lesion Enlarging.**
Skin cancer

A brown lesion which has any two of the first three signs, or either diameter enlarging or colour darkening alone should be regarded as highly suspicious of melanoma.

**Curative treatment**

Non-pigmented skin cancers (BCC and SCC) seldom spread to distant organs, and the majority are curable either by surgery or radiotherapy.

Small lesions can be excised by health workers. Bigger lesions, particularly those in the face, will have to be referred to specialists.

Pigmented skin cancers (melanomas) are divided into 3 stages at diagnosis.

Stage I. melanoma confined to the skin

Stage II. involvement of regional lymph nodes

Stage III. distant metastases

The most important prognostic variable is the thickness of the lesion. Thin melanomas (<1 mm) are curable and no further work-up is needed. For thicker lesions a full examination of lymph nodes is required to look for distant metastases. Other tests are used only when indicated. Suspicious pigmented skin lesions should be referred for appropriate treatment.

**Palliative treatment**

Unfortunately many cases of melanoma are still not diagnosed early. The prognosis for patients with stages II and III of the disease is very poor. There is no efficient active systemic treatment for metastases that consistently results in relief of symptoms or increased survival. Melanomas commonly spread to regional lymph nodes, liver, lungs and brain. Relief of pain and other symptoms, and psychosocial and spiritual support should be given.

**What the health worker should do**
Health education

In certain countries of the Region, notably Australia and New Zealand, the incidence of skin cancer is high enough to warrant strong public health measures. The public should be made completely aware of the importance of avoiding excessive exposure to sunlight, especially in the middle part of the day, and in particular of avoiding sunburn. The use of sunscreen to avoid sunburn and using hats and umbrellas should be constantly encouraged, particularly among light-skinned persons who do not tan, and sunburn easily.

Early detection

The health worker should be familiar with the warning signs for pigmented and non-pigmented skin lesions. The public should be made aware of these signs and periodically examine their skin.

The warning signs for pigmented skin lesions are (ABCDE):

- **A**ssymetric shape.
- **B**order irregularity.
- **C**olour variation within the lesion, including brown, black, blue, red and white hues, or colour or lesion darkening or blackening.
- **D**iameter **E**nlarging.

The warning signs for non-pigmented skin lesions are:

- Persistent ulcers that heal intermittently or exhibit minimal bleeding.
• *Bleeding, ulceration, asymmetric nodularity in an actinic (solar) keratosis.* (Figure 15.2)

(please see attached slide)

• *Ulceration or nodularity in previously irradiated skin, scar or sinus tract.*

• *Chronic reddish patches with erosions which are not healing.*

A strong light and a hand held magnifying lens are required for proper inspection of skin lesions.

The health worker should be able to do an excision biopsy of small non-pigmented lesions. For large lesions, a section biopsy is done, and the patient referred accordingly.

**The steps in an excision biopsy are as follows:**

1. *The skin is prepared with an antiseptic* (povidone iodine, chlorhexidine, hexachlorophene).

2. *A local anaesthetic agent is infiltrated into the planned incision site.* If lidocaine is used, the maximum safe dose is 7.5 mg/kg. For large areas, it is preferable to use a diluted solution.
3. A 1.0 cm lateral (Figure 15.3A) and inferior (Figures 15.3B and 15.3C) margin from the tumour is usually sufficient.

4. The skin is closed with interrupted sutures (Figure 15.3D).

5. Post-operatively, two or three doses of a non-steroidal anti-inflammatory drug (NSAID) are sufficient to control post-operative pain. No antibiotics are needed.

Health workers should not attempt to biopsy suspicious pigmented lesions and should refer them to hospital for management.

Figure 15.3: Excision biopsy. Adequate margins both on the surface and in depth are required.

Source: Primary care surgery for family physicians. Manila, Philippine College of Surgeons, 1993 (PCS Scientific Publications No. 8).
Palliative care

When active intervention measures (e.g. surgery, radiotherapy) are not feasible or available, pain and symptom control, with social, psychological and spiritual support should be given in order to improve the quality of remaining life.
References and suggested readings


Skin cancer


16. Breast cancer

Magnitude, cause and prevention

Magnitude

Breast cancer is the third most common cancer worldwide and is the most common cancer in women. In 1980 it comprised nine per cent of the global cancer burden, even although occurring almost exclusively among women. It ranks third in developed countries, and fifth in developing countries. Incidence rates are high in most industrialized countries (except Japan), and low in central and tropical South America, Africa and Asia.

The incidence curve for breast cancer rises with age from 30 to 70 years. There is considerable variation within countries according to sociodemographic factors such as race, social class, marital status and region of residence. Table 16 shows the 1990 estimated age-standardized rates (ASR) per 100,000 in ten countries and one area in the Western Pacific Region.

The highest estimated incidence rates were in New Zealand and Australia where breast cancer comprised a quarter of all female cancers, while the lowest rate was in the Republic of Korea. Intermediate rates were estimated for the other eight countries.

Increasing trends in incidence have been observed in many countries, and, together with the observed changes in risk in migrant populations, may be related to changes in reproductive and dietary behaviours.
Table 16. Breast Cancer, Female: age-standardized incidence rates (ASR) per 100,000 in ten countries and one area in the Western Pacific Region (1990 Estimates, Reference 8).

<table>
<thead>
<tr>
<th>COUNTRY/AREA</th>
<th>ASR</th>
<th>%ALL CANCERS IN FEMALES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>61.21</td>
<td>25.52</td>
</tr>
<tr>
<td>China</td>
<td>20.45</td>
<td>9.96</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>31.00</td>
<td>14.17</td>
</tr>
<tr>
<td>Japan</td>
<td>26.26</td>
<td>15.34</td>
</tr>
<tr>
<td>Malaysia</td>
<td>26.90</td>
<td>18.63</td>
</tr>
<tr>
<td>New Zealand</td>
<td>74.33</td>
<td>26.01</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>22.65</td>
<td>12.19</td>
</tr>
<tr>
<td>Philippines</td>
<td>32.72</td>
<td>23.00</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>12.70</td>
<td>8.55</td>
</tr>
<tr>
<td>Singapore</td>
<td>38.26</td>
<td>19.35</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>33.20</td>
<td>17.43</td>
</tr>
</tbody>
</table>

**Cause**

The fact that breast cancer almost exclusively occurs in females strongly indicates that reproductive and hormonal factors are involved. Whatever the overall incidence rates, the basic shape of the incidence curve by birth cohort is similar in all populations, emphasizing the effect of ovarian activity on the susceptibility of breast epithelium to neoplastic transformation. Commonly recognized factors that confer a higher risk are early menarche, late menopause and first full-term pregnancy at age 30 years and older. Obesity in post-menopausal women has been incriminated, and the associated increase in risk has been partly explained by the fact that adipose tissue is the main source of oestrogens in post-menopausal women. Some studies have reported a protective effect from delayed menarche, early menopause (natural or induced) first full-term pregnancy occurring at age 20 and high parity.
Increasing incidence in some countries that have progressed from developing to developed status has been attributed to changing reproductive behaviour, such as smaller family size and higher age at first full-term pregnancy. A change in diet is probably also responsible for the increasing incidence seen in countries which have undergone an epidemiological transition, such as Singapore.

While there is no conclusive evidence that a high fat diet may be a causal factor in breast cancer, the promotion of a healthy diet is considered to be sensible from a public health perspective. Exercise and the consumption of fruits and vegetables are important protective factors and the degree of protection is highest when started at an early age (i.e. childhood and adolescence). Scientists continue to carry out further investigations on issues such as the relative importance of total fat and saturated fat, and the accuracy and reliability of different dietary assessment methods.

**Prevention**

Breast cancer is one of only a few cancers (i.e. cancers of the cervix, breast and mouth) for which a good opportunity for both primary and secondary prevention currently exists by methods which are practical enough to be implemented regionally.

In primary prevention, reproductive modification is not a practical measure as it may be extremely difficult from a social, cultural and economic sense to convince women to have more babies, and earlier, in order to prevent breast cancer. On the contrary, as nations progress economically the tendency is to adopt child-bearing patterns that increase the risk of breast cancer, making the other primary prevention option, dietary modification, even more important. Nevertheless, such information on both promotive and protective reproductive behaviour should be made available to women.

While fat is the dietary component implicated in breast cancer risk, the public health programme should not involve only fat, or its association with breast cancer and other cancers, but rather promote the notion that the "affluent" diet is bad for health, and that a healthy diet is beneficial. The "affluent" diet, high in fat, salt and free sugars and low in whole grains, vegetables and fruits, increases the risk of cancer, cardiovascular diseases and many other chronic diseases, and may also lead to deficiency states. A healthy diet, low in fat, salt and free sugars and high in whole grains, tubers, lentils, vegetables and fruits, decreases the occurrence of both deficiency states and many chronic diseases, including cancer.
For secondary prevention (early detection) the use of mammographic screening has repeatedly demonstrated a mortality benefit compared with unscreened populations. The reduced mortality has, however, only been consistently demonstrated for women of 50 years and older. However, the resources needed to undertake a full-scale mammographic screening programme are quite considerable, so that it cannot yet be recommended as a global cancer control policy. For countries where it may be feasible, the greatest benefit would be obtained by concentrating screening on women aged 50-69.

Although randomized trials on breast self examination (BSE) and health worker breast examination (HWBE) are still ongoing, preliminary results have demonstrated both the feasibility of teaching women and health workers to perform the examination, as well as the detection of earlier stage cancers. As it will still take several years of follow-up to determine if indeed a reduced mortality survival benefit will be observed, it is recommended for countries with high or intermediate risk to consider implementing these practical methods now.

The breast cancer control programme

Primary prevention

The number of new breast cancer cases can be reduced by primary prevention, specifically by avoiding the "affluent diet" and the promotion of a healthy diet.

The following key principles must be observed:

- **Avoid excessive fat**: lower limit 10 per cent of energy, upper limit 30 per cent of energy. This is the level generally advocated to minimize the risk of cardiovascular disease.

- **Include adequate amounts of vegetables, fruits, and whole grains with fibre in the diet**: lower limit 400 grams per day

- **Ensure energy balance and maintenance of ideal body weight by a combination of adequate exercise and a moderate calorie intake.**
• Prevent contamination of foods by carcinogens such as aflatoxin and chemicals used as pesticides, and avoid adding to food substances such as nitrites and nitrates that may be carcinogenic or lead to the formation of carcinogens.

The important measures to be considered in promoting dietary modification are the following:

• government action to recognize dietary factors in cancer etiology and consider the implications of this for the relevant ministries (especially health and agriculture);

• appropriate education on diet in schools;

• public education campaign about diet and adults;

• collaboration with representatives of the food industry (both production and service aspects) to ensure compliance with the nutritional objectives of the programme.

The main feature of a diet modification programme are summarized diagrammatically in Figure 16.1.

Secondary prevention - early detection

Screening

Secondary prevention of breast cancer is possible by means of mammography, breast self-examination (BSE), and health worker breast examination (HWBE).

Mammography

Several randomized trials have clearly shown a benefit from mammography for women aged 50 years or older. Screened women are expected to achieve a survival benefit of around 30 per cent compared with unscreened women. When feasible, mammographic screening for women of 50 years and above should be done every two to three years. No benefit had been shown for women of less than 50 years.
Figure 16.1: Secondary prevention - screening of cancer of the breast

**Implementation**
- Train health care workers to examine breast and teach self-examination to women aged 40 years or over
- Ensure link between identification of abnormality and referral for diagnosis, treatment, and follow-up
- If mammography is affordable for diagnosis, train radiologists and radiographers, and establish quality control of films
- Establish policy to use mammography for screening only at 50-69 years

**Detectable preclinical phase (DPCP)**

**Average age:**
- Birth
- Onset of sexual activity
- Dysplasia
- Carcinoma \textit{in situ}
- Invasive cancer
- Death

**Process measures**
- >80% of women aged 40 years or over receive information on breast cancer screening
- >80% of primary health care workers informed about the guidelines for breast cancer screening

**Impact measure**
- >80% of women aged 40 years or over receive a single physical examination and are taught breast self-examination
- >70% of women aged 50-69 years screened (for mammography programmes)

**Outcome measures**
- Short term: >30% of breast cancer detected by screening
- Ratio of cancers detected at first screen three times expected incidence (for mammography programmes)
- Medium term: >15% reduction in proportion of cases of invasive breast cancer with advanced (stage II+) disease
- Long term: >15% reduction in breast cancer mortality


Mammographic screening is, however, costly and technologically intensive, and may not be implementable for most women worldwide. While no randomized trials have been completed on self examination and
health worker examination, these two methods have the potential of detecting lesions earlier than usual, and may have a survival benefit.

Mammographic screening should:

1) focus on women 50 years and older, and

2) should not be introduced for screening unless the resources are available to ensure effective and reliable screening of at least 70 per cent of the target group in a highly organized setting.

Attention must also be given to providing adequate quality control measures for this highly technical procedure. HWBE should be integrated with the cervical cytological screening programme, and the level of BSE sustained every time a woman has personal contact with health workers.

The main features of a breast cancer screening programme are summarized diagrammatically in Figure 16.2.

**Early diagnosis and curative treatment**

For most women, BSE offers the most practical method of early detection.

Several studies have demonstrated the following:

- The feasibility and effectiveness of a BSE education programme.
- A substantial increase in the number of cases of breast abnormalities detected.
- A shortening of the time between detection and visit to the doctor.
- A shift to an earlier stage of breast cancer diagnosis.

In addition, a study in Finland and another in Canada have produced evidence suggesting that women who are competent in BSE and have access to physicians capable of diagnosing detected abnormalities have a reduced mortality rate from breast cancer.

BSE should be part of an integrated women's health programme. Intensive person to person interaction is required for women to acquire and maintain the habit, so that personal responsibility for one's own health and improved relations between women and health workers are fostered.
Figure 16.2: Primary prevention - diet

**Implementation**
- Establish collaboration with agricultural interests at government and industry level
- Perform a sampling survey to identify current dietary practices
- Set up a threefold strategy based on the following:
  
  **Legislation**
  - Change agricultural support to reduce consumption of fat and increase that of fruit and vegetables
  - Regulate food preservation and preparation
  - Label food with details of nutrient content

  **Education**
  - Especially of schoolchildren from age 10 years
  - Mass education of adults
  - Link with other elements of a healthy lifestyle (e.g. exercise)
  - Integrate with related messages (e.g. on heart disease)
  - Use the influence of the media

  **National leadership**
  - Promote interdisciplinary and interministerial collaboration
  - Promote domestic and international collaboration, by government, agricultural industry, and NGOs

**Process measures**
- >80% of schoolchildren aged 10 years and over receive education about good dietary practices
- >50% of adults receive publicity about diet and cancer each year
- >1 legislative measure concerned with diet and health implemented

**Impact measures**
- >80% of schoolchildren aged 10 years and over aware of good dietary practices
- >50% of adults aware of link between diet and cancer

**Outcome measures**
- Short term: >30% of adults actively practising dietary modification
- >30% of adults exercise at least 3.5 hours each week
- Medium term: reduction in incidence of diseases (cardiovascular disease, colon cancer)
- Long term: reduction in incidence of other cancers (breast, stomach)


HWBE ought to complement BSE. Since another important component of an integrated women’s health programme is screening for cervical...
cancer with the cervical smear, HWBE should be done at the time the smear is taken. The starting age should be between 35-40 years.

The diagnosis of breast cancer is through a biopsy. The majority of breast masses in women younger than 35 years are not malignant and can be observed. The general practitioner should, however, refer all women with breast masses to a physician skilled in the diagnosis and treatment of breast cancer. Lumps in women 35 years and older should be biopsied, as the age-specific incidence rates of breast cancer progressively increase from this point. Fine needle aspiration biopsy (FNAB) is an important diagnostic method. FNAB is a safe, simple and inexpensive procedure and is more acceptable than an open biopsy. Health workers can be trained to perform FNAB in the clinic.

Appendix 10 shows the clinical staging classification of breast cancer. Modified radical mastectomy (MRM) has been the standard curative treatment for Stages I,II and IIIA breast cancer. The operation consists of a total mastectomy and axillary node dissection. Breast conservation procedures have similar survival results as MRM, and consist of excising the breast tumour plus an axillary lymph node dissection, followed by radiotherapy to the breast. Axillary nodal metastases is associated with significantly shorter survival. The probability of survival ten years after treatment among women without axillary nodal metastases is around 80 per cent, as compared to 60 per cent for axillary node-positive cases.

Adjuvant therapy significantly prolongs survival if axillary nodes are positive, the type of adjuvant therapy depending on the woman's age or menopausal status. Adjuvant hormone therapy using tamoxifen results in a 20 per cent average reduction in annual mortality risk among women older than 50 years. For woman younger than 50 years the reduction with adjuvant chemotherapy is 17 per cent, and 25 per cent with adjuvant oophorectomy.

There is no evidence that periodic laboratory or radiologic tests ("metastases work-up") in order to detect "early" asymptomatic metastases is of benefit, in survival or any other outcome parameter. Routine investigations in the follow-up of asymptomatic patients are not indicated, and investigations should be done only as needed in symptomatic patients.
Palliative treatment

Breast cancer is a slow growing tumour, particularly in older women, and many patients with advanced disease benefit from active treatment. For locally advanced cases (IIIB) the probability of surviving five years is around 40 per cent. The aim of active palliative treatment is the long-lasting relief of locoregional symptoms, and the combination of surgery and radiotherapy is standard treatment. The addition of systemic drugs had been reported to reduce local recurrence but has not prolonged survival.

The quality of life of most women with symptomatic metastatic disease can benefit from active palliative treatment, with many having prolonged survival. Radiotherapy gives very good palliation for symptomatic bone, vertebral and CNS lesions. The first line systemic treatment of choice is hormone therapy and the patients who will most likely benefit have the following characteristics:

• Long disease-free interval (at least two years)
• Metastases limited to bone and soft tissue
• Late premenopausal or postmenopausal status
• Prior response to endocrine therapy
• Tumour with an oestrogen or progesterone receptor (or both)

For those who do not have these characteristics, chemotherapy is used as an initial systemic treatment. Symptomatic treatment, particularly pain relief, is always given in conjunction with active treatment, or for those unable to receive active treatment.
What the health worker should do

Health education

The Core Cancer Health Education Module recommended for the Region (see Chapter 6 - Health education) includes 1) promoting awareness of the importance of a healthy diet in health promotion and the prevention of many noncommunicable diseases, including cancer, 2) helping individuals who have adopted unhealthy dietary habits to change to a healthy diet, 3) promoting the habit of breast self examination (BSE), and 4) in countries where there is a population-based screening programme (e.g. mammography for women 50 years or older), encouraging the target population to participate in the screening programme.

Health education, aimed at the prevention and early detection of breast cancer, can, in some countries, consist of all four different categories of cancer health education - 1) increasing awareness, 2) changing risk behaviour, 3) learning self-examination skills, and 4) promoting participation in an early detection programme.

The following are the steps in performing BSE (Figure 16.3):

**Inspection**

- *Remove clothing and view yourself standing in front of a mirror.*

- *Raise both arms above the head simultaneously, and look at your breasts as you do so (Figure 16.3A).*

- *Lower your arms, and again observe both breasts.*
• Repeat arm raising and lowering, looking at your breasts from different angles.

• Place your hands on your hips and tighten your chest muscles by pressing down firmly on your hips, relax, then press again, repeating several times and looking closely at your breasts (Figure 16.3B).

![Figure 16.3B]

• Be on the lookout for these warning signs during inspection - lumps; change in size or shape; dimpling or puckering of the skin; nipple retraction; bleeding or discharge from the nipple.

**Palpation**

• Lie down with a pillow or folded towel underneath your right shoulder.

• Place your right hand under your head.

• Use your left hand to examine your right breast. Placing your fingers flat over your breast, examine the breast in a vertical strip pattern, the first strip starting at your armpit.
• Make a circle of light, then firm pressure to feel for any lump or thickening (Figure 16.3C).

• Proceed towards the bra-line, making similar circles of light and firm pressure until every spot has been covered.

• Move your fingers 2 cm to the left and repeat the procedure, starting from the collar bone to the bra-line.

• Work up and down in 2 cm strips until you reach the breast bone (Figure 16.3D).

• Carefully examine the areola, and with both hands apply firm pressure on the right breast and see if any discharge comes from the nipple.

• Transfer the pillow to underneath your left shoulder, and put your left hand under your head.

• Examine your left breast with your right hand, using the same circles of light then firm pressure in a vertical strip manner.

For women who are still menstruating, BSE should be performed at least one week after the last day of menstruation, when the usual perimenstrual breast changes will have subsided.
Early Detection

Health workers should take the opportunity to examine the breasts whenever women attend the clinic, particularly women 35 years and older. At the same time, BSE should be taught and the correct procedure reinforced. An opportune time is when a cervical smear is taken.

The following are the steps in performing HWBE (Figure 16.4):

*Inspection*

- *Clothing above the waist is removed, and the patient either sits on the side of the examining table with the health worker standing in front of her, or, the patient sits on a chair with the health worker also sitting on a chair in front of the patient.*

- *As in BSE, the patient raises and lowers her arms, and alternately presses and relaxes her hands on her hips.*

- *The health worker should be on the lookout for the same warning signs.*

Figure 16.4A
Palpation

- The patient remains seated, and the examiner palpates each supraclavicular area, looking out for lymph nodes (Figure 16.4A).

- The examiner’s right forearm then supports the patient’s right forearm which is flexed at the elbow.

- The examiner palpates the patient’s left axilla, urging the patient to relax her right shoulder and right arm while supporting her right forearm, so as to facilitate palpation as deep into the axilla as possible in order to feel for enlarged axillary lymph nodes (Figure 16.4B).

- The procedure is reversed in palpating the left axilla.

- The patient then lies down with a pillow underneath her right shoulder and her right hand underneath her head.

- The examination proceeds in the same manner as in BSE, using circles of light then firm pressure with the fingers flat (Figure 16.4C) in a vertical strip pattern (Figure 16.4D), ensuring that the entire breast is examined.
• The nipple and areola area are palpated last.

• The procedure is repeated on the left breast.

Health workers should also be able to perform a diagnostic biopsy in the clinic. This is particularly important in areas where access to hospital-based facilities is difficult, or when the reliability of patients actually going to hospital for a biopsy is questionable. A definite diagnosis is important, even if the biopsy specimen has to be sent to a remote facility for reading. Of great value is FNAB, which can be done as soon as a suspicious mass is detected.

The following are the steps in performing FNAB (Figure 16.5):

• The patient lies down, and as in BSE and HWBE, with a pillow underneath the shoulder and the ipsilateral hand under the head.

• The skin over the mass is prepared with an antiseptic (i.e. povidone-iodine, chlorhexidine, hexachlorophene).

• The mass is fixed firmly with the thumb and index finger of one hand.
• No local anaesthetic is required.

• A sterile gauge 23 needle, attached to a sterile syringe, is used. The bigger the syringe the easier to generate negative pressure.

• Using the other hand, the needle is inserted into the mass percutaneously, and, applying negative pressure, by incomplete withdrawal of the syringe plunger.

• While maintaining the negative pressure, the needle is moved to and fro in different directions within the mass without pulling the needle from the skin puncture site (Figure 16.5).

  ![Figure 16.5](image)

• The syringe tip is carefully observed to see if tissue, often mixed with serosanguinous fluid is aspirated.

• The needle is then withdrawn and the syringe plunger released before the needle exits the skin.

• A sterile gauze is placed on the puncture site and the patient is asked to apply firm pressure for at least 5 minutes using the contralateral hand.
• The syringe plunger is withdrawn completely, reinserted, and the aspirated material squirted onto a glass slide.

• A second slide is used to produce a smear of the aspirated material, taking care not to make the smear too thin.

• The smear is allowed to dry and then immersed in a fixative (70-90 per cent alcohol) for 10 minutes.

• The fixed slide is labelled with the name of the patient, place and date of the procedure.

• The fixed slide is sent to a processing and reading facility.

• If possible, the aspiration site is inspected the following day.

• Neither postoperative analgesics nor antibiotics are necessary.
References and suggested readings


17. Cervical cancer

Magnitude, cause and prevention

Magnitude

In 1980, cervical cancer was the fifth most common cancer worldwide and comprised 7.3 per cent of all cancers. It was the second most common among females after breast cancer, and made up 15 per cent of all cancers in women. Cases in developing countries were almost four times more numerous than in developed countries.

There are large variations in rates between ethnic groups within countries. Rates are higher in urban areas. Wives of clergymen had only 12 per cent of the rates of cervical cancer in other women of the same age, while rates in wives of seamen and fishermen were 160 per cent more. These wide variations can be attributed to two major factors: 1) differences in sexual practices; and 2) differences in access to organized cervical cancer screening programmes.

Incidence and mortality have generally been declining in countries where an organized screening programme exists, the greatest declines observed in the age groups that are maximally screened. Incidence and mortality are increasing in countries where there are no organized screening programmes, which is the case in most developing countries.
Table 17 shows the 1990 estimated age-standardized rates (ASR) in ten countries and one area in the Western Pacific Region.

Table 17. Cervical cancer: age-standardized incidence rates (ASR) per 100 000 in ten countries and one area in the Western Pacific Region (1990 Estimates, Reference 9).

<table>
<thead>
<tr>
<th>Country/Area</th>
<th>ASR</th>
<th>% ALL CANCERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>11.03</td>
<td>4.59</td>
</tr>
<tr>
<td>China</td>
<td>14.68</td>
<td>7.15</td>
</tr>
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<td>Hong Kong</td>
<td>18.6</td>
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<td>Japan</td>
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<td>Malaysia</td>
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<td>New Zealand</td>
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<tr>
<td>Papua New Guinea</td>
<td>46.21</td>
<td>24.83</td>
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<td>Philippines</td>
<td>15.09</td>
<td>10.61</td>
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<tr>
<td>Republic of Korea</td>
<td>21.35</td>
<td>14.37</td>
</tr>
<tr>
<td>Singapore</td>
<td>23.64</td>
<td>11.96</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>34.16</td>
<td>17.93</td>
</tr>
</tbody>
</table>

The highest estimated ASR was in Papua New Guinea and the lowest in Australia. Comparatively low rates were also estimated for China, Japan, the Philippines, New Zealand and Malaysia. Intermediate rates were estimated for the Republic of Korea, Singapore, Viet Nam, and Hong Kong.

The peak age for incidence of cancer of the cervix is between 40 and 60. A small percentage occur below 30. Most recent reports, however, indicate that in some countries in the region incidence among the young is increasing. The incidence rate becomes significantly high between 30 and 35, increases further to its peak at about 50, and steadily declines after 60.
Cause

Risk factors for cancer of the cervix include multiple sexual partners on the part of both the man and the woman, early age at first coitus, multiparity, a history of sexually transmitted infections, and a history of such infections in male sexual partners. Among sexually active women, a positive correlation has been established between the incidence of cancer of the cervix and the sexual partner's occupation, extramarital sexual activity and cancer of the cervix in previous sexual partners.

There is overwhelming epidemiological evidence that cancer of the cervix is caused by an infectious agent that is transmitted through sexual intercourse. Several viruses have been implicated. The focus of current attention is human papilloma virus (HPV).

HPV is the virus responsible for condyloma acuminata or "venereal wart" or "genital wart" commonly seen in the vulva, vagina and perineum. In the cervix, the lesion is less obvious. It has thus been called "flat condyloma" or "subclinical human papilloma virus infection". Characteristic cytological, colposcopic and histological findings generally result from this infection.

It has been observed that the incidence of cervical condyloma is high in population groups with a high incidence of cervical cancer and its precursors. It has also been observed that there are definite relationships between the mean ages of patients with cervical condyloma, cervical cancer precursors and cervical cancer. In the laboratory, HPV DNA has been demonstrated in cervical cancer cells in a significant number of cases.

Pathology

Following inoculation of the virus during sexual intercourse, it reaches the basal layers of the cervical squamous epithelium and establishes a colony there. Not all inoculated women become persistently infected, depending on individual host resistance factors. There is no clinical manifestation at this time and the histological changes in the cervix indicative of malignancy are limited to the basal layers of the epithelium. This lesion is called cervical intraepithelial neoplasia, grade I or CIN I.

When these histological changes involve two-thirds of the total thickness of the epithelium, the lesion is referred to as cervical intraepithelial neoplasia grade II or CIN II. When they involve the whole
Cervical Cancer

thickness of the epithelium, the lesion is referred to as cervical intraepithelial neoplasia, grade III or CIN III. CIN III incorporates both severe dysplasia and the old "carcinoma-in-situ". CIN III is the most severe of the precursor lesions. It precedes invasive cancer.

All of these lesions have the potential to progress to invasive cancer. However, not all of them actually do progress. Some are still reversible. Reversibility is highest in CIN I and lowest in CIN III. Progression to invasive cancer is highest in CIN III and lowest in CIN I. The rate of progression also varies greatly. In general, it takes years rather than months for these epithelial abnormalities to become invasive cancer. The generally accepted time interval for this change to occur is 5 to 15 years.

In its original location in the cervix, usually the squamo-columnar junction, the tumour grows and soon becomes clinically evident. It is at this stage that the first symptoms usually appear. The most common symptom is vaginal bleeding, intermenstrual and, classically, postcoital.

From the cervix, it spreads 1) by direct extension, 2) through the lymphatic system, and 3) through the blood stream. The most common routes of direct extension are laterally to the parametria-cardinal and uterosacral ligaments, inferiorly to the vagina, and superiorly to the corpus uteri. In the late stages, it may spread anteriorly to the urinary bladder and/or posteriorly to the rectum. Initially, it causes bleeding from these organs. Subsequently it may cause obstruction and even fistula formation.

When the cancer gains access to the lymphatic vessels in the cervical stroma and the parametria, the pelvic lymph nodes may be involved, as well as the upper lymph node chains. Spread through the blood stream may explain the occurrence of metastases in distant sites like the lungs and the brain.

With parametrial involvement, ureteral obstruction occurs. The resulting hydronephrosis, pyelonephritis, and non-functioning kidneys, if uncorrected, can lead to uraemia which is the most common cause of death among patients with cervical cancer. Other causes of death are haemorrhage and infection. With parametrial involvement of varying degrees, obstruction of the lymphatics and veins draining the lower extremeties also occurs. This results in oedema of the lower extremeties. Sometimes, the vulva also becomes oedematous. Sometimes, bone and spinal nerve roots become involved even before the onset of uraemia. When this occurs, pain becomes a very prominent symptom.

In this terminal stage, the clinical picture is classic, characterized by 1) pain in the lower back, hips or thighs, 2) oedema of the lower extremities and 3) evidence of ureteral obstruction. These constitute the "ominous triad" in cancer of the cervix.
Prevention

Primary Prevention

Since there is almost universal acceptance that a sexually-transmitted agent is the major cause of cervical cancer, primary prevention must entail a consideration of the following:

1) a monogamous sexual relationship between husband and wife;
2) a delay in the onset of sexual activity; and
3) the use of barrier contraceptives. Mechanical barriers include condoms (for male and female) and diaphragms.

Primary prevention involves a major change in sexual practices and attitudes. This change is very difficult to effect and it takes a long time to involve the majority of the population. Nevertheless, primary prevention concepts should be incorporated into both adult and adolescent health education. These educational programmes need to be culturally sensitive but should emphasize the responsibility of men in reducing the risk of subsequent disease in their partners, as well as that of women themselves. There is a need to educate males from adolescence. This should be linked with programmes on the prevention of AIDS and other STDs.

Secondary Prevention

Most cases are asymptomatic for a long period. Therefore secondary prevention through screening is currently the most important component of cervical cancer control. Screening is to detect lesions (precursor lesions or early invasive cancer) at a time when the presence of the disease is not recognized. The women may have symptoms but may not appreciate them as due to the disease.

At the present time, the most reliable and most practical screening method for cancer of the cervix and its precursors is the Papanicolaou smear. It is based on the biological phenomenon that cells are continuously shed from epithelial surfaces. Both normal and abnormal (atypical, malignant) cells are shed. If these cells are properly collected, fixed and stained, accurate interpretation can be made and very useful information can be obtained regarding the epithelium from which they came.
Screening for cancer of the cervix is intended to discover preinvasive lesions. If these lesions are appropriately treated, their progression to invasive cancer is prevented. Sometimes, with screening, invasive cancer is discovered. This is generally at an early stage and, when appropriately treated, the prognosis is very good.

Considering the effectiveness of the Pap smear in detecting cervical cancer precursors, and considering the great number of women at risk of developing cervical cancer, public health education on cancer of the cervix should emphasize, among other things, that the development of invasive cancer can be prevented with effective screening. Public education messages should emphasize the effectiveness and availability of cervico-vaginal cytological and auxiliary diagnostic procedures to follow up abnormal results. Necessarily, treatment facilities should be available and accessible to the target population.

Public information may be effected through radio, television, movies and the print media, including pamphlets and posters. Direct personal communications with knowledgeable and respected members of the community, the health care providers and the community leaders, are very important.

It is also important that proper sterilization methods are strictly implemented for reusable vaginal specula to assist in the prevention of HPV infection. Disposable specula should not be reused.
The cervical cancer control programme

Primary prevention

Cervical cancer incidence can be significantly decreased by both primary and secondary prevention. Primary prevention consists of safe sexual practices, including barrier methods to prevent the transmission of the viral agent(s). Health education on safe sexual practices should be integrated with other important national health activities such as the control of sexually transmitted diseases (STDs), AIDS and population control.

Secondary prevention - screening

Prevention of invasive cancer is accomplished through a cervical cytological screening programme (Pap smear). The target age group and screening frequency has to be determined by each country, and will depend on epidemiological, sociocultural and economic factors, taking into consideration all the activities to be carried out following the reading of an abnormal smear.

The main features of a cervical cytology screening programme are summarized diagrammatically in Figure 17.1.

For cervical cancer screening to be effective, it should target as many women as possible. In general, re-screening is not as important as increasing the number of women screened. For this reason, the following managerial guidelines are recommended:

1) A central/national registry should be kept. This should contain accurate basic information on all women screened, including date and result of screening. If a result is abnormal, action taken should also be recorded.
Cervical Cancer

Figure 17.1: Secondary prevention - cytology screening for cancer of the cervix

**Implementation**
- Establish health education for awareness of screening
- Establish a clear policy to screen women >35 years of age
- Identify women aged 35-59 years
- Train primary health care workers to examine cervix and take smears
- Train cytotechnicians and cytopathologists
- Establish laboratories with quality control
- Ensure link between identification of abnormalities and referral for diagnosis, treatment, and follow-up
- Establish information system for monitoring and evaluation

**Detectable preclinical phase (DPCP)**

**Average age:**
- ~13
- 18
- 35
- 50
- 55 years

**Process measures**
- >80% of women aged 35-59 years informed about screening for cancer of the cervix
- >80% of primary health care workers instructed in taking cervical smears

**Impact measure**
- >80% of women aged 35-59 years screened at least once

**Outcome measures**
- Short term: >30% reduction in proportion of cases of invasive cervical cancer with advanced (stage II+) disease
- Medium term: >30% reduction in incidence of invasive cervical cancer
- Long term: >30% reduction in cervical cancer mortality

2) The screening programme should not be isolated but integrated into the primary health care services.

3) Screening facilities should be decentralized and located near the main centres of population. The following may be utilized: 1) health centres, 2) lying-in clinics, 3) family planning clinics, 4) STD clinics, 5) hospital outpatient services, 6) mobile units, and 7) private doctors’ offices. Rarely will it be necessary to establish a new facility for smear collection.

4) The screening facilities should be available during hours that are convenient for women, especially working women.

5) Allied health workers should be utilized in the screening programme. They should be given adequate training in speculum examination, obtaining cervical smears and recognition of deviations from normal appearance.

6) Screening personnel should be client-oriented. All efforts should be exerted to make the client feel at ease.

7) Briefing should be done by a specially trained member of the screening team. This briefing should include information on the benefits as well as risks of false-positive and false-negative results.

8) Screening procedures should be free or very inexpensive.

9) The cytology laboratory should be centralized to ensure strict quality control. Cytoscreeners should not be constantly changing since experience enhances the accuracy of reading.

10) Arrangements should be made for the efficient transport of slides, clinical data and results.

11) Results should be reported promptly.

12) Cervical cytology must be integrated into a system of diagnostic and therapeutic services such as

   - colposcopy/Schiller’s test and biopsy;
   - gynaecological pathology;
   - gynaecological therapy; and
   - radiation therapy.
13) Relevant data should be fed into a system of regional and national statistics to help in the monitoring and evaluation of the programme.

14) Appropriate resources should be tapped to sustain the programme.

**When should screening be started, and how often?**

Quantitative studies have shown that, after one negative cytological smear for cervical cancer, screening once every five years accomplishes about the same effect among women 35-64 years of age as screening every year. Even screening once every ten years yields a reduction of almost two-thirds in the incidence of invasive cervical cancer. This evidence led a WHO meeting to conclude that countries with limited resources should aim to screen every woman once in her lifetime between 35 and 40 years.

When more resources are available, the frequency of screening should be increased to every ten and then every five years for women aged 35-64 years. In the national cancer control programme, the aim should be to screen every woman aged 35-40 once, wherever laboratories to examine the smears and facilities for treatment of abnormalities are available. When 80 per cent of women aged 35-40 years have been screened once, screening frequency should increase to ten years and then five years for women aged 35-64 years, as resources permit.

In most developing countries in the Region, the proportion of younger women is higher than that in developed countries, and it is recommended that the target population are women aged 30-59 years. Women of low socioeconomic status are at higher risk.

**Who should take the Papanicolaou smear?**

Virtually anyone who is tasked with the delivery of women’s health care should be able to take the smear with proper training - the gynaecologist-obstetrician, general physician, midwife, nurse or traditional birth attendant.

The gynaecologist-obstetrician will probably not need any special training because the procedure is basic to gynaecology. The general physician will need a short review of the technique of inserting the vaginal speculum as well as the topographic anatomy of the cervix and the vagina, as will the midwife and the nurse. The traditional birth attendant will need
more intensive training. The non-gynaecologist will also need to acquire competency in recognizing gross deviations from the normal appearance of the cervix. Certain abnormalities may require biopsy.

What is necessary in the collecting centres/clinics?

1) An examining table where the women can be placed in the dorsal lithotomy or lateral position. This may be improvised.

2) Provision for privacy.

3) A good source of light.

4) Vaginal specula.

5) Sterilization facilities.

6) Materials:

   - glass slides;
   - pencil to identify slides;
   - fixative like 95 per cent alcohol, equal parts of 95 per cent alcohol, ether and spraycyte;
   - Ayre spatula; and
   - forms for entering relevant data.

The volume of specimens should be sufficient to justify the employment of at least two cytoscreeners, to ensure that quality control programmes can be put in place. Adequate volume ensures the occurrence and recognition of abnormalities.

Cytology laboratory

For purposes of effective quality control, the cytology laboratory must be centralized. It should be manned by:

1) A cytopathologist who acts as director of the laboratory and is responsible for the final cytological diagnosis of all specimens received. He/she plans and implements strategies for quality control.
2) A cytotechnologist who acts as cytoscreener and supervisor of the cytotechnician.

3) A cytotechnician who prepares the slides -- sorts, fixes and stains them for reading by the cytotechnologist. He/she also cleans and maintains the microscope and other laboratory equipment.

4) A secretary who must be computer literate. He/she performs all the secretarial duties in the laboratory -- receiving the specimens (and requests), recording them, typing the results, sending them out and filing copies in the laboratory.

The laboratory may be hospital-based to avoid the problem of too much initial financial outlay. It must be well lit and well ventilated and must have sufficient space for microscopic work, slide preparation, slide and report filing, and administrative, teaching and research activities. Cytology reports should not only be accurate but promptly communicated.

Secondary prevention - early diagnosis

*Early diagnosis and curative treatment*

Although a cervical cytological screening programme is the ideal method of reducing mortality through *secondary prevention*, this can be supplemented by earlier diagnosis of symptomatic cases. In countries where a cytological screening programme is not yet feasible, the following early detection measures will help considerably:

- encouraging and training health professionals to be alert to the signs and symptoms of cancer;

- instituting campaigns to make the public aware of the symptoms of the disease and of the benefits of early diagnosis;

- where appropriate, introducing measures to promote early diagnosis of common cancers that are potentially curable if diagnosed early.

The main features of early detection for cancer of the cervix are summarized diagrammatically in Figure 17.2.
Figure 17.2: Secondary prevention - downstaging for cancer of the cervix

**Implementation**
- Establish health education for awareness of the disease
- Establish a clear policy to examine women >35 years of age
- Identify women aged 35-59 years
- Train primary health care workers to examine cervix and identify abnormalities
- Ensure link between identification of abnormality and referral for diagnosis, treatment, and follow-up
- Establish information system for monitoring and evaluation

**Detectable preclinical phase (DPCP)**

**Average age:**
- ~13
- 18
- 35
- 50
- 55 years

- Examinations here unlikely to find cancers
- Examinations here are cost-effective
- ~8% of cancers
- ~92% of cancers

**Process measures**
- >80% of women aged 35-59 years received education on cancer of the cervix
- >80% of primary health care workers informed of the benefits of downstaging for cancer of the cervix

**Impact measure**
- >80% of women aged 35-59 years examined at least once

**Outcome measures**
- Short term: >30% of cervical cancers discovered by examination
- Medium term: >30% reduction in proportion of cases of invasive cervical cancer with advanced (stage II+) disease
- Long term: >30% reduction in cervical cancer mortality

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The most important symptom of cancer of the cervix is vaginal bleeding which can be postcoital and/or intermenstrual. This occurs even in the very early stages of the disease. Foul smelling vaginal discharge may also be an early symptom. Pain is not an early symptom. Symptomatic women should have an initial speculum examination of the cervix as soon as possible.

Physical findings

Classic physical findings include:

1) A fungating or cauliflower-like mass arising from either lip or all of the cervix, which bleeds easily when touched. There may be necrotic areas.

2) An ulceration, often with raised and indurated edges, also involving either the lip or all of the cervix. It also bleeds easily. There may also be necrotic areas.

3) Roughening or "erosion" around the external os. This may or may not bleed when touched.

Procedural considerations

Some important procedural considerations are:

1) No oily lubricant should be used. If the vagina is dry (as in elderly women) and insertion of the speculum produces pain, normal saline solution, or even water, may be used.

2) No sexual intercourse should be engaged in for at least 24 hours before the procedure. This is not absolute.

3) No bleeding should be evident. This is also not absolute. While the abundance of red blood cells may mask abnormal/malignant cells, exfoliation may be greatest at the time of bleeding.

Occasionally, the growth of the tumour may be towards the endocervix. In this case, while the ectocervix may be smooth and unremarkable, the entire cervix may be felt to be bulky or barrel-shaped, particularly on rectal examination.
Management of abnormalities

It is the responsibility of primary-health-care workers to ensure that those women discovered to have an abnormality on cervical smear or on visual inspection of the cervix are referred for appropriate diagnosis and management. This can be one of the major points of failure for cervical cancer screening programmes.

In the early cases, when the lesion is not obvious, the following steps are taken. Following an abnormal cervical cytological result, colposcopy is performed and biopsy taken from the most serious looking area. For those classified cytologically as CIN I, a repeat smear at six months is appropriate, with referral for colposcopy only if there is evidence of cytological progression.

If the abnormal area can be seen in its entirety, the result of biopsy may be taken as definitive. If the upper margin of the abnormal area cannot be seen (i.e., if this extends into the cervical canal) endocervical curettage is performed. If endocervical curettage shows malignancy, conization is performed to establish the presence or absence of invasion.

The cervix is very strategically located. It is very accessible to the examining finger and routine diagnostic procedures. The staging (measurement of the extent of spread) of cancer of the cervix is clinical. It is based on the findings following a careful physical examination that is primarily focused on the pelvis, and certain diagnostic procedures like colposcopy, endocervical curettage, conization, cystoscopy, intravenous pyelography, proctosigmoidoscopy, biopsy of inguinal or supraclavicular nodes (when suspicious), chest X-ray and bone survey. Computerized tomography scanning and magnetic resonance imaging, though effective in detecting metastases, are still very expensive and of limited availability. Their use in clinical staging is not routine.

The original clinical stage record is retained regardless of subsequent developments, such as the finding of more extensive disease on definitive surgery. This is very important in reporting incidences by stage of the disease and evaluating the results of treatment. The International Federation of Gynaecologists and Obstetricians (FIGO) has adopted the clinical staging of cancer of the cervix shown in Appendix 11.

The pelvic examination should preferably be done under anaesthetic. However, since this cannot be easily implemented, anaesthesia, except in very rare circumstances, is not required.
Treatment of invasive cancer

At the present time, the treatment of choice for patients with invasive cancer of the cervix is radiation. It is, in general, applicable to all stages of the disease, from stage I to stage IV. In young, good-risk patients with early stages of the disease up to IIa, surgery, in the form of radical hysterectomy and bilateral pelvic lymphadenectomy, is equally effective.

Both external and intracavitary radiation are used. By a proper combination of the two, an ideal dose distribution to the pelvis is achieved. In the early stages, when most of the disease is still centrally located, the treatment is principally intracavitary radiation, supplemented laterally by external radiation. As the disease progresses and spreads peripherally, there is a gradual shift in emphasis in favour of external radiation.

Radical hysterectomy and bilateral pelvic lymphadenectomy is an alternative treatment for stages Ib and IIa. It is performed on young, good-risk patients. It has the advantage of allowing for direct assessment of spread (surgical staging), easier preservation of ovarian function (in radical hysterectomy, the ovaries may be preserved) and maintaining the integrity of the vaginal epithelium. Radical hysterectomy entails removal of the whole uterus, usually both tubes and ovaries, a wide portion of the parametria almost to the pelvic wall, and the upper half or two-thirds of the vagina.

The search continues for effective systemic therapies that will show reduced mortality or even improved locoregional control.

Palliative treatment

In the late stages, when the tumour involves bone or spinal nerve roots, pain becomes a major problem, particularly the severe hip and leg pains unique to the terminal stages of this disease. In many countries, the recommendation of the World Health Organization for cancer pain control has been adopted. It is effective, simple and inexpensive. It consists of oral administration of drugs "by the clock" rather than "on demand". With certain modifications, drugs are progressively increased from non-opioids to mild opioids to strong opioids.
What the health worker should do

Health Education

The Core Cancer Health Education Module recommended for the Region (see Chapter 6 - Health education) includes 1) promoting cancer awareness of safe sexual practices that will prevent the transmission of the infectious agent that causes cervical cancer, and the ability of the cervical cytological test (Pap smear) to detect early cervical cancer, and 2) persuading the target population to participate in a population-based cervical cytological screening programme when this is in place.

Early Detection

The following are the steps in taking a cervical smear:

1) After preliminary counselling, the woman is placed in the dorsal lithotomy position and properly draped.

2) After examining the vulva, the vaginal speculum is inserted. If a bivalve speculum is used, the blades must initially be side by side (i.e., the long diameter of the instrument must be aligned with the antero-posterior diameter of the introitus). As the instrument is gently pushed in, it is rotated so that when fully inserted, the blades are directly against the anterior and the posterior vagina. Care should be taken that pressure is consistently on the posterior vagina. If necessary, the lower vagina is gently pressed with one or two fingers to make insertion more comfortable. The blades are separated only when the instrument is fully inserted.

3) With a good source of light, the cervix, in its entirety, is visible. Gross abnormalities, including bleeding, and/or discharge, are noted.
Cervical Cancer

4) A wooden (or plastic) Ayre spatula is inserted, with the longer tip at the external os. This is rotated 360 degrees in a sweeping/scraping motion. No portion of the squamo-columnar junction should be spared.

5) The material that sticks to the spatula is then spread thinly and evenly over a wide area of a clean and pre-labelled glass slide. The spatula is held parallel to the slide to effect an even distribution of the cellular material. The glass slide may be pre-cleaned with acetone, ether, xylol or alcohol.

The procedure of spreading the material over the glass slide is the same as if a tongue depressor was used. If a cotton tipped applicator is used it is rolled over the glass slide.

6) After the smear is made, the slide is immediately dipped in or sprayed with fixative. It should not be allowed to dry.

7) The speculum is gently removed, again with a gentle rotating motion and with pressure being applied more to the posterior vagina.

8) After checking the labelling, the slide is sent to the processing laboratory.

9) A disposable speculum is discarded, or a reusable speculum is properly sterilized.

To increase the accuracy of the smear, certain precautions prior to the procedure must be observed:

1) No internal examination should be performed.

2) No vaginal douche should be given.

Symptomatic women (e.g. postcoital or intermenstrual vaginal bleeding, foul vaginal discharge) should have an examination as soon as possible. The examination is the same as in taking the cervical smear. If a lesion is seen which looks suspiciously like cervical cancer, a health worker may perform a punch biopsy of the lesion. If not, the patient should be referred accordingly.
Palliative care

The most distressing complaint of women with advanced cervical cancer is pain, mostly localized to the pelvic area. Fortunately the majority can be satisfactorily relieved by following the WHO Method of cancer pain relief.

Terminal uraemia is often welcomed as the patient's suffering diminishes, and priority should be given to providing psychosocial and spiritual support for the patient and her family.
References and suggested readings


### Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td><strong>Active treatment (Anticancer treatment)</strong></td>
<td>treatment which removes or destroys cancer cells (e.g. surgery, radiotherapy, chemo-therapy), in contrast to palliative treatment which aims to relieve symptoms without necessarily affecting the cancer cells.</td>
</tr>
<tr>
<td><strong>Adjuvant therapy</strong></td>
<td>active treatment intended to improve survival following curative treatment (e.g. adjuvant chemotherapy following mastectomy for curable breast cancer).</td>
</tr>
<tr>
<td><strong>Aflatoxin</strong></td>
<td>any of several mycotoxins that are produced by molds in stored grain and food meals (e.g. corn).</td>
</tr>
<tr>
<td><strong>Betel-quid</strong></td>
<td>prepared usually by smearing the betel leaf with slaked lime and ground pieces of areca nut. Crushed leaves of cured tobacco may be added. The ingredients are folded in the betel leaf and chewed.</td>
</tr>
<tr>
<td><strong>Brachytherapy</strong></td>
<td>a form of radiotherapy that delivers local irradiation from sources in contact with or near target tissue. It can be intracavitary (e.g. cervix cancer), or interstitial (e.g. breast cancer), and given through implants, molds, seeds, needles and applicators.</td>
</tr>
<tr>
<td><strong>Cereal</strong></td>
<td>a processed foodstuff made of grains.</td>
</tr>
<tr>
<td><strong>Colposcopy</strong></td>
<td>examination of the tissues of the cervix and vagina by means of an instrument (coloscope) with a magnifying glass.</td>
</tr>
<tr>
<td><strong>Complex carbohydrates</strong></td>
<td>these are the most available and cheapest sources of energy that can be used by man, and are contained in grains and other staples such as potatoes and yams.</td>
</tr>
<tr>
<td><strong>Cytology</strong></td>
<td>the microscopic examination of cells, usually contained in fluid in normal body secretion.</td>
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<tr>
<td><strong>Dysplasia</strong></td>
<td>cellular deviations from the normal in the...</td>
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</table>
epithelium, and considered a precursor to carcinoma.

**Epidemiology**
the study of the distribution and determinants of disease.

**Genome**
the complete set of genes of an individual organism.

**Grains**
the seeds or fruits of various food plants. In commercial and statutory usage includes other plants (e.g. soybean).

**Hepatitis B carriers**
individuals who are unable to get rid of the virus. They develop chronic hepatitis that often leads to cirrhosis and a high risk of primary liver cancer.

**Histology**
the microscopic examination of tissues removed from the suspected cancer itself or from its spread.

**Hyperplasia**
abnormal increase in the number of normal cells in normal arrangement in a tissues.

**Legumes**
the fruits or seeds of a wide variety of herbs, shrubs and trees bearing nodules on the roots that contain nitrogen-fixing bacteria (e.g. peas, beans).

**Lentils**
a widely cultivated annual leguminous plant with flat edible seeds.

**Mammography**
a radiological technique which can detect preclinical breast cancer (i.e. before the cancer is palpable).

**Narcotic**
in relation to the Single Convention on Narcotic Drugs, 1961, in which the term is used in a legal sense (and not in a pharmacological sense) includes substances that are not narcotics, from a pharmacological sense (e.g. marijuana, cocaine)

**Opioid**
refers to morphine, codeine and other natural and synthetic drugs whose effects are mediated by specific receptors in the central and peripheral nervous systems.

**Palliative**
affording relief, but not cure.

**Physical dependence**
the neuroadaptation of the body to the presence of an opioid, and characterized by the onset of acute symptoms and signs of withdrawal if the opioid is
stopped or an opioid antagonist is administered.

**Precancerous**
lesions which eventually become cancerous if the initiating factor is not removed (e.g. oral leukoplakia in betel quid chewers).

**Prevention, primary**
decreasing the incidence (new cases) of cancer by means of avoiding the risk factors most of which are environmental, such as smoking and unhealthy diet.

**Prevention, secondary**
decreasing the mortality from cancer by means of early detection and treatment.

**Psychological dependence (drug addiction)**
a behavioural pattern characterized by a craving for the mood-altering effects of a drug, and an overwhelming preoccupation with obtaining and using the drug.

**Pulses**
the edible seeds of many leguminous crops (e.g. peas, beans, lentils).

**Recurrence**
the clinically detectable re-appearance of cancer in an individual, following a period after active treatment when the cancer cannot be detected. Recurrence can be local or distant.

**Remission**
a period during which cancer cannot be clinically detected in an individual, usually following active anticancer treatment.

**Schiller's test**
a test for early squamous cell cancer using iodine solutions on the suspected area. Normal epithelium turns brown, while cancerous tissue turned white or yellow. Cancer cells do not contain glycogen and do not stain with iodine.

**Screening**
testing asymptomatic individuals for early detection of cancers.

**Tolerance**
increased resistance to the usual effect of a drug as a result of long-term continuous use. Results in the need for higher doses to achieve the same pharmacological effect.

**Tubers**
short, fleshy underground stems of some plants, some of which are edible (e.g. potato, taro, yam, cassava).

**Whole grain**
made of entire ground grain kernels, in contrast to
processed grains which lose many nutritional contents during processing.
Appendices:

Appendix 1: Population-based cancer registries which are members of the International Association of Cancer Registries

Appendix 2: Antineoplastic and immunosuppressant drugs and drugs used in palliative care

Appendix 3: Clinical staging of oral cancer

Appendix 4: Clinical staging of nasopharyngeal cancer

Appendix 5: Clinical staging of oesophageal cancer

Appendix 6: Clinical staging of stomach cancer

Appendix 7: Clinical staging of colonic and rectal cancer

Appendix 8: Clinical staging of liver cancer

Appendix 9: Clinical staging of lung cancer

Appendix 10: Clinical staging of breast cancer

Appendix 11: Clinical staging of cervical cancer
### Appendix 1

**Population - based cancer registries which are members of the International Association of Cancer Registries**

<table>
<thead>
<tr>
<th>Registry</th>
<th>Department</th>
<th>CHIL</th>
<th>POPU</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Paediatric Cancer Registry</td>
<td>Department of Child Health</td>
<td>CHIL</td>
<td>POPU</td>
<td>AUSTRALIA</td>
</tr>
<tr>
<td>ACT Cancer Registry</td>
<td>Epidemiology and Population Health</td>
<td>GEN</td>
<td>POPU</td>
<td>ACT</td>
</tr>
<tr>
<td>Northern Territory Cancer Registry</td>
<td>Epidemiology and Statistics Branch</td>
<td>GEN</td>
<td>POPU</td>
<td>AUSTRALIA Northern Territory</td>
</tr>
<tr>
<td>Queensland Cancer Registry</td>
<td>Epidemiology and Prevention Unit (NCD)</td>
<td>GEN</td>
<td>POPU</td>
<td>AUSTRALIA Queensland</td>
</tr>
<tr>
<td>South Australian Cancer Registry</td>
<td>S. Australian Health Commission</td>
<td>GEN</td>
<td>POPU</td>
<td>AUSTRALIA South Australia</td>
</tr>
<tr>
<td>Tasmanian Cancer Registry</td>
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<td>POPU</td>
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<td>POPU</td>
<td>CHINA Tianjin</td>
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<td>GEN</td>
<td>POPU</td>
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</tr>
<tr>
<td>Fiji Cancer Registry</td>
<td>Ministry of Health</td>
<td>GEN</td>
<td>POPU</td>
<td>FJI</td>
</tr>
<tr>
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<td>Direction de la Sante Publique</td>
<td>GEN</td>
<td>POPU</td>
<td>FRENCH POLYNESIA</td>
</tr>
<tr>
<td>Registry Name</td>
<td>Address/Department</td>
<td>Country</td>
<td>City</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------------------------------------</td>
<td>-----------</td>
<td>--------</td>
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</tr>
<tr>
<td>Hong Kong Cancer Registry</td>
<td>c/o Radiotherapy &amp; Oncology Department</td>
<td>GEN POPU</td>
<td>HONG KONG</td>
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<td>Aichi Cancer Registry</td>
<td>Division of Epidemiology</td>
<td>GEN POPU</td>
<td>JAPAN Aichi (Nagoya)</td>
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<td>Fukui Cancer Registry</td>
<td>Fukui Medical Association</td>
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<td>JAPAN Fukui</td>
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<td>GEN POPU</td>
<td>JAPAN Fukuoka</td>
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<td>Hiroshima Cancer Registry</td>
<td>Radiation Effects Research Foundation</td>
<td>GEN POPU</td>
<td>JAPAN Hiroshima</td>
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<td>Hyogo Medical Center for Adults</td>
<td>GEN POPU</td>
<td>JAPAN Hyogo (Akashi)</td>
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<td>Kanagawa Cancer Center</td>
<td>GEN POPU</td>
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<tr>
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<td>GEN POPU</td>
<td>JAPAN Miyagi (Sendai)</td>
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<tr>
<td>Nagasaki Prefectual Cancer Registry</td>
<td>RERF</td>
<td>GEN POPU</td>
<td>JAPAN Nagasaki</td>
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<td>JAPAN Osaka</td>
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<td>GEN POPU</td>
<td>JAPAN Saga</td>
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<td>GEN POPU</td>
<td>JAPAN Tottori (Yonago)</td>
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<td>Yamagata Center for Adults</td>
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<td>JAPAN Yamagata</td>
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<td>Malaysian Childhood Cancer Study Group</td>
<td>CHIL POPU</td>
<td>MALAYSIA</td>
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<td>Disease Control Unit 2nd Floor, Block E</td>
<td>GEN POPU</td>
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<td>NEW CALEDONIA</td>
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<td>NEW ZEALAND</td>
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<td></td>
<td>GEN POPU</td>
<td>NEW ZEALAND Wasikato</td>
<td></td>
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<tr>
<td>Manual on the prevention and control of common cancers</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>------------------------------------------------------</td>
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<table>
<thead>
<tr>
<th>Papua New Guinea Tumour</th>
<th>Hispanic Pathology Department</th>
<th>GEN POPU</th>
<th>PAPUA NEW GUINEA</th>
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<tr>
<td>Metro Cebu Population - Based</td>
<td>Eduardo J. Aboitiz Cancer Center</td>
<td>GEN POPU</td>
<td>PHILIPPINES Cebu</td>
</tr>
<tr>
<td>Manila Cancer Registry</td>
<td>Philippine Cancer Society</td>
<td>GEN POPU</td>
<td>PHILIPPINES Manila</td>
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<td>DOH - Rizal Cancer Registry</td>
<td>Rizal Medical Center</td>
<td>GEN POPU</td>
<td>PHILIPPINES Rizal</td>
</tr>
<tr>
<td>Central Cancer Registry</td>
<td></td>
<td>GEN POPU</td>
<td>KOREA (Republic of)</td>
</tr>
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<td>Kangwha Cancer Registry</td>
<td>Department of Preventive Medicine and Public Health</td>
<td>GEN POPU</td>
<td>KOREA (Republic of) Kangwha</td>
</tr>
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<td>Seoul Cancer Registry</td>
<td>Department of Surgery</td>
<td>GEN POPU</td>
<td>KOREA (Republic of) Seoul</td>
</tr>
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<td>Singapore Cancer Registry</td>
<td>c/o Department of Pathology</td>
<td>GEN POPU</td>
<td>SINGAPORE</td>
</tr>
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<td>Vanuatu Cancer Registry</td>
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<td>GEN POPU</td>
<td>VANUATU</td>
</tr>
<tr>
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<td>Hopital Benh Vien K</td>
<td>GEN POPU</td>
<td>VIET NAM Hanoi</td>
</tr>
<tr>
<td>Ho Chi Minh City Cancer Registry</td>
<td>Institute of Oncology</td>
<td>GEN POPU</td>
<td>VIET NAM Ho Chi Minh City</td>
</tr>
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Appendix 2

Antineoplastic and immunosuppressant drugs and drugs used in palliative care

1. Immunosuppressant drugs

<table>
<thead>
<tr>
<th>Drug dosage</th>
<th>Route of administration, forms and strengths&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>azathioprine</td>
<td>tablet, 50 mg powder for injection, 100 mg (as sodium salt) in vial</td>
</tr>
<tr>
<td>ciclosporin&lt;sup&gt;b&lt;/sup&gt;</td>
<td>capsule, 25 mg concentrate for injection, 50 mg/ml in 1-ml ampoule</td>
</tr>
</tbody>
</table>

2. Cytotoxic drugs

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route of administration, forms and strengths&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>asparaginase</td>
<td>powder for injection, 10 000 IU in vial</td>
</tr>
<tr>
<td>bleomycin</td>
<td>powder for injection, 15 mg (as sulfate) in vial</td>
</tr>
<tr>
<td>calcium folinate</td>
<td>tablet, 15 mg injection, 3 mg/ml in 10-ml ampoule</td>
</tr>
<tr>
<td>chlorambucil</td>
<td>powder for injection, 10 mg (hydrochloride) in vial</td>
</tr>
<tr>
<td>cisplatin</td>
<td>powder for injection, 10 mg, 50 mg in vial</td>
</tr>
<tr>
<td>cyclophosphamide</td>
<td>tablet, 25 mg powder for injection, 500 mg in vial</td>
</tr>
<tr>
<td>cytarabine</td>
<td>powder for injection, 100 mg in vial</td>
</tr>
<tr>
<td>dacarbazine</td>
<td>powder for injection, 100 mg in vial</td>
</tr>
<tr>
<td>dactinomycin</td>
<td>powder for injection, 500 mg in vial</td>
</tr>
<tr>
<td>doxorubicin</td>
<td>powder for injection, 10 mg, 50 mg (hydrochloride) in vial</td>
</tr>
<tr>
<td>etoposide</td>
<td>capsule, 100 mg injection, 20 mg/ml in 5-ml ampoule</td>
</tr>
<tr>
<td>fluorouracil</td>
<td>injection, 50 mg/ml in 5-ml ampoule</td>
</tr>
<tr>
<td>levamisole</td>
<td>tablet, 50 mg (as hydrochloride)</td>
</tr>
<tr>
<td>mercaptopurine</td>
<td>tablet, 50 mg</td>
</tr>
<tr>
<td>methotrexate</td>
<td>tablet, 2.5 mg (as sodium salt) powder for injection, 50 mg (as sodium salt) in vial</td>
</tr>
<tr>
<td>procarbazine</td>
<td>capsule, 50 mg (as hydrochloride)</td>
</tr>
<tr>
<td>vinblastine</td>
<td>powder for injection, 10 mg (sulfate) in vial</td>
</tr>
<tr>
<td>vincristine</td>
<td>powder for injection, 1 mg, 5 mg (sulfate) in vial</td>
</tr>
</tbody>
</table>
3. Hormones and antihormones

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route of administration, forms and strengths&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>prednisolone</td>
<td>tablet, 5 mg powder for injection, 20 mg, 25 mg (as sodium phosphate or sodium succinate) in vial</td>
</tr>
<tr>
<td>tamoxifen</td>
<td>tablet, 10 mg, 20 mg (as citrate)</td>
</tr>
</tbody>
</table>

<sup>a</sup> When the strength is specified in terms of a selected salt or ester, this is mentioned in brackets; when it refers to the active moiety, the name of the salt or ester in brackets is preceded by the word "as".

<sup>b</sup> For organ transplantation.

<sup>≡</sup> Example of a therapeutic group.

## Appendix 3

### Clinical staging of lung cancer

<table>
<thead>
<tr>
<th>T - Primary Tumour</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX</td>
<td>Primary tumour cannot be assessed; tumour can be proven by the presence of malignant cells in sputum or bronchial washings but not visualized by imaging or bronchoscopy</td>
</tr>
<tr>
<td>TO</td>
<td>No evidence or primary tumour</td>
</tr>
<tr>
<td>Tis</td>
<td>Carcinoma in situ</td>
</tr>
<tr>
<td>T1</td>
<td>Tumour ≤3 cm in greatest dimension, surrounded by lung or visceral pleura, without bronchoscopic evidence of invasion more proximal than the lobar bronchus (i.e. not in the main bronchus)</td>
</tr>
</tbody>
</table>
| T2                 | Tumour with any of the following features of size or extent:  
|                   | - >3 cm in greatest dimension  
|                   | - Involves main bronchus ≥2 cm distal to the carina  
|                   | - Invades visceral pleura  
|                   | Associated with atelectasis or obstructive pneumonitis, that extends to the hilar region but does not involve the entire lung |
| T3                 | Tumour of any size that directly invades any of the following: chest wall (including superior sulcus tumours), diaphragm, mediastinal pleura, parietal paricardium; or tumour in the main bronchus <2 cm distal to the carina, but without involvement of the carina; or associated atelectasis or obstructive pneumonitis of the entire lung |
| T4                 | Tumour of any size that invades any of the following: mediastinum, heart, great vessels, trachea, oesophagus, vertebral body, carina; or tumour with malignant pleural effusion |

<table>
<thead>
<tr>
<th>N - Regional lymph nodes</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>NO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis to ipsilateral peribronchial and/or ipsilateral hilar lymph nodes, and intrapulmonary nodes including involvement by direct extension of the primary tumour</td>
</tr>
<tr>
<td>N2</td>
<td>Metastasis in ipsilateral mediastinal and/or subcarinal lymph node(s)</td>
</tr>
<tr>
<td>M3</td>
<td>Metastasis to contralateral mediastinal, contralateral hilar, ipsilateral or contralateral scalene, or supraclavicular lymph node(s)</td>
</tr>
<tr>
<td>M - Distant Metastasis</td>
<td></td>
</tr>
<tr>
<td>MX</td>
<td>Distant metastasis cannot be assessed</td>
</tr>
<tr>
<td>MO</td>
<td>No distant metastasis</td>
</tr>
<tr>
<td>M1</td>
<td>Distant metastasis</td>
</tr>
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</table>

<table>
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<tr>
<th>Occult Carcinoma</th>
<th>Stage 0</th>
<th>Stage IA</th>
<th>Stage IIA</th>
<th>Stage IIB</th>
<th>Stage IIIA</th>
<th>Stage IIIB</th>
<th>Stage IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tis NO MO</td>
<td>T1 NO MO</td>
<td>T2 NO MO</td>
<td>T1 N1 MO</td>
<td>T2 N1 MO</td>
<td>T3 NO MO</td>
<td>T1 N2 MO</td>
<td>Any T N3 MO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T2 N2 MO</td>
<td>Any T Any N MO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T3 N1 MO</td>
<td>M1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T3 N2 MO</td>
<td></td>
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## Appendix 4

### Clinical staging of cervical cancer

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Stage O</td>
<td>Carcinoma in situ</td>
</tr>
<tr>
<td>Stage 1</td>
<td>The carcinoma is strictly confined to the cervix (extension to the corpus is disregarded).</td>
</tr>
<tr>
<td>Stage Ia</td>
<td>Microinvasive disease with lesion not grossly visible (All gross lesions, even if with superficial invasion, are staged as Ib) The depth of invasion should not be more than 5 mm from the base of the epithelium, either surface or glandular, from which it originates. Vascular space involvement, either venous or lymphatic, should not alter the staging.</td>
</tr>
<tr>
<td>Stage Ia1</td>
<td>The depth of stromal invasion should not exceed 3 mm and the horizontal diameter should not exceed 7 mm</td>
</tr>
<tr>
<td>Stage Ia2</td>
<td>The depth of stromal invasion is greater than 3 mm but should not exceed 5 mm and the horizontal diameter should not exceed 7 mm.</td>
</tr>
<tr>
<td>Stage Ib</td>
<td>Clinical lesions confined to the cervix or preclinical lesions greater than Ia</td>
</tr>
<tr>
<td>Stage Ib1</td>
<td>Clinical lesions not greater than 4 cm in diameter</td>
</tr>
<tr>
<td>Stage Ib2</td>
<td>Clinical lesions greater than 4 cm in diameter</td>
</tr>
<tr>
<td>Stage II</td>
<td>The carcinoma extends beyond the cervix, to the parametria, but has not reached the pelvic wall. The carcinoma extends to the vagina, but has not reached the lower third.</td>
</tr>
<tr>
<td>Stage IIa</td>
<td>Without obvious parametrial involvement.</td>
</tr>
<tr>
<td>Stage IIb</td>
<td>With obvious parametrial involvement.</td>
</tr>
<tr>
<td>Stage III</td>
<td>The carcinoma extends to the pelvic wall. On rectal examination, there is no cancer-free space between the tumour and the pelvic wall. The tumour involves the lower third of the vagina. All cases with hydronephrosis or nonfunctioning kidney are included, unless they are known to be due to some other cause.</td>
</tr>
<tr>
<td>Stage IIIa</td>
<td>Without extension to the pelvic wall.</td>
</tr>
<tr>
<td>Stage IIIb</td>
<td>With extension to the pelvic wall and/or hydronephrosis or nonfunctioning kidney.</td>
</tr>
</tbody>
</table>
The carcinoma extends beyond the true pelvis or clinically involves the mucose of the bladder or the rectum. A bullous oedema as such does permit a case to be allotted to Stage IV.

<table>
<thead>
<tr>
<th>Stage IV</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage IVa</td>
<td>Spread to adjacent organs</td>
</tr>
<tr>
<td>Stage IVb</td>
<td>Spread to distant organs</td>
</tr>
</tbody>
</table>

**Stage Grouping**

<table>
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<th>Stage</th>
<th>T Classification</th>
<th>N Classification</th>
<th>M Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage O</td>
<td>Tis</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage 1A1</td>
<td>T1a1</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage 1A2</td>
<td>T1a2</td>
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<td>MO</td>
</tr>
<tr>
<td>Stage 1B1</td>
<td>T1b1</td>
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<td>MO</td>
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<tr>
<td>Stage 1B2</td>
<td>T1b2</td>
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<td>MO</td>
</tr>
<tr>
<td>Stage IIA</td>
<td>T2a</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIB</td>
<td>T2b</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIIA</td>
<td>T3a</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIIB</td>
<td>T1</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2</td>
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<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3a</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3b</td>
<td>Any N</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IVA</td>
<td>T4</td>
<td>Any N</td>
<td>MO</td>
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<tr>
<td>Stage IVB</td>
<td>Any T</td>
<td>Any N</td>
<td>M1</td>
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## Appendix 5

### Clinical staging of oral cancer

<table>
<thead>
<tr>
<th>Definition of TNM</th>
<th>Primary Tumour (T)</th>
<th>Regional Lymph Nodes (N)</th>
</tr>
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<tbody>
<tr>
<td><strong>Primary Tumour</strong> (T)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TX</td>
<td>Primary tumour cannot be assessed</td>
<td></td>
</tr>
<tr>
<td>TO</td>
<td>No evidence of primary tumour</td>
<td></td>
</tr>
<tr>
<td>Tis</td>
<td>Carcinoma in situ</td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>Tumour 2 cm or less in greatest dimension</td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>Tumour more than 2 cm but not more than 4 cm in greatest dimension</td>
<td></td>
</tr>
<tr>
<td>T3</td>
<td>Tumour more than 4 cm in greatest dimension</td>
<td></td>
</tr>
<tr>
<td>T4 (lip)</td>
<td>Tumour invades adjacent structures (e.g. through cortical bone, inferior alveolar nerve, floor of mouth, skin of face)</td>
<td></td>
</tr>
<tr>
<td>T4 (Oral cavity)</td>
<td>Tumour invades adjacent structures (e.g. through cortical bone, into deep (extrinsic) muscle of tongue, maxillary sinus, skin. Superficial erosion alone of bone/tooth socket by gingival primary is not sufficient to classify as T4)</td>
<td></td>
</tr>
<tr>
<td><strong>Regional Lymph Nodes</strong> (N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td>No regional lymph node metastasis</td>
<td></td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis in a single ipsilateral lymph node, more than 3 cm or less in greatest dimension</td>
<td></td>
</tr>
<tr>
<td>N2</td>
<td>Metastasis in a single ipsilateral lymph node, more than 3 cm but not more than 6 cm in greatest dimension or in multiple ipsilateral lymph nodes, none more than 6 cm in greatest dimension; or in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension</td>
<td></td>
</tr>
<tr>
<td>N2a</td>
<td>Metastasis in single ipsilateral lymph node more than 3 cm but not more than 6 cm in greatest dimension</td>
<td></td>
</tr>
<tr>
<td>N2b</td>
<td>Metastasis in multiple ipsilateral lymph nodes, none more than 6 cm in greatest dimension</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N2c</td>
<td>Metastasis in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension</td>
</tr>
<tr>
<td>---------</td>
<td>-----</td>
<td>------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>N3</td>
<td></td>
<td>Metastasis in a lymph node more than 6 cm in greatest dimension</td>
</tr>
<tr>
<td>Distant Metastasis</td>
<td>(M)</td>
<td>Distant metastasis cannot be assessed</td>
</tr>
<tr>
<td></td>
<td>MO</td>
<td>No distant metastasis</td>
</tr>
<tr>
<td></td>
<td>M1</td>
<td>Distant metastasis</td>
</tr>
</tbody>
</table>

### Stage Grouping

<table>
<thead>
<tr>
<th>Stage</th>
<th>Tis</th>
<th>NO</th>
<th>MO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>T1</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage II</td>
<td>T2</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage III</td>
<td>T3</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T1</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IVA</td>
<td>T4</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>Any T</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IVB</td>
<td>Any T</td>
<td>N3</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IVC</td>
<td>Any T</td>
<td>Any N</td>
<td>M1</td>
</tr>
</tbody>
</table>
## Appendix 6

### Clinical staging of liver cancer

<table>
<thead>
<tr>
<th>Definition of TNM</th>
<th>(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Tumour</strong></td>
<td></td>
</tr>
<tr>
<td>TX</td>
<td>Primary tumour cannot be assessed</td>
</tr>
<tr>
<td>TO</td>
<td>No evidence of primary tumour</td>
</tr>
<tr>
<td>T1</td>
<td>Solitary tumour 2 cm or less in greatest dimension without vascular invasion</td>
</tr>
<tr>
<td>T2</td>
<td>Solitary tumour 2 cm or less in greatest dimension with vascular invasion, or multiple tumours limited to one lobe, none more than 2 cm in greatest dimension without vascular invasion, or a solitary tumour more than 2 cm in greatest dimension without vascular invasion</td>
</tr>
<tr>
<td>T3</td>
<td>Solitary tumour more than 2 cm in greatest dimension with vascular invasion, or multiple tumours limited to one lobe, none more than 2 cm in greatest dimension with vascular invasion, or multiple tumours limited to one lobe, any more than 2 cm in greatest dimension, with or without vascular invasion</td>
</tr>
<tr>
<td>T4</td>
<td>Multiple tumours in more than one lobe or tumour(s) involve(s) a major branch of portal or hepatic vein(s) or invasion of adjacent organs other than the gallbladder or perforation of the visceral peritoneum</td>
</tr>
<tr>
<td><strong>Regional Lymph Nodes</strong></td>
<td>(N)</td>
</tr>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>NO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Regional lymph node metastasis</td>
</tr>
<tr>
<td><strong>Distant Metastasis</strong></td>
<td>(M)</td>
</tr>
<tr>
<td>MX</td>
<td>Presence of distant metastasis cannot be assessed</td>
</tr>
<tr>
<td>MO</td>
<td>No distant metastasis</td>
</tr>
<tr>
<td>M1</td>
<td>Distant metastasis</td>
</tr>
<tr>
<td>Stage Grouping</td>
<td>T1</td>
</tr>
<tr>
<td>----------------</td>
<td>----</td>
</tr>
<tr>
<td>Stage 1</td>
<td>NO</td>
</tr>
<tr>
<td>Stage II</td>
<td>NO</td>
</tr>
<tr>
<td>Stage IIIA</td>
<td>NO</td>
</tr>
<tr>
<td>Stage IIIB</td>
<td>N1</td>
</tr>
<tr>
<td></td>
<td>MO</td>
</tr>
<tr>
<td>Stage IVA</td>
<td>T4</td>
</tr>
<tr>
<td>Stage IVB</td>
<td>Any T</td>
</tr>
</tbody>
</table>
Appendix 7

Clinical staging of breast cancer

<table>
<thead>
<tr>
<th>Primary Tumour</th>
<th>(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX</td>
<td>Primary tumour cannot be assessed</td>
</tr>
<tr>
<td>TO</td>
<td>No evidence of primary tumour</td>
</tr>
<tr>
<td>Tis*</td>
<td>Carcinoma in situ: intraductal carcinoma, lobular carcinoma in situ, or Paget's disease of the nipple without tumour.</td>
</tr>
<tr>
<td>T1</td>
<td>Tumour 2 cm or less in greatest dimension</td>
</tr>
<tr>
<td>T1mic</td>
<td>Microinvasion 0.1 cm or less in greatest dimension</td>
</tr>
<tr>
<td>T1a</td>
<td>More than 0.1 but not more than 0.5 cm in greatest dimension</td>
</tr>
<tr>
<td>T1b</td>
<td>More than 0.5 cm but not more than 1 cm in greatest dimension</td>
</tr>
<tr>
<td>T1c</td>
<td>More than 1 cm but not more than 2 cm in greatest dimension</td>
</tr>
<tr>
<td>T2</td>
<td>Tumour more than 2 cm but not more than 5 cm in greatest dimension</td>
</tr>
<tr>
<td>T3</td>
<td>Tumour more than 5 cm in greatest dimension</td>
</tr>
<tr>
<td>T4+</td>
<td>Tumour of any size with direct extension to (a) chest wall or (b) skin, only as described below.</td>
</tr>
<tr>
<td>T4a</td>
<td>Extension to chest wall</td>
</tr>
<tr>
<td>T4b</td>
<td>Edema (including peau d’orange) or ulceration of the skin of the breast or satellite skin nodules confined to the same breast</td>
</tr>
<tr>
<td>T4c</td>
<td>Both (T4a and T4b)</td>
</tr>
<tr>
<td>T4d</td>
<td>Inflammatory carcinoma</td>
</tr>
</tbody>
</table>

*Note: Paget's disease associated with a tumour is classified according to the size of the tumour.*
Manual on the prevention and control of common cancers

+Note: Chest wall includes ribs, intercostal muscles, and serratus anterior muscle but not pectoral muscle.

<table>
<thead>
<tr>
<th>Regional Lymph Nodes</th>
<th>(N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed (e.g. previously removed)</td>
</tr>
<tr>
<td>NO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis to movable ipsilateral axillary lymph node(s)</td>
</tr>
<tr>
<td>N2</td>
<td>Metastasis to ipsilateral axillary lymph node(s) fixed to one another or to other structures</td>
</tr>
<tr>
<td>N3</td>
<td>Metastasis to ipsilateral internal mammary lymph node(s)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pathologic Classification</th>
<th>(pN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pNX</td>
<td>Regional lymph nodes cannot be assessed (e.g. previously removed or not removed for pathologic study)</td>
</tr>
<tr>
<td>pNO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>pN1</td>
<td>Metastasis to movable ipsilateral axillary lymph node(s)</td>
</tr>
<tr>
<td>pN1a</td>
<td>Only micrometastasis (none larger than 0.2 cm)</td>
</tr>
<tr>
<td>pN1b</td>
<td>Metastasis to lymph node(s), any larger than 0.2 cm</td>
</tr>
<tr>
<td>pN1bi</td>
<td>Metastasis in 1 to 3 lymph nodes, any more than 0.2 cm and all less than 2 cm in greatest dimension</td>
</tr>
<tr>
<td>pN1bii</td>
<td>Metastasis to 4 or more lymph nodes, any more than 0.2 cm in greatest dimension</td>
</tr>
<tr>
<td>pN1biiii</td>
<td>Extension of tumour beyond the capsule of a lymph node metastasis less than 2 cm in greatest dimension</td>
</tr>
<tr>
<td>pN1biv</td>
<td>Metastasis to a lymph node 2 cm or more in greatest dimension</td>
</tr>
<tr>
<td>pN2</td>
<td>Metastasis to ipsilateral axillary lymph nodes that are fixed to one another or to other structures</td>
</tr>
<tr>
<td>pN3</td>
<td>Metastasis to ipsilateral internal mammary lymph node(s)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distant Metastasis</th>
<th>(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX</td>
<td>Distant metastasis cannot be assessed</td>
</tr>
</tbody>
</table>
## Manual on the prevention and control of common cancers

<table>
<thead>
<tr>
<th></th>
<th>MO</th>
<th>No distant metastasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>Distant metastasis (includes metastasis to ipsilateral supraclavicular lymph node[s])</td>
<td></td>
</tr>
</tbody>
</table>

### Stage grouping

<table>
<thead>
<tr>
<th>Stage</th>
<th>Tis</th>
<th>NO</th>
<th>MO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage O</td>
<td>Tis</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage I</td>
<td>T1*</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIA</td>
<td>TO</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T1*</td>
<td>N1**</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIIB</td>
<td>T2</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIIA</td>
<td>TO</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T1*</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>N1, N2</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIIIB</td>
<td>T4</td>
<td>Any N</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>Any T</td>
<td>N3</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IV</td>
<td>Any T</td>
<td>Any N</td>
<td>M1</td>
</tr>
</tbody>
</table>

*Note: T1 includes T1mic

**Note: The prognosis of patients with pN1a is similar to that of patients with pNO.
### Appendix 8

**Clinical staging of stomach cancer**

<table>
<thead>
<tr>
<th>Definition of TNM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Tumour (T)</strong></td>
<td></td>
</tr>
<tr>
<td>TX</td>
<td>Primary tumour cannot be assessed</td>
</tr>
<tr>
<td>TO</td>
<td>No evidence of primary tumour</td>
</tr>
<tr>
<td>Tis</td>
<td>Carcinoma in situ: intraepithelial tumour without invasion of the lamina propria</td>
</tr>
<tr>
<td>T1</td>
<td>Tumour invades the lamina propria or submucosa</td>
</tr>
<tr>
<td>T2</td>
<td>Tumour invades the muscularis propria of the subserosa*</td>
</tr>
<tr>
<td>T3</td>
<td>Tumour penetrates the serosa (visceral peritoneum) without invasion of adjacent structures*+</td>
</tr>
<tr>
<td>T4</td>
<td>Tumour invades adjacent structures**+</td>
</tr>
</tbody>
</table>

*Note: A tumour may penetrate the muscularis propria with extension into the gastrocolic or gastrohepatic ligaments or into the greater of lesser omentum without perforation of the visceral peritoneum covering these structures. In this case, the tumour is classified T2. If there is perforation of the visceral peritoneum covering the gastric ligaments or omentum, the tumour should be classified T3.

*The adjacent structures of the stomach are the spleen, transverse colon, liver, diaphragm, pancreas, abdominal wall, adrenal gland, kidney, small intestine, and retroperitoneum.

**Intramural extension to the doudenum or esophagus is classified by the depth of greatest invasion in any of these sites, including stomach.

<table>
<thead>
<tr>
<th>Regional Lymph Nodes</th>
<th>(N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX</td>
<td>Regional lymph node(s) cannot be assessed</td>
</tr>
<tr>
<td>NO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis in 1 to 6 regional lymph nodes</td>
</tr>
<tr>
<td>N2</td>
<td>Metastasis in 7 to 15 regional lymph nodes</td>
</tr>
<tr>
<td>N3</td>
<td>Metastasis in more than 15 regional lymph nodes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distant Metastasis</th>
<th>(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX</td>
<td>Distant metastasis cannot be assessed</td>
</tr>
<tr>
<td>MO</td>
<td>No distant metastasis</td>
</tr>
<tr>
<td>Stage grouping</td>
<td>Tis</td>
</tr>
<tr>
<td>----------------</td>
<td>-----</td>
</tr>
<tr>
<td>Stage 0</td>
<td>Tis</td>
</tr>
<tr>
<td>Stage IA</td>
<td>T1</td>
</tr>
<tr>
<td>Stage 1B</td>
<td>T1</td>
</tr>
<tr>
<td></td>
<td>T2</td>
</tr>
<tr>
<td>Stage II</td>
<td>T1</td>
</tr>
<tr>
<td></td>
<td>T2</td>
</tr>
<tr>
<td></td>
<td>T3</td>
</tr>
<tr>
<td>Stage IIIA</td>
<td>T2</td>
</tr>
<tr>
<td></td>
<td>T3</td>
</tr>
<tr>
<td></td>
<td>T4</td>
</tr>
<tr>
<td>Stage IIIB</td>
<td>T3</td>
</tr>
<tr>
<td>Stage IV</td>
<td>T4</td>
</tr>
<tr>
<td></td>
<td>T1</td>
</tr>
<tr>
<td></td>
<td>T2</td>
</tr>
<tr>
<td></td>
<td>T3</td>
</tr>
<tr>
<td></td>
<td>T4</td>
</tr>
<tr>
<td></td>
<td>T4</td>
</tr>
<tr>
<td></td>
<td>Any T</td>
</tr>
</tbody>
</table>
Appendix 9

Clinical staging of colonic and rectal cancer

<table>
<thead>
<tr>
<th>Definition of TNM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The same classification is used for both clinical and pathologic staging.</td>
<td></td>
</tr>
<tr>
<td>Primary Tumour</td>
<td>(T)</td>
</tr>
<tr>
<td>TX</td>
<td>Primary tumour cannot be assessed</td>
</tr>
<tr>
<td>TO</td>
<td>No evidence of primary tumour</td>
</tr>
<tr>
<td>Tis</td>
<td>Carcinoma <em>in situ</em>: intraepithelial or invasion of lamina propria*</td>
</tr>
<tr>
<td>T1</td>
<td>Tumour invades submucosa</td>
</tr>
<tr>
<td>T2</td>
<td>Tumour invades muscularis propria</td>
</tr>
<tr>
<td>T3</td>
<td>Tumour invades through the muscularis propria into the subserosa, or into nonperitonealized pericolic or perirectal tissues</td>
</tr>
<tr>
<td>T4</td>
<td>Tumour perforates the visceral peritoneum, or directly invades other organs or structures.**</td>
</tr>
</tbody>
</table>

*Note: Tis includes cancer cells confined within the glandular basement membrane (intraepithelial) or lamina propria (intramucosal) with no extension through the muscularis mucosae into the submucosa.

**Note: Direct invasion in T4 includes invasion of other segments of the colorectum by way of the serosa’ for example, invasion of the sigmoid colon by a carcinoma of the cecum.

<table>
<thead>
<tr>
<th>Regional Lymph Nodes</th>
<th>(N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>NO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis in 1 to 3 regional lymph nodes</td>
</tr>
<tr>
<td>N2</td>
<td>Metastasis in 4 or more regional lymph nodes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distant Metastasis</th>
<th>(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX</td>
<td>Presence of distant metastasis cannot be assessed</td>
</tr>
<tr>
<td>MO</td>
<td>No distant metastasis</td>
</tr>
<tr>
<td>M1</td>
<td>Distant metastasis</td>
</tr>
</tbody>
</table>
### Stage Grouping

<table>
<thead>
<tr>
<th>Stage</th>
<th>AJCC/UICC</th>
<th>Dukes*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage O</td>
<td>Tis</td>
<td>NO</td>
</tr>
<tr>
<td>Stage 1</td>
<td>T1</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>NO</td>
</tr>
<tr>
<td>Stage II</td>
<td>T3</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>NO</td>
</tr>
<tr>
<td>Stage III</td>
<td>Any T</td>
<td>N1</td>
</tr>
<tr>
<td></td>
<td>Any T</td>
<td>N2</td>
</tr>
<tr>
<td>Stage IV</td>
<td>Any T</td>
<td>Any N</td>
</tr>
</tbody>
</table>

* Dukes B is a composite of better (T3, NO, MO) and worse (T4, NO, MO) prognostic groups as is Dukes C (Any T, N1, MO) and (Any T, N2, MO)
Appendix 10

Clinical staging of oesophageal cancer

<table>
<thead>
<tr>
<th>Definition of TNM</th>
<th>(T)</th>
<th>(N)</th>
<th>(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Tumour</td>
<td>TX</td>
<td>TO</td>
<td>MX</td>
</tr>
<tr>
<td></td>
<td>Primary tumour cannot be assessed</td>
<td>No evidence of primary tumour</td>
<td>Distant metastasis cannot be assessed</td>
</tr>
<tr>
<td>Ti</td>
<td>Carcinoma in situ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tis</td>
<td>Tumour invades lamina propria or submucosa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>Tumour invades muscularis propria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>Tumour invades adventitia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T3</td>
<td>Tumour invades adjacent structures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Lymph Nodes</td>
<td>NX</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>Regional lymph nodes cannot be assessed</td>
<td>No regional lymph node metastasis</td>
<td>No distant metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Regional lymph node metastasis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distant metastasis</td>
<td>M1</td>
<td>M1a</td>
<td>M1b</td>
</tr>
<tr>
<td></td>
<td>Distant metastasis</td>
<td>Metastasis in celiac lymph nodes</td>
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<td>M1a</td>
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<td>Other distant metastasis</td>
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<td></td>
</tr>
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<td>Nonregional lymph nodes and/or other distant metastasis</td>
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<tr>
<td>Tumours of the upper thoracic oesophagus</td>
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<td>Metastasis in cervical nodes</td>
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<td>M1b</td>
<td>Other distant metastasis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage Grouping</td>
<td>Tis</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>----------------</td>
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<td>----</td>
</tr>
<tr>
<td>Stage O</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage I</td>
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</tr>
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<td>MO</td>
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<td>T3</td>
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<td>Any N</td>
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<tr>
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<td>Any T</td>
<td>Any N</td>
<td>M1a</td>
</tr>
<tr>
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**Appendix 11**

**Clinical staging of nasopharyngeal cancer**

<table>
<thead>
<tr>
<th>Definition of TNM</th>
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<tbody>
<tr>
<td><strong>Primary Tumour</strong></td>
<td>(T)</td>
</tr>
<tr>
<td>TX</td>
<td>Primary tumour cannot be assessed</td>
</tr>
<tr>
<td>TO</td>
<td>No evidence of primary tumour</td>
</tr>
<tr>
<td>Tis</td>
<td>Carcinoma in situ</td>
</tr>
<tr>
<td>T1</td>
<td>Tumour confined to nasopharynx</td>
</tr>
<tr>
<td>T2</td>
<td>Tumour extends to soft tissues of oropharynx and/or nasal fossa</td>
</tr>
<tr>
<td>T2a</td>
<td>without parapharyngeal extension</td>
</tr>
<tr>
<td>T2b</td>
<td>with parapharyngeal extension</td>
</tr>
<tr>
<td>T3</td>
<td>Tumour invades bony structures and/or parasinal sinuses</td>
</tr>
<tr>
<td>T4</td>
<td>Tumour with intracranial extension and/or involvement of cranial nerves, infratemporal fossa, hybopharynx, or orbit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Regional Lymph Nodes</strong></th>
<th>(N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>NO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Unilateral metastasis in lymph node(s), 6 cm or less in greatest dimension, above the supraclavicular fossa</td>
</tr>
<tr>
<td>N2</td>
<td>Bilateral metastasis in lymph node(s), 6 cm or less in greatest dimension, above the supraclavicular fossa</td>
</tr>
<tr>
<td>N3</td>
<td>Metastasis in a lymph node(s)</td>
</tr>
<tr>
<td>N3a</td>
<td>greater than 6 cm in dimension</td>
</tr>
<tr>
<td>N3b</td>
<td>extension to the supraclavicular fossa</td>
</tr>
<tr>
<td>N2c</td>
<td>Metastasis in bilateral or contralateral lymph nodes, none more than 6 cm in greater dimension.</td>
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## Distant Metastasis

<table>
<thead>
<tr>
<th>(M)</th>
<th>Presence of distant metastasis cannot be assessed</th>
</tr>
</thead>
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<tr>
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<td>Presence of distant metastasis cannot be assessed</td>
</tr>
<tr>
<td>MO</td>
<td>No distant metastasis</td>
</tr>
<tr>
<td>MI</td>
<td>Distant metastasis</td>
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## Stage grouping

<table>
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<th>MO</th>
</tr>
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<tbody>
<tr>
<td>Stage I</td>
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<tr>
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<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIB</td>
<td>T1</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2a</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2b</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage III</td>
<td>T1</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2a</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2b</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IVA</td>
<td>T4</td>
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<td>MO</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>N2</td>
<td>MO</td>
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<tr>
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<td>MO</td>
</tr>
<tr>
<td>Stage IVC</td>
<td>Any T</td>
<td>Any N</td>
<td>M1</td>
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Appendices:

Appendix 1: Population-based cancer registries which are members of the International Association of Cancer Registries

Appendix 2: Antineoplastic and immunosuppressant drugs and drugs used in palliative care

Appendix 3: Clinical staging of oral cancer

Appendix 4: Clinical staging of nasopharyngeal cancer

Appendix 5: Clinical staging of oesophageal cancer

Appendix 6: Clinical staging of stomach cancer

Appendix 7: Clinical staging of colonic and rectal cancer

Appendix 8: Clinical staging of liver cancer

Appendix 9: Clinical staging of lung cancer

Appendix 10: Clinical staging of breast cancer

Appendix 11: Clinical staging of cervical cancer
Appendix 1

Population-based cancer registries which are members of the International Association of Cancer Registries

<table>
<thead>
<tr>
<th>Name</th>
<th>Population</th>
<th>Place</th>
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<tr>
<td>Australian Paediatric Cancer</td>
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<td>AUSTRALIA</td>
</tr>
<tr>
<td>ACT Cancer Registry</td>
<td>GEN</td>
<td>AUSTRALIA ACT</td>
</tr>
<tr>
<td>Northern Territory Cancer Registry</td>
<td>GEN</td>
<td>AUSTRALIA Northern Territory</td>
</tr>
<tr>
<td>Queensland Cancer Registry</td>
<td>GEN</td>
<td>AUSTRALIA Queensland</td>
</tr>
<tr>
<td>South Australian Cancer Registry</td>
<td>GEN</td>
<td>AUSTRALIA South Australia</td>
</tr>
<tr>
<td>Tasmanian Cancer Registry</td>
<td>GEN</td>
<td>AUSTRALIA Tasmania</td>
</tr>
<tr>
<td>Victoria Cancer Registry</td>
<td>GEN</td>
<td>AUSTRALIA Victoria</td>
</tr>
<tr>
<td>Western Australia Cancer Registry</td>
<td>GEN</td>
<td>AUSTRALIA Western Australia</td>
</tr>
<tr>
<td>Beijing Cancer Registry</td>
<td>GEN</td>
<td>CHINA Beijing</td>
</tr>
<tr>
<td>Qidong Cancer Registry</td>
<td>GEN</td>
<td>CHINA Qidong</td>
</tr>
<tr>
<td>Shanghai Cancer Registry</td>
<td>GEN</td>
<td>CHINA Shanghai</td>
</tr>
<tr>
<td>Tianjin Cancer Registry</td>
<td>GEN</td>
<td>CHINA Tianjin</td>
</tr>
<tr>
<td>Zhongshan Cancer Registry</td>
<td>GEN</td>
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</tr>
<tr>
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<td>GEN</td>
<td>FIJI</td>
</tr>
<tr>
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<td>GEN</td>
<td>FRENCH POLYNESIA</td>
</tr>
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<td>GEN</td>
<td>HONG KONG</td>
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</tr>
<tr>
<td>Fukui Cancer Registry</td>
<td>GEN</td>
<td>JAPAN Fukui</td>
</tr>
<tr>
<td>Fukuoka Cancer Registry</td>
<td>GEN</td>
<td>JAPAN Fukuoka</td>
</tr>
<tr>
<td>Hiroshima Cancer Registry</td>
<td>GEN</td>
<td>JAPAN Hiroshima</td>
</tr>
<tr>
<td>Hyogo Cancer Registry</td>
<td>GEN</td>
<td>JAPAN Hyogo (Akashi)</td>
</tr>
<tr>
<td>Kanagawa Cancer Registry</td>
<td>GEN</td>
<td>JAPAN Kanagawa (Yokohama)</td>
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<td>GEN</td>
<td>JAPAN Miyagi (Sendai)</td>
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<tr>
<td>Nagasaki Prefectural Cancer Registry</td>
<td>GEN</td>
<td>JAPAN Nagasaki</td>
</tr>
<tr>
<td>Osaka Cancer Registry</td>
<td>GEN</td>
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<tr>
<td>Saga Prefectural Cancer Registry</td>
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<td>JAPAN Saga</td>
</tr>
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<td>Cancer Registry</td>
<td>GEN</td>
<td>Country</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
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<td>----------------------</td>
</tr>
<tr>
<td>Tottori Cancer Registry</td>
<td>GEN</td>
<td>JAPAN Tottori (Yonago)</td>
</tr>
<tr>
<td>Yamagata Cancer Registry</td>
<td>GEN</td>
<td>JAPAN Yamagata</td>
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<tr>
<td>Malaysian Childhood Cancer Registry</td>
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<td>MALAYSIA</td>
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<tr>
<td>Cancer Registry of Malaysia</td>
<td>GEN</td>
<td>MALAYSIA Kuala Lumpur</td>
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<td>Registre du Cancer de Nouvelle</td>
<td>GEN</td>
<td>NEW CALEDONIA</td>
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<td>New Zealand Cancer Registry</td>
<td>GEN</td>
<td>NEW ZEALAND</td>
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<tr>
<td>Wasikato Tumour Registry</td>
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<td>NEW ZEALAND Wasikato</td>
</tr>
<tr>
<td>Papua New Guinea Tumour Registry</td>
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<td>PAPUA NEW GUINEA</td>
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<td>PHILIPPINES Cebu</td>
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<tr>
<td>Manila Cancer Registry</td>
<td>GEN</td>
<td>PHILIPPINES Manila</td>
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<td>Department of Health - Rizal Cancer Registry</td>
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<td>PHILIPPINES Rizal</td>
</tr>
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<td>Central Cancer Registry</td>
<td>GEN</td>
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</tr>
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</tr>
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<td>KOREA (Republic of) Seoul</td>
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<td>GEN</td>
<td>VANUATU</td>
</tr>
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<td>VIET NAM Hanoi</td>
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<td>Ho Chi Minh City Cancer Registry</td>
<td>GEN</td>
<td>VIET NAM Ho Chi Minh City</td>
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CHIL = Children
GEN = General
## Appendix 2

**Antineoplastic and immunosuppressant drugs and drugs used in palliative care**

1. **Immunosuppressant drugs**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route of administration, forms and strengths&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>azathioprine</td>
<td>tablet, 50 mg powder for injection, 100 mg (as sodium salt) in vial</td>
</tr>
<tr>
<td>ciclosporin</td>
<td>capsule, 25 mg concentrate for injection, 50 mg/ml in 1-ml ampoule</td>
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</tbody>
</table>

2. **Cytotoxic drugs**

<table>
<thead>
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<th>Drug</th>
<th>Route of administration, forms and strengths&lt;sup&gt;a&lt;/sup&gt;</th>
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<tbody>
<tr>
<td>asparaginase</td>
<td>powder for injection, 10 000 IU in vial</td>
</tr>
<tr>
<td>bleomycin</td>
<td>powder for injection, 15 mg (as sulfate) in vial</td>
</tr>
<tr>
<td>calcium folinate</td>
<td>tablet, 15 mg injection, 3 mg/ml in 10-ml ampoule</td>
</tr>
<tr>
<td>chloromethine</td>
<td>powder for injection, 10 mg (hydrochloride) in vial</td>
</tr>
<tr>
<td>cisplatin</td>
<td>powder for injection, 10 mg, 50 mg in vial</td>
</tr>
<tr>
<td>cyclophosphamide</td>
<td>tablet, 25 mg powder for injection, 500 mg in vial</td>
</tr>
<tr>
<td>cytarabine</td>
<td>powder for injection, 100 mg in vial</td>
</tr>
<tr>
<td>dacarbazine</td>
<td>powder for injection, 100 mg in vial</td>
</tr>
<tr>
<td>dactinomycin</td>
<td>powder for injection, 500 mg in vial</td>
</tr>
<tr>
<td>doxorubicin</td>
<td>powder for injection, 10 mg, 50 mg (hydrochloride) in vial</td>
</tr>
<tr>
<td>etoposide</td>
<td>capsule, 100 mg injection, 20 mg/ml in 5-ml ampoule</td>
</tr>
<tr>
<td>fluorouracil</td>
<td>injection, 50 mg/ml in 5-ml ampoule</td>
</tr>
<tr>
<td>levamisole</td>
<td>tablet, 50 mg (as hydrochloride)</td>
</tr>
<tr>
<td>mercaptopurine</td>
<td>tablet, 50 mg</td>
</tr>
<tr>
<td>methotrexate</td>
<td>tablet, 2.5 mg (as sodium salt) powder for injection, 50 mg (as sodium salt) in vial</td>
</tr>
<tr>
<td>procarbazine</td>
<td>capsule, 50 mg (as hydrochloride)</td>
</tr>
<tr>
<td>vinblastine</td>
<td>powder for injection, 10 mg (sulfate) in vial</td>
</tr>
<tr>
<td>vincristine</td>
<td>powder for injection, 1 mg, 5 mg (sulfate) in vial</td>
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</table>
3. Hormones and antihormones

<table>
<thead>
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<th>Drug</th>
<th>Route of administration, forms and strengths&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>=prednisolone</td>
<td>tablet, 5 mg powder for injection, 20 mg, 25 mg (as sodium phosphate or sodium succinate) in vial</td>
</tr>
<tr>
<td>tamoxifen</td>
<td>tablet, 10 mg, 20 mg (as citrate)</td>
</tr>
</tbody>
</table>

<sup>a</sup> When the strength is specified in terms of a selected salt or ester, this is mentioned in brackets; when it refers to the active moiety, the name of the salt or ester in brackets is preceded by the word “as”.

<sup>b</sup> For organ transplantation.

<sup>≡</sup> Example of a therapeutic group.

## Appendix 3

### Clinical staging of oral cancer

<table>
<thead>
<tr>
<th>Definition of TNM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Tumour (T)</strong></td>
<td></td>
</tr>
<tr>
<td>TX</td>
<td>Primary tumour cannot be assessed</td>
</tr>
<tr>
<td>TO</td>
<td>No evidence of primary tumour</td>
</tr>
<tr>
<td>Tis</td>
<td>Carcinoma <em>in situ</em></td>
</tr>
<tr>
<td>T1</td>
<td>Tumour 2 cm or less in greatest dimension</td>
</tr>
<tr>
<td>T2</td>
<td>Tumour more than 2 cm but not more than 4 cm in greatest dimension</td>
</tr>
<tr>
<td>T3</td>
<td>Tumour more than 4 cm in greatest dimension</td>
</tr>
<tr>
<td>T4 (lip)</td>
<td>Tumour invades adjacent structures (e.g. through cortical bone, inferior alveolar nerve, floor of mouth, skin of face)</td>
</tr>
<tr>
<td>T4 (Oral cavity)</td>
<td>Tumour invades adjacent structures (e.g. through cortical bone, into deep (extrinsic) muscle of tongue, maxillary sinus, skin. Superficial erosion alone of bone/tooth socket by gingival primary is not sufficient to classify as T4)</td>
</tr>
<tr>
<td><strong>Regional Lymph Nodes (N)</strong></td>
<td></td>
</tr>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>NO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis in a single ipsilateral lymph node, more than 3 cm or less in greatest dimension</td>
</tr>
<tr>
<td>N2</td>
<td>Metastasis in a single ipsilateral lymph node, more than 3 cm but not more than 6 cm in greatest dimension or in multiple ipsilateral lymph nodes, none more than 6 cm in greatest dimension; or in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension</td>
</tr>
<tr>
<td>N2a</td>
<td>Metastasis in single ipsilateral lymph node more than 3 cm but not more than 6 cm in greatest dimension</td>
</tr>
<tr>
<td>N2b</td>
<td>Metastasis in multiple ipsilateral lymph nodes, none more than 6 cm in greatest dimension</td>
</tr>
</tbody>
</table>
### Manual on the prevention and control of common cancers

<table>
<thead>
<tr>
<th>N2c</th>
<th>Metastasis in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>N3</th>
<th>Metastasis in a lymph node more than 6 cm in greatest dimension</th>
</tr>
</thead>
</table>

**Stage Grouping**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Tis</th>
<th>NO</th>
<th>MO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
<td>T1</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage I</td>
<td>T2</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage II</td>
<td>T3</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage III</td>
<td>T1</td>
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<tr>
<td></td>
<td>T2</td>
<td>N1</td>
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</tr>
<tr>
<td></td>
<td>T3</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IVA</td>
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<td>MO</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>Any T</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IVB</td>
<td>Any T</td>
<td>N3</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IVC</td>
<td>Any T</td>
<td>Any N</td>
<td>M1</td>
</tr>
</tbody>
</table>
# Appendix 4

## Clinical staging of nasopharyngeal cancer

<table>
<thead>
<tr>
<th>Definition of TNM</th>
<th>(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Tumour</strong></td>
<td>(T)</td>
</tr>
<tr>
<td>TX</td>
<td>Primary tumour cannot be assessed</td>
</tr>
<tr>
<td>TO</td>
<td>No evidence of primary tumour</td>
</tr>
<tr>
<td>Tis</td>
<td>Carcinoma in situ</td>
</tr>
<tr>
<td>T1</td>
<td>Tumour confined to nasopharynx</td>
</tr>
<tr>
<td>T2</td>
<td>Tumour extends to soft tissues of oropharynx and/or nasal fossa</td>
</tr>
<tr>
<td>T2a</td>
<td>without parapharyngeal extension</td>
</tr>
<tr>
<td>T2b</td>
<td>with parapharyngeal extension</td>
</tr>
<tr>
<td>T3</td>
<td>Tumour invades bony structures and/or panausal sinuses</td>
</tr>
<tr>
<td>T4</td>
<td>Tumour with intracranial extension and/or involvement of cranial nerves, infratemporal fossa, hyobopharynx, or orbit</td>
</tr>
<tr>
<td><strong>Regional Lymph Nodes</strong></td>
<td>(N)</td>
</tr>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>NO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Unilateral metastasis in lymph node(s), 6 cm or less in greatest dimension, above the supraclavicular fossa</td>
</tr>
<tr>
<td>N2</td>
<td>Bilateral metastasis in lymph node(s), 6 cm or less in greatest dimension, above the supraclavicular fossa</td>
</tr>
<tr>
<td>N3</td>
<td>Metastasis in a lymph node(s)</td>
</tr>
<tr>
<td>N3a</td>
<td>greater than 6 cm in dimension</td>
</tr>
<tr>
<td>N3b</td>
<td>extension to the supraclavicular fossa</td>
</tr>
<tr>
<td>N2c</td>
<td>Metastasis in bilateral or contralateral lymph nodes, none more than 6 cm in greater dimension.</td>
</tr>
</tbody>
</table>
### Distant Metastasis (M)

<table>
<thead>
<tr>
<th>Distant Metastasis</th>
<th>(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX</td>
<td>Presence of distant metastasis cannot be assessed</td>
</tr>
<tr>
<td>MO</td>
<td>No distant metastasis</td>
</tr>
<tr>
<td>MI</td>
<td>Distant metastasis</td>
</tr>
</tbody>
</table>

### Stage grouping

<table>
<thead>
<tr>
<th>Stage</th>
<th>Tis</th>
<th>NO</th>
<th>MO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>T1</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIA</td>
<td>T2a</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIB</td>
<td>T1</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2a</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2b</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2b</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td>Stage III</td>
<td>T1</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2a</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2b</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IVA</td>
<td>T4</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IVB</td>
<td>Any T</td>
<td>N3</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IVC</td>
<td>Any T</td>
<td>Any N</td>
<td>M1</td>
</tr>
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</table>
Appendix 5

Clinical staging of oesophageal cancer

<table>
<thead>
<tr>
<th>Definition of TNM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Tumour</strong></td>
<td>(T)</td>
</tr>
<tr>
<td>TX</td>
<td>Primary tumour cannot be assessed</td>
</tr>
<tr>
<td>TO</td>
<td>No evidence of primary tumour</td>
</tr>
<tr>
<td>Tis</td>
<td>Carcinoma <em>in situ</em></td>
</tr>
<tr>
<td>Ti</td>
<td>Tumour invades lamina propria or submucosa</td>
</tr>
<tr>
<td>T2</td>
<td>Tumour invades muscularis propria</td>
</tr>
<tr>
<td>T3</td>
<td>Tumour invades adventitia</td>
</tr>
<tr>
<td>T4</td>
<td>Tumour invades adjacent structures</td>
</tr>
<tr>
<td><strong>Regional Lymph Nodes</strong></td>
<td>(N)</td>
</tr>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>NO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Regional lymph node metastasis</td>
</tr>
<tr>
<td><strong>Distant metastasis</strong></td>
<td>(M)</td>
</tr>
<tr>
<td>MX</td>
<td>Distant metastasis cannot be assessed</td>
</tr>
<tr>
<td>MO</td>
<td>No distant metastasis</td>
</tr>
<tr>
<td>M1</td>
<td>Distant metastasis</td>
</tr>
<tr>
<td><strong>Tumours of the lower thoracic oesophagus:</strong></td>
<td></td>
</tr>
<tr>
<td>M1a</td>
<td>Metastasis in celiac lymph nodes</td>
</tr>
<tr>
<td>M1b</td>
<td>Other distant metastasis</td>
</tr>
<tr>
<td><strong>Tumours of the midthoracic oesophagus</strong></td>
<td></td>
</tr>
<tr>
<td>M1a</td>
<td>Not applicable</td>
</tr>
<tr>
<td>M1b</td>
<td>Nonregional lymph nodes and/or other distant metastasis</td>
</tr>
<tr>
<td><strong>Tumours of the upper thoracic oesophagus</strong></td>
<td></td>
</tr>
<tr>
<td>M1a</td>
<td>Metastasis in cervical nodes</td>
</tr>
<tr>
<td>M1b</td>
<td>Other distant metastasis</td>
</tr>
<tr>
<td>Stage Grouping</td>
<td>Tis</td>
</tr>
<tr>
<td>----------------</td>
<td>-----</td>
</tr>
<tr>
<td>Stage O</td>
<td>Tis</td>
</tr>
<tr>
<td>Stage I</td>
<td>T1</td>
</tr>
<tr>
<td>Stage IIA</td>
<td>T2</td>
</tr>
<tr>
<td></td>
<td>T3</td>
</tr>
<tr>
<td>Stage IIB</td>
<td>T1</td>
</tr>
<tr>
<td></td>
<td>T2</td>
</tr>
<tr>
<td>Stage III</td>
<td>T3</td>
</tr>
<tr>
<td></td>
<td>T4</td>
</tr>
<tr>
<td>Stage IV</td>
<td>Any T</td>
</tr>
<tr>
<td>Stage IVA</td>
<td>Any T</td>
</tr>
<tr>
<td>Stage IVB</td>
<td>Any T</td>
</tr>
</tbody>
</table>
Appendix 6

Clinical staging of stomach cancer

<table>
<thead>
<tr>
<th>Definition of TNM</th>
<th>(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Tumour</td>
<td></td>
</tr>
<tr>
<td>TX</td>
<td>Primary tumour cannot be assessed</td>
</tr>
<tr>
<td>TO</td>
<td>No evidence of primary tumour</td>
</tr>
<tr>
<td>Tis</td>
<td>Carcinoma in situ: intraepithelial tumour without invasion of the lamina propria</td>
</tr>
<tr>
<td>T1</td>
<td>Tumour invades the lamina propria or submucosa</td>
</tr>
<tr>
<td>T2</td>
<td>Tumour invades the muscularis propria of the subserosa*</td>
</tr>
<tr>
<td>T3</td>
<td>Tumour penetrates the serosa (visceral peritoneum) without invasion of adjacent structures</td>
</tr>
<tr>
<td>T4</td>
<td>Tumour invades adjacent structures++</td>
</tr>
</tbody>
</table>

*Note: A tumour may penetrate the muscularis propria with extension into the gastrocolic or gastrohepatic ligaments or into the greater of lesser omentum without perforation of the visceral peritoneum covering these structures. In this case, the tumour is classified T2. If there is perforation of the visceral peritoneum covering the gastric ligaments or omentum, the tumour should be classified T3.

*The adjacent structures of the stomach are the spleen, transverse colon, liver, diaphragm, pancreas, abdominal wall, adrenal gland, kidney, small intestine, and retroperitoneum.

**Intramural extension to the doudenum or esophagus is classified by the depth of greatest invasion in any of these sites, including stomach.

<table>
<thead>
<tr>
<th>Regional Lymph Nodes</th>
<th>(N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX</td>
<td>Regional lymph node(s) cannot be assessed</td>
</tr>
<tr>
<td>NO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis in 1 to 6 regional lymph nodes</td>
</tr>
<tr>
<td>N2</td>
<td>Metastasis in 7 to 15 regional lymph nodes</td>
</tr>
<tr>
<td>N3</td>
<td>Metastasis in more than 15 regional lymph nodes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distant Metastasis</th>
<th>(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX</td>
<td>Distant metastasis cannot be assessed</td>
</tr>
<tr>
<td>MO</td>
<td>No distant metastasis</td>
</tr>
<tr>
<td>Stage</td>
<td>T</td>
</tr>
<tr>
<td>-----------</td>
<td>-----</td>
</tr>
<tr>
<td>Stage 0</td>
<td>Tis</td>
</tr>
<tr>
<td>Stage IA</td>
<td>T1</td>
</tr>
<tr>
<td>Stage 1B</td>
<td>T1</td>
</tr>
<tr>
<td></td>
<td>T2</td>
</tr>
<tr>
<td>Stage II</td>
<td>T1</td>
</tr>
<tr>
<td></td>
<td>T2</td>
</tr>
<tr>
<td></td>
<td>T3</td>
</tr>
<tr>
<td>Stage IIIA</td>
<td>T2</td>
</tr>
<tr>
<td></td>
<td>T3</td>
</tr>
<tr>
<td></td>
<td>T4</td>
</tr>
<tr>
<td>Stage IIIB</td>
<td>T3</td>
</tr>
<tr>
<td>Stage IV</td>
<td>T4</td>
</tr>
<tr>
<td></td>
<td>T1</td>
</tr>
<tr>
<td></td>
<td>T2</td>
</tr>
<tr>
<td></td>
<td>T3</td>
</tr>
<tr>
<td></td>
<td>T4</td>
</tr>
<tr>
<td></td>
<td>T4</td>
</tr>
<tr>
<td></td>
<td>Any T</td>
</tr>
</tbody>
</table>
Appendix 7

Clinical staging of colonic and rectal cancer

<table>
<thead>
<tr>
<th>Definition of TNM</th>
</tr>
</thead>
<tbody>
<tr>
<td>The same classification is used for both clinical and pathologic staging.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Tumour (T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX Primary tumour cannot be assessed</td>
</tr>
<tr>
<td>TO No evidence of primary tumour</td>
</tr>
<tr>
<td>Tis Carcinoma in situ: intraepithelial or invasion of lamina propria*</td>
</tr>
<tr>
<td>T1 Tumour invades submucosa</td>
</tr>
<tr>
<td>T2 Tumour invades muscularis propria</td>
</tr>
<tr>
<td>T3 Tumour invades through the muscularis propria into the subserosa, or into nonperitonealized pericolic or perirectal tissues</td>
</tr>
<tr>
<td>T4 Tumour perforates the visceral peritoneum, or directly invades other organs or structures.**</td>
</tr>
</tbody>
</table>

*Note: Tis includes cancer cells confined within the glandular basement membrane (intraepithelial) or lamina propria (intramucosal) with no extension through the muscularis mucosae into the submucosa.

**Note: Direct invasion in T4 includes invasion of other segments of the colorectum by way of the serosa for example, invasion of the sigmoid colon by a carcinoma of the cecum.

<table>
<thead>
<tr>
<th>Regional Lymph Nodes (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>NO No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1 Metastasis in 1 to 3 regional lymph nodes</td>
</tr>
<tr>
<td>N2 Metastasis in 4 or more regional lymph nodes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distant Metastasis (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX Presence of distant metastasis cannot be assessed</td>
</tr>
<tr>
<td>MO No distant metastasis</td>
</tr>
<tr>
<td>M1 Distant metastasis</td>
</tr>
</tbody>
</table>
### Stage Grouping

<table>
<thead>
<tr>
<th>Stage</th>
<th>AJCC/UICC</th>
<th>Dukes*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage O</td>
<td>Tis</td>
<td>NO</td>
</tr>
<tr>
<td>Stage I</td>
<td>T1</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>NO</td>
</tr>
<tr>
<td>Stage II</td>
<td>T3</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>NO</td>
</tr>
<tr>
<td>Stage III</td>
<td>Any T</td>
<td>N1</td>
</tr>
<tr>
<td></td>
<td>Any T</td>
<td>N2</td>
</tr>
<tr>
<td>Stage IV</td>
<td>Any T</td>
<td>Any N</td>
</tr>
</tbody>
</table>

* Dukes B is a composite of better (T3, NO, MO) and worse (T4, NO, MO) prognostic groups as is Dukes C (Any T, N1, MO) and (Any T, N2, MO)
## Appendix 8

### Clinical staging of liver cancer

<table>
<thead>
<tr>
<th>Definition of TNM</th>
<th>(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Tumour</strong></td>
<td></td>
</tr>
<tr>
<td>TX</td>
<td>Primary tumour cannot be assessed</td>
</tr>
<tr>
<td>TO</td>
<td>No evidence of primary tumour</td>
</tr>
<tr>
<td>T1</td>
<td>Solitary tumour 2 cm or less in greatest dimension without vascular invasion</td>
</tr>
<tr>
<td>T2</td>
<td>Solitary tumour 2 cm or less in greatest dimension with vascular invasion, or multiple tumours limited to one lobe, none more than 2 cm in greatest dimension without vascular invasion, or a solitary tumour more than 2 cm in greatest dimension without vascular invasion</td>
</tr>
<tr>
<td>T3</td>
<td>Solitary tumour more than 2 cm in greatest dimension with vascular invasion, or multiple tumours limited to one lobe, none more than 2 cm in greatest dimension with vascular invasion, or multiple tumours limited to one lobe, any more than 2 cm in greatest dimension, with or without vascular invasion</td>
</tr>
<tr>
<td>T4</td>
<td>Multiple tumours in more than one lobe or tumour(s) involve(s) a major branch of portal or hepatic vein(s) or invasion of adjacent organs other than the gallbladder or perforation of the visceral peritoneum</td>
</tr>
<tr>
<td><strong>Regional Lymph Nodes</strong></td>
<td>(N)</td>
</tr>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>NO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Regional lymph node metastasis</td>
</tr>
<tr>
<td><strong>Distant Metastasis</strong></td>
<td>(M)</td>
</tr>
<tr>
<td>MX</td>
<td>Presence of distant metastasis cannot be assessed</td>
</tr>
<tr>
<td>MO</td>
<td>No distant metastasis</td>
</tr>
<tr>
<td>M1</td>
<td>Distant metastasis</td>
</tr>
<tr>
<td>Stage Grouping</td>
<td>T1</td>
</tr>
<tr>
<td>----------------</td>
<td>-----</td>
</tr>
<tr>
<td>Stage 1</td>
<td>T1</td>
</tr>
<tr>
<td>Stage II</td>
<td>T2</td>
</tr>
<tr>
<td>Stage IIIA</td>
<td>T3</td>
</tr>
<tr>
<td>Stage IIIB</td>
<td>T1</td>
</tr>
<tr>
<td></td>
<td>T2</td>
</tr>
<tr>
<td></td>
<td>T3</td>
</tr>
<tr>
<td>Stage IVA</td>
<td>T4</td>
</tr>
<tr>
<td>Stage IVB</td>
<td>Any T</td>
</tr>
</tbody>
</table>
## Appendix 9

### Clinical staging of lung cancer

<table>
<thead>
<tr>
<th>T - Primary Tumour</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TX</td>
<td>Primary tumour cannot be assessed; tumour can be proven by the presence of malignant cells in sputum or bronchial washings but not visualized by imaging or bronchoscopy</td>
</tr>
<tr>
<td>TO</td>
<td>No evidence or primary tumour</td>
</tr>
<tr>
<td>Tis</td>
<td>Carcinoma <em>in situ</em></td>
</tr>
<tr>
<td>T1</td>
<td>Tumour ≤3 cm in greatest dimension, surrounded by lung or visceral pleura, without bronchoscopic evidence of invasion more proximal than the lobar bronchus (i.e. not in the main bronchus)</td>
</tr>
</tbody>
</table>
| T2                 | Tumour with any of the following features of size or extent:  
|                   |  
|                   | >3 cm in greatest dimension  
|                   | Involves main bronchus ≥2 cm distal to the carina  
|                   | Invades visceral pleura  
|                   | Associated with atelectasis or obstructus pneumonitis, that extends to the hilar region but does not involve the entire lung |
| T3                 | Tumour of any size that directly invades any of the following: chest wall (including superior sulcus tumours), diaphragm, mediastinal pleura, parietal paricardium; or tumour in the main bronchus <2 cm distal to the carina, but without involvement of the carina; or associated atelectasis or obstructive pneumonitis of the entire lung. |
| T4                 | Tumour of any size that invades any of the following: mediastinum, heart, great vessels, trachea, oesophagus, vertebral body, carina; or tumour with malignant pleural effusion. |

<table>
<thead>
<tr>
<th>N - Regional lymph nodes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>NO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis to ipsilateral peribronchial and/or ipsilateral hilar lymph nodes, and intrapulmonary nodes including involvement by direct etension of the primary tumour.</td>
</tr>
<tr>
<td>N2</td>
<td>Metastasis in ipsilateral mediastinal and/or subcarinal lymph node(s)</td>
</tr>
</tbody>
</table>
### N3
| Metastasis to contralateral mediastinal, contralateral hilar, ipsilateral or contralateral scalene, or supraclavicular lymph node(s) |

### M - Distant Metastasis

<table>
<thead>
<tr>
<th>MX</th>
<th>Distant metastasis cannot be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>MO</td>
<td>No distant metastasis</td>
</tr>
<tr>
<td>M1</td>
<td>Distant metastasis</td>
</tr>
</tbody>
</table>

### Stage grouping

<table>
<thead>
<tr>
<th>Occult Carcinoma</th>
<th>TX</th>
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<th>MO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
<td>Tis</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IA</td>
<td>T1</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IB</td>
<td>T2</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIA</td>
<td>T1</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIIB</td>
<td>T2</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIIA</td>
<td>T1</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIIB</td>
<td>Any T</td>
<td>N3</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>Any N</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IV</td>
<td>Any T</td>
<td>Any N</td>
<td>M1</td>
</tr>
</tbody>
</table>
Appendix 10

Clinical staging of breast cancer

Definition of TNM

Definitions for classifying the primary tumour (T) are the same for clinical and for pathologic classification. The telescoping method of classification can be applied. If the measurement is made by physical examination, the examiner will use the major headings (T1, T2, or T3). If other measurements, such as mammographic or pathologic, are used, the telescoped subsets of T1 can be used.

<table>
<thead>
<tr>
<th>Primary Tumour</th>
<th>(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX</td>
<td>Primary tumour cannot be assessed</td>
</tr>
<tr>
<td>TO</td>
<td>No evidence of primary tumour</td>
</tr>
<tr>
<td>Tis*</td>
<td>Carcinoma in situ: intraductal carcinoma, lobular carcinoma in situ, or Paget’s disease of the nipple without tumour.</td>
</tr>
<tr>
<td>T1</td>
<td>Tumour 2 cm or less in greatest dimension</td>
</tr>
<tr>
<td>T1mic</td>
<td>Microinvasion 0.1 cm or less in greatest dimension</td>
</tr>
<tr>
<td>T1a</td>
<td>More than 0.1 but not more than 0.5 cm in greatest dimension</td>
</tr>
<tr>
<td>T1b</td>
<td>More than 0.5 cm but not more than 1 cm in greatest dimension</td>
</tr>
<tr>
<td>T1c</td>
<td>More than 1 cm but not more than 2 cm in greatest dimension</td>
</tr>
<tr>
<td>T2</td>
<td>Tumour more than 2 cm but not more than 5 cm in greatest dimension</td>
</tr>
<tr>
<td>T3</td>
<td>Tumour more than 5 cm in greatest dimension</td>
</tr>
<tr>
<td>T4+</td>
<td>Tumour of any size with direct extension to (a) chest wall or (b) skin, only as described below.</td>
</tr>
<tr>
<td>T4a</td>
<td>Extension to chest wall</td>
</tr>
<tr>
<td>T4b</td>
<td>Edema (including peau d’orange) or ulceration of the skin of the breast or satellite skin nodules confined to the same breast</td>
</tr>
<tr>
<td>T4c</td>
<td>Both (T4a and T4b)</td>
</tr>
<tr>
<td>T4d</td>
<td>Inflammatory carcinoma</td>
</tr>
</tbody>
</table>

*Note: Paget’s disease associated with a tumour is classified according to the size of the tumour.
**Note:** Chest wall includes ribs, intercostal muscles, and serratus anterior muscle but not pectoral muscle.

<table>
<thead>
<tr>
<th>Regional Lymph Nodes</th>
<th>(N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed (e.g. previously removed)</td>
</tr>
<tr>
<td>NO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis to movable ipsilateral axillary lymph node(s)</td>
</tr>
<tr>
<td>N2</td>
<td>Metastasis to ipsilateral axillary lymph node(s) fixed to one another or to other structures</td>
</tr>
<tr>
<td>N3</td>
<td>Metastasis to ipsilateral internal mammary lymph node(s)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pathologic Classification</th>
<th>(pN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pNX</td>
<td>Regional lymph nodes cannot be assessed (e.g. previously removed or not removed for pathologic study)</td>
</tr>
<tr>
<td>pNO</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>pN1</td>
<td>Metastasis to movable ipsilateral axillary lymph node(s)</td>
</tr>
<tr>
<td>pN1a</td>
<td>Only micrometastasis (none larger than 0.2 cm)</td>
</tr>
<tr>
<td>pN1b</td>
<td>Metastasis to lymph node(s), any larger than 0.2 cm</td>
</tr>
<tr>
<td>pN1bi</td>
<td>Metastasis in 1 to 3 lymph nodes, any more than 0.2 cm and all less than 2 cm in greatest dimension</td>
</tr>
<tr>
<td>pN1bii</td>
<td>Metastasis to 4 or more lymph nodes, any more than 0.2 cm in greatest dimension</td>
</tr>
<tr>
<td>pN1biii</td>
<td>Extension of tumour beyond the capsule of a lymph node metastasis less than 2 cm in greatest dimension</td>
</tr>
<tr>
<td>pN1biv</td>
<td>Metastasis to a lymph node 2 cm or more in greatest dimension</td>
</tr>
<tr>
<td>pN2</td>
<td>Metastasis to ipsilateral axillary lymph nodes that are fixed to one another or to other structures</td>
</tr>
<tr>
<td>pN3</td>
<td>Metastasis to ipsilateral internal mammary lymph node(s)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distant Metastasis</th>
<th>(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX</td>
<td>Distant metastasis cannot be assessed</td>
</tr>
</tbody>
</table>
### Manual on the prevention and control of common cancers

<table>
<thead>
<tr>
<th>Stage</th>
<th>T</th>
<th>N</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage O</td>
<td>Tis</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage I</td>
<td>T1*</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIA</td>
<td>TO</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T1*</td>
<td>N1**</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIB</td>
<td>T2</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIIA</td>
<td>TO</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T1*</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>N2</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>N1, N2</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIIB</td>
<td>T4</td>
<td>Any N</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>Any T</td>
<td>N3</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IV</td>
<td>Any T</td>
<td>Any N</td>
<td>M1</td>
</tr>
</tbody>
</table>

*Note: T1 includes T1mic

**Note: The prognosis of patients with pN1a is similar to that of patients with pNO.
## Appendix 11

### Clinical staging of cervical cancer

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage O</td>
<td>Carcinoma in situ</td>
</tr>
<tr>
<td>Stage 1</td>
<td>The carcinoma is strictly confined to the cervix (extension to the corpus is disregarded).</td>
</tr>
<tr>
<td>Stage 1a</td>
<td>Microinvasive disease with lesion not grossly visible (All gross lesions, even if with superficial invasion, are staged as Ib) The depth of invasion should not be more than 5 mm from the base of the epithelium, either surface or glandular, from which it originates. Vascular space involvement, either venous or lymphatic, should not alter the staging.</td>
</tr>
<tr>
<td>Stage 1a1</td>
<td>The depth of stromal invasion should not exceed 3 mm and the horizontal diameter should not exceed 7 mm</td>
</tr>
<tr>
<td>Stage 1a2</td>
<td>The depth of stromal invasion is greater than 3 mm but should not exceed 5 mm and the horizontal diameter should not exceed 7 mm.</td>
</tr>
<tr>
<td>Stage Ib</td>
<td>Clinical lesions confined to the cervix or preclinical lesions greater than Ia</td>
</tr>
<tr>
<td>Stage Ib1</td>
<td>Clinical lesions not greater than 4 cm in diameter</td>
</tr>
<tr>
<td>Stage Ib2</td>
<td>Clinical lesions greater than 4 cm in diameter</td>
</tr>
<tr>
<td>Stage II</td>
<td>The carcinoma extends beyond the cervix, to the parametria, but has not reached the pelvic wall. The carcinoma extends to the vagina, but has not reached the lower third.</td>
</tr>
<tr>
<td>Stage IIa</td>
<td>Without obvious parametrial involvement.</td>
</tr>
<tr>
<td>Stage IIb</td>
<td>With obvious parametrial involvement.</td>
</tr>
<tr>
<td>Stage III</td>
<td>The carcinoma extends to the pelvic wall. On rectal examination, there is no cancer-free space between the tumour and the pelvic wall. The tumour involves the lower third of the vagina. All cases with hydronephrosis or nonfunctioning kidney are included, unless they are known to be due to some other cause.</td>
</tr>
<tr>
<td>Stage IIIa</td>
<td>Without extension to the pelvic wall.</td>
</tr>
<tr>
<td>Stage IIIb</td>
<td>With extension to the pelvic wall and/or hydronephrosis or nonfunctioning kidney.</td>
</tr>
</tbody>
</table>
Stage IV: The carcinoma extends beyond the true pelvis or clinically involves the mucosa of the bladder or the rectum. A bullous oedema as such does not permit a case to be allotted to Stage IV.

<table>
<thead>
<tr>
<th>Stage IVa</th>
<th>Spread to adjacent organs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage IVb</td>
<td>Spread to distant organs</td>
</tr>
</tbody>
</table>

**Stage Grouping**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Tis</th>
<th>NO</th>
<th>MO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1A1</td>
<td>T1a1</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage 1A2</td>
<td>T1a2</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage 1B1</td>
<td>T1b1</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage 1B2</td>
<td>T1b2</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIA</td>
<td>T2a</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIB</td>
<td>T2b</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIIA</td>
<td>T3a</td>
<td>NO</td>
<td>MO</td>
</tr>
<tr>
<td>Stage IIIB</td>
<td>T1</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3a</td>
<td>N1</td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>T3b</td>
<td>Any N</td>
<td>MO</td>
</tr>
</tbody>
</table>

Stage IVA: T4 Any N MO
Stage IVB: Any T Any N M1