

Early detection of cancer is based on the observation that treatment is more effective when the disease is detected earlier in its natural history, prior to the development of symptoms, than in an advanced stage. The aim is to detect the cancer when it is localized to the organ of origin without invasion of surrounding tissues or distant organs.

A decision to implement early detection of cancer in health services should be evidence-based, with consideration for the public health importance of the disease, characteristics of early-detection tests, efficacy and cost-effectiveness of early detection, personnel requirements and the level of development of health services in a given setting. Even if the costs of the screening tests are relatively low, the whole process may involve substantial expenses and may divert resources from other health care activities.

Early detection is only a part of a wider strategy that includes diagnosis, treatment of the condition detected, and follow-up. These activities need to be integrated at appropriate levels of health services, if early detection is to be sustained. Some specific additional investments in health services infrastructure may be required for the extra disease burden resulting from early detection.

There are two principal components of early detection programmes for cancer: education to promote early diagnosis, and screening. Successful education leading to early diagnosis can result in substantial improvement in the health outcome of persons destined to develop cancer. Screening is unlikely to be successful unless based upon an effective education programme and effective treatment for the cancers detected.

Both approaches involve costs to the individual (in terms of time spent, distance travelled, cash payments for detection/diagnosis) and the health services (staff, subsidies for detection/diagnosis, treatment, follow-up), and sometimes may be associated with undesired harm. It is important to establish that benefits of early detection outweigh complications and harmful effects before early detection is implemented as a public health policy. National health services often operate with limited resources against a wide variety of competing priorities. It is essential, therefore, to recommend for implementation only those interventions for which there is sufficient evidence on efficacy and cost-effectiveness.

EARLY DIAGNOSIS

It is essential to educate people to recognize the early signs and symptoms of cancer. They should understand that cancer, when diagnosed early, is far more likely to be treatable, and to respond to effective treatment. They should appreciate the possible significance of lumps, sores, persistent indigestion or cough, and bleeding from the body's orifices, and the importance of seeking prompt medical attention if any of these occur. The cancers amenable to early diagnosis are: oral cavity, nasopharynx, stomach, colon/rectum, skin melanoma and other skin cancers, breast, cervix, ovary, urinary bladder, and prostate.

Substantial endeavours may be needed in many cultures to dispel the myths, fears and gloom that tend to accompany any consideration of cancer. Otherwise, it is unlikely that the majority of those at risk for cancer will take effective prompt action.

A high proportion of cancers that are relatively curable in developed countries are detected only at advanced stages in developing countries. It is reasonable to assume, therefore, that increased awareness among physicians, allied health care workers, and the general public in developing countries, combined with prompt and effective therapy, could have a major impact on the disease. There is evidence that prompt action, combined with the availability of effective treatment, resulted in improvements in both the stage of cancer at presentation and mortality from cancer of the cervix in developed countries in the last half of the 20th century (Ponten et al., 1995). A similar pattern has become evident more recently in rural India (Jayant et al., 1998).

Professional education of primary health care workers is essential. Such workers are at the forefront of the initial contact between possible cancer patients and the medical care system, and they must be aware of the signs and symptoms of early cancer, even though their prior training may have only exposed them to advanced and often untreatable cancers. This means that they must be systematically trained in the early detection of certain cancers, so that they are alert to the signs and symptoms of early cancer, and they must be given sufficient time to carry out such responsibilities. Further, it may be necessary to improve peoples' accessibility to trained health workers who are competent in performing the necessary examinations (including female health workers for women).

If the majority of common cancers (for example, cervix, breast, mouth, skin) are advanced at presentation (that is, stage III or IV), trained workers should promote measures for earlier diagnosis and referral. Early diagnosis, referral, and treatment of these cancers are of far greater prognostic importance than any attempts to treat the disease in its late stages. Even in cases where the eventual outcome cannot be changed, treatment is simpler and

quality of life improved for those cases where early diagnosis is achieved.

Every suspected case of cancer must be promptly referred for appropriate diagnosis and therapy, and institutions with the staff and facilities necessary to provide effective treatment must be accessible to patients. Special measures may be needed to ensure that those referred do in fact attend for diagnosis and management of suspected abnormalities.

SCREENING FOR CANCER

Screening is the presumptive identification of unrecognized disease or defects by means of tests, examinations, or other procedures that can be applied rapidly.

In advocating screening programmes as part of early detection of cancer, it is important for national cancer control programmes to avoid imposing the “high technology” of the developed world on countries that lack the infrastructure and resources to use the technology appropriately or to achieve adequate coverage of the population. The success of screening depends on having sufficient numbers of personnel to perform the screening tests and on the availability of facilities that can undertake subsequent diagnosis, treatment, and follow-up.

A number of factors should be taken into account when the adoption of any screening technique is being considered:

- *sensitivity* – the effectiveness of a test in detecting a cancer in those who have the disease;
- *specificity* – the extent to which a test gives negative results in those that are free of the disease;
- *positive predictive value* – the extent to which subjects have the disease in those that give a positive test result;
- *negative predictive value* – the extent to which subjects are free of the disease in those that give a negative test result;
- *acceptability* – the extent to which those for whom the test is designed agree to be tested.

A screening test aims to be sure that as few as possible with the disease get through undetected (high sensitivity) and as few as possible without the disease are subject to further diagnostic tests (high specificity). Given high sensitivity and specificity, the likelihood that a positive screening test will give a correct result (positive predictive value) strongly depends on the prevalence of the disease within the population. If the prevalence of the disease is very low, even the best screening test will not be an effective public health programme.

It is also important to review the organization of a screening programme (Hakama et al., 1985). The test procedure itself should be efficiently administered. There should also be adequate follow-up of individuals with positive results, so that diagnosis can be quickly confirmed and appropriate therapy started.

Policies on early cancer detection will differ markedly between countries. An industrialized country may conduct screening programmes for cervical and breast cancer. Such programmes are not, however, recommended in the least developed countries in which there is a low prevalence of cancer and a weak health care infrastructure. Further, only organized screening programmes are likely to be fully successful as a means of reaching a high proportion of the at-risk population. Countries that favour cancer detection remaining part of routine medical practice, or that simply encourage people to seek specific tests at regular intervals, are unlikely to realize the full potential of screening.

The success of screening programmes depends on a number of fundamental principles:

- the target disease should be a common form of cancer, with high associated morbidity or mortality;
- effective treatment, capable of reducing morbidity and mortality, should be available;
- test procedures should be acceptable, safe, and relatively inexpensive.

In a national cancer control programme, screening programmes should be organized to ensure that a large proportion of the target group is screened and that those individuals in whom abnormalities are observed receive appropriate diagnosis and therapy. Agreement needs to be reached on guidelines to be applied in the national cancer control programme concerning:

- the frequency of screening and ages at which screening should be performed;
- quality control systems for the screening tests;
- defined mechanisms for referral and treatment of abnormalities;
- an information system that can:
 - send out invitations for initial screening;
 - recall individuals for repeat screening;
 - follow those with identified abnormalities;
 - monitor and evaluate the programme.

For a number of reasons, patients often fail to adhere to recommended cancer screening activities. While in many cases both the patients and the health care providers understand the concept of early detection, they fail to comply

with recommendations. Non-compliance is a general health problem and one that should be addressed in a comprehensive manner to improve outcome and reduce the waste of resources.

Screening that concentrates solely on a high-risk group is rarely justified, as identified risk groups usually represent only a small proportion of the cancer burden in a country. In planning the coverage of screening programmes, however, steps must be taken to ensure that all those at high risk are included. This requirement may be difficult to fulfil. In screening for cancer of the cervix, for example, those at high risk are often difficult to recruit into screening.

The main criteria that should be considered before a screening programme is instituted as part of the national cancer control programme are summarized in Table 5.1.

Screening for cancer of the cervix

Cervical cancer is the second most common cancer among women worldwide, with almost half a million new cases each year (Ferlay et al., 2000). Screening with the cervical smear plus adequate follow-up therapy can achieve major reductions in both incidence and mortality rates (Miller et al., 1990). The smear can reveal cytological abnormalities indicating the presence of a precancerous lesion (various grades of dysplasia, or cervical intraepithelial neoplasia, or low- or high- grade cytological abnormalities, depending on the classification used by the laboratory), as well as *in situ* or very early invasive cancer (see Figure 5.1). Treatment of these early lesions is highly effective, though far more are diagnosed than will ever progress to invasive cancer if untreated.

The experience of the Nordic countries is instructive (Hakama, 1982).

Table 5.1 Criteria for instituting a screening programme

1. The condition to be detected is of public health importance.
2. The natural history of the condition is understood and there is an unsuspected but detectable (pre-clinical) stage.
3. There is an ethical, acceptable, safe and effective procedure for detecting the condition at a sufficiently early stage to permit intervention.
4. There are ethical, acceptable, safe and effective preventive measures or treatments for the condition when it is detected at an early stage.
5. There is sufficient political will, and it is feasible to carry out the relevant screening, diagnostic and intervention practices in a population-based manner with existing resources or with resources that could be obtained during the planning period.
6. Adoption and implementation of the screening, diagnostic and intervention practices will strengthen development of the health system and overall societal development in a manner consistent with the principles of primary health care.
7. The cost of the screening and intervention is warranted and reasonable compared with alternative uses of resources.

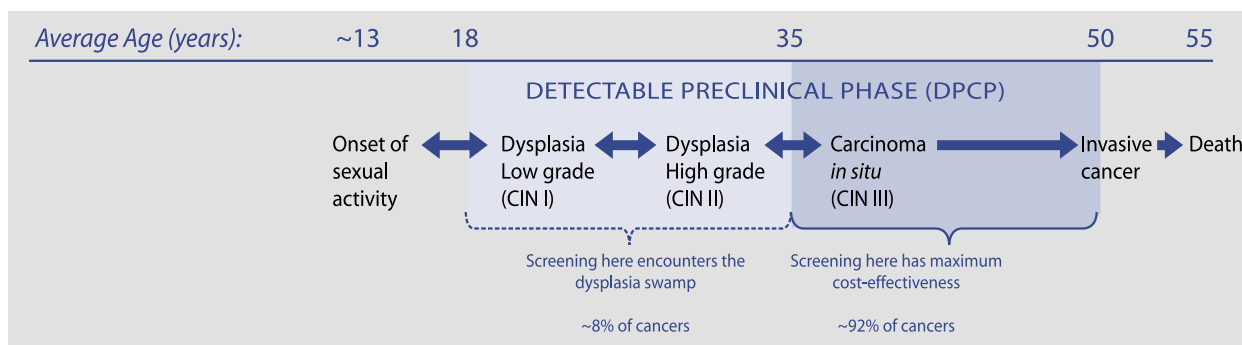
Systematic application of screening in Iceland and Finland during the 1960s sharply reduced cervical cancer in those countries. This contrasts with the slow but steady increase of cervical cancer in Norway, where screening was not applied systematically until 1980, and a lesser decline in incidence in Denmark, where screening programmes were introduced gradually.

Quantitative studies have shown that, after one negative cytological smear for cervical cancer, screening once every three to five years accomplishes about the same effect among women of 35–64 years of age as screening every year (Table 5.2). Even screening once every 10 years yields an important reduction in the incidence of invasive cervical cancer. The bottom half of Table 5.2 shows that the effect in the population will be lower if compliance and sensitivity of the test are less than perfect. Nevertheless, such 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 of age. When more resources are available, the frequency of screening should be increased to every 10 and then every 5 years for women aged 35–55 years (WHO, 1986b). Only when this is achieved, is it legitimate to extend screening to younger ages, and rarely below 25 years of age. Programmatic issues, however, required attention (Miller et al., 2000b).

In the national cancer control programme, wherever laboratories to examine the smears and facilities for treatment of abnormalities are available, the initial aim should be to screen every woman aged 35–40 years once. When 80% of women aged 35–40 years have been screened once, screening frequency should increase to 10-yearly and then 5-yearly for women aged 30–60 years, as resources permit. It is important to recognize that efforts to increase both the quality of laboratory tests, and the compliance of the target population are extremely important, as emphasized by the contrast between the upper and lower parts of Table 5.2. Well organized programmes are, therefore, essential (Hakama et al., 1985). Increasing the frequency of

Fig. 5.1 Screening
for cervical cancer

Note: CIN = cervical
intraepithelial neoplasia



screening or extending screening to younger ages does not compensate for deficiencies in laboratory quality and compliance (Miller, 1992).

In several low resource countries, few laboratory facilities providing good quality cervical cytology are available. This makes it impossible to plan cervical cancer screening using cervical cytology. In such settings, low cost approaches are under investigation. Visual inspection of the cervix with acetic acid application to the cervix (VIA) to help detect precancerous lesions appears to be a promising approach. This is conducted by specially trained health workers using a speculum.

According to the report of a WHO consultation (WHO, 2001a): “The test performance of VIA suggests that it has similar sensitivity to that of cervical cytology in detecting CIN (cervical intraepithelial neoplasia), but has lower specificity. Further research is required to improve its specificity without compromising sensitivity. Information from ongoing studies regarding its longitudinally-derived sensitivity, efficacy in reducing incidence/mortality from cervical cancer, its cost-effectiveness and safety will be useful in formulating public health policies to guide the organization of VIA-based mass population-based screening programmes in developing countries.

It is not known whether cost-savings with a cheap test like VIA might be offset by the referral and investigation of a higher proportion of women who screen positive using this procedure. Since a programme based on VIA involves a certain level of over-treatment, the efficacy, safety and long-term consequences of such a programme also remain to be fully addressed. Thus, information from ongoing studies on these issues will be crucial to judge how appropriate and feasible it will be to introduce VIA-based cervical cancer screening programmes on a population-wide basis in low-income countries.” (WHO 2001a)

There is increasing interest in the use of HPV DNA testing for screening, and an international evaluation of the test is under way. Especially for women over the age of 35 years, a negative HPV test could imply that there is no need to screen for 5 or even 10 years. The test, however, requires somewhat sophisticated technical resources, and is not yet ready for routine application within a national cancer control programme. A WHO Consultation (WHO, 2001a) reached the following conclusion: “In middle income countries with some laboratory skills and limited impact of cytology based screening practices, HPV DNA tests as the primary screening test may offer an alternative for the reduction in incidence of cervical cancer. Ongoing research

Table 5.2 Reduction in the cumulative rate of invasive cervical cancer for women aged 35–64 years, with different frequencies of screening

(a) Assuming 100% compliance and a highly sensitive test

Frequency of screening	Percentage reduction in cumulative rate	No. of tests
Yearly	93	30
2-yearly	93	15
3-yearly	91	10
5-yearly	84	6
10-yearly	64	3

Source: Miller AB. (1992) Cervical cancer screening programmes: managerial guidelines. Geneva, World Health Organization.

(b) After correcting for lesser compliance (80%) and reduced sensitivity in practice

Frequency of screening	Percentage reduction in cumulative rate	No. of tests
Yearly	61	30
2-yearly	61	15
3-yearly	60	10
5-yearly	55	6
10-yearly	42	3

should provide data on the cost benefit balance of screening programmes that adopt HPV as a stand-alone screening test. Final proof of the capacity to reduce the incidence of cervical cancer can only be provided by carefully conducted intervention trials.”

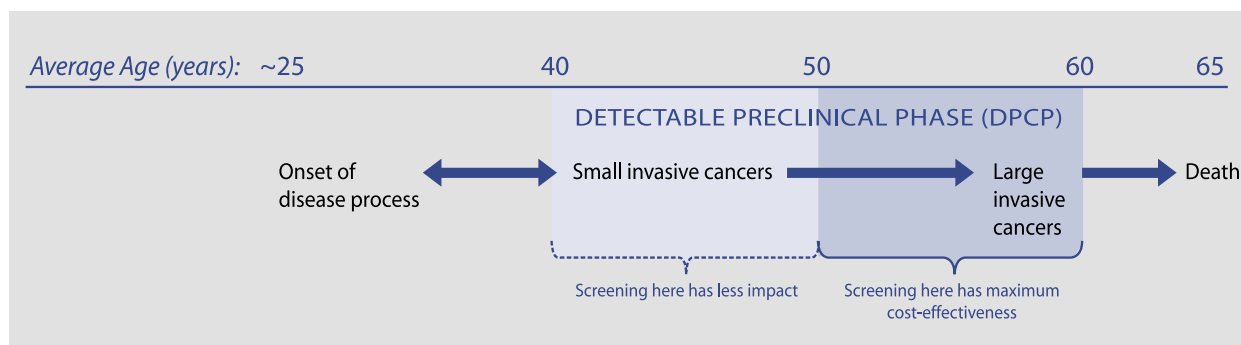
Screening for breast cancer

Breast cancer is the most common cancer among women worldwide, and there are several possible methods for screening.

If facilities are available, screening by mammography alone, with or without physical examination of the breasts, plus follow-up of individuals with positive or suspicious findings, will reduce mortality from breast cancer by up to one-third among women aged 50–69 years (IARC, In press). Much of the benefit is obtained by screening once every 2–3 years. There is limited evidence for its effectiveness for women 40–49 years of age (IARC, In press)(see Figure 5.2). The Health Insurance Plan (HIP) study, which used physical examinations by surgeons, suggested benefits in younger women only after they had reached their fifties (Shapiro, 1997). A cohort study in Finland suggested breast self-examination to be of benefit at all ages (Gastrin et al., 1994), as did a case-control study in Canada (Harvey et al., 1997). However, observational studies of these latter types cannot exclude selection bias and may overestimate benefit. A randomized trial of breast self-examination in China has not found any evidence of reduction in breast cancer mortality after long-term follow-up (IARC, In press). This suggests that a programme to encourage breast self-examination alone would not reduce mortality from breast cancer. Women should, however, be encouraged to seek medical advice immediately if they detect any change in a breast that suggests breast cancer.

Unfortunately, mammography is an expensive test that requires great

Fig. 5.2 Screening
for breast cancer



care and expertise both to perform and in the interpretation of results. It is therefore currently not a viable option for many countries. Although there is inadequate evidence that physical examination of the breasts as a single screening modality reduces mortality from breast cancer (IARC, In press), there are indications that good clinical breast examinations by specially trained health workers could have an important role. These come from the HIP study where mammography detected a low proportion of breast cancers, especially in women under the age of 50 (Shapiro, 1997), yet breast cancer mortality was reduced. Similarly, in the Canadian National Breast Screening Study, where the addition of mammography to such examinations in women aged 50–59 did not result in a reduction in breast cancer mortality (Miller et al., 2000a).

Given the present level of evidence, the national cancer control programme should not recommend screening by breast self-examination and physical examinations of the breast. Rather, the programme should encourage early diagnosis of breast cancer, especially for women aged 40–69 years who are attending primary health care centres or hospitals for other reasons, by offering clinical breast examinations to those concerned about their breasts and promoting awareness in the community. If mammography is available, the top priority is to use it for diagnosis, especially for women who have detected an abnormality by self-examination. It should be borne in mind, however, that cancer may be present even if the mammogram is negative. Mammography should not be introduced for screening unless the resources are available to ensure effective and reliable screening of at least 70% of the target age group, that is, women over the age of 50 years.

In determining the relative priorities for different screening programmes, it is important to recognize that breast cancer screening is intrinsically less effective than cytological screening for cervical cancer. As a rough guide, screening will produce an equivalent reduction in numbers of deaths in the two conditions only if, in the absence of screening, breast cancer mortality is three times that of cervical cancer in the age groups concerned.

Screening for colorectal cancer

Evidence to suggest that sigmoidoscopy may be effective for colorectal cancer screening, with benefits lasting for up to ten years, has come from two case-controlled studies (Selby et al., 1992; Newcomb et al., 1992). As such studies cannot eliminate the effect of selection bias, however, this benefit may have been overestimated. Trials are now under way to evaluate flexible sigmoidoscopy and colonoscopy for screening.

Several trials have evaluated the effect of the faecal occult blood test (FOBT). A trial in Minnesota, United States of America, used the FOBT

annually in one group and biennially in another. This initially indicated that annual, but not biennial, FOBTs reduce mortality from colorectal cancer after about a ten year period (Mandel et al., 1993). A more recent report, with follow-up for up to 18 years, showed mortality reduction at a lower level from biennial screening (Mandel et al., 1999). Trials in Europe also showed mortality reduction from biennial screening (Hardcastle et al., 1996; Kronborg et al., 1996).

It is clear that a major difficulty with screening using the FOBT is lack of specificity, especially if the test is rehydrated, which substantially increases the costs of programmes. Further, there seems to be a lack in sensitivity for detecting adenomas. Taken together, the FOBT trials suggest that, after an interval of about 10 years, there could be a reduction of up to 20% in colorectal cancer mortality from biennial screening, and a greater reduction as a result of annual screening. Unless high compliance with the test can be achieved, however, the benefit that could be obtained in the general population would be much less, and not commensurate with the expense of the screening programme.

Screening for prostate cancer

Screening for prostate cancer using the digital rectal examination (DRE) is often recommended, but DRE is not a sensitive screening test for early disease. Other screening tests include the prostate specific antigen (PSA) and trans-rectal ultrasound. PSA screening has been widely introduced in the United States, with an initial major increase in the incidence of the disease, and a subsequent reduction. It is not yet clear if such screening reduces the mortality from the disease.

There are many obstacles in the way of an effective screening programme for prostate cancer because of the increasing frequency of latent prostate carcinoma with increasing age and the not inappreciable morbidity and mortality of the radical procedures usually used to treat prostate cancer. It is necessary to establish the effectiveness of screening programmes for prostate cancer by performing well-designed randomized trials, before making any recommendation for public health policy (International Prostate Screening Trial Evaluation Group, 1999). Such trials are underway.

Screening for oral cancer

Early detection (as distinct from organized screening) of oral cancer using visual inspection of the mouth is being considered in countries where incidence is high, such as Bangladesh, India, Pakistan, and Sri Lanka (Sankaranarayanan et al., 2000). The oral cavity is easily accessible for

routine examination, and nonmedical personnel can readily detect lesions that are the precursors of carcinoma (WHO, 1984). Furthermore, there are indications that precursor lesions may regress if tobacco use ceases (see Figure 5.3), and that surgical treatment of early oral cancer is very effective. Experience in south-east Asia has demonstrated under field conditions that primary health care workers can examine large numbers of people, and detect and classify precancerous lesions and cancers of the oral region with acceptable accuracy. Some programmes have also encouraged early detection of oral cancer by self-examination using a mirror (Mathew et al., 1995). However, so far it has not been shown that detection of precancerous lesions or early cancers can reduce mortality from the disease.

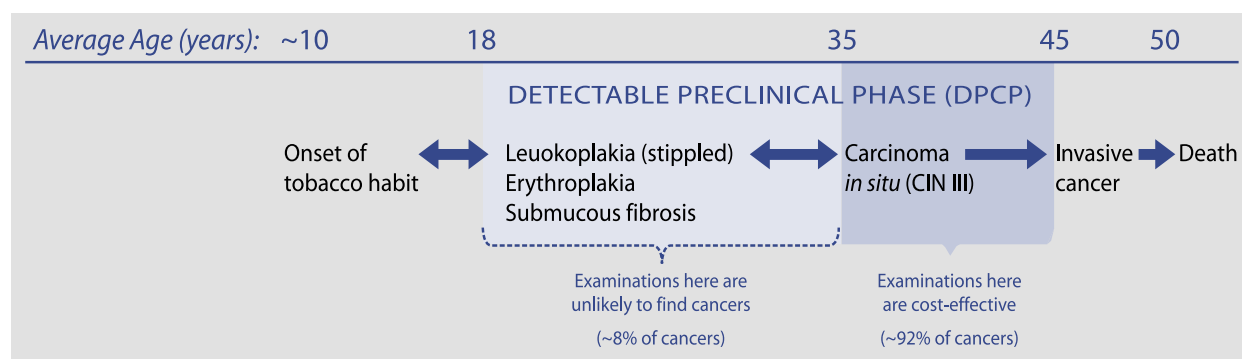
Screening for cancer at other sites

Where the incidence of stomach cancer is very high, for example, in Japan, a special radiographic technique may be useful in screening (Miller et al., 1990). The technique is expensive, and has so far only been used in Japan.

Screening for lung cancer has been attempted with X-ray and cytological examinations, but investigations have failed to establish its effectiveness (Prorok et al., 1984). Interest has now been raised in the possibility that helical CT scanning may detect lung cancers early (Henschke et al., 1999). The spectrum of cancers detected is, however, unusual (the vast majority are adenocarcinomas), and randomized trials are required before this technique is recommended for adoption.

Because there is an association between melanoma and the presence of numerous skin naevi (moles), systematic self-inspection of the skin could be useful in early detection of this form of skin cancer. Excision and biopsy of naevi that are apparently undergoing malignant transformation might help

Fig. 5.3 Early detection of oral cancer



prevent fatalities from the disease, but have not yet been proved effective (Miller et al., 1990).

Where the incidence of bladder cancer is high, for example in areas in which schistosomiasis is endemic or among people who have been occupationally exposed to carcinogens, screening with urinary cytology has been advocated. The value of this technique may be limited, however, because *in situ* lesions may involve a substantial portion of the bladder lining and be difficult to treat (Prorok et al., 1984).

In Chinese populations, with a high incidence of nasopharynx cancer, early cancers can be detected by screening for high levels of certain antibodies to the EBV virus. (IARC, 1997). It is not clear how effective this may be in reducing mortality from the disease.

RECOMMENDED EARLY DETECTION POLICIES FOR VARIOUS RESOURCE LEVELS

Early diagnosis (already symptomatic populations)

As part of a national cancer control programme, all countries should promote awareness of the warning signs for those cancers that display signs and symptoms early in the evolution of the disease. The public should be educated about the changes to watch for, and what to do if they notice these signs. Health workers should be trained to recognize early cancer cases, and refer them rapidly to places where the disease can be diagnosed and treated. Cancer sites amenable to early diagnosis include: oral cavity, larynx, colorectum, skin, breast, cervix, urinary bladder, and prostate (see Table 5.3).

In low-resource settings, low cost and effective community approaches should be used in

Table 5.3
Recommended
policies for early
detection of
selected cancers
in health services

Site of cancer	Recommendation for early detection	
	Warning signs	Screening
Oral cavity	Yes	No
Nasopharynx	Yes	No
Oesophagus	No	No
Stomach	Yes	No
Colon/rectum	Yes	No
Liver	No	No
Lung	No	No
Skin melanoma	Yes	No
Other skin cancers	Yes	No
Breast	Yes	Yes
Cervix	Yes	Yes
Ovary	Yes	No
Urinary bladder	Yes	No
Prostate	Yes	No

the first phase to promote early diagnosis of one or two priority detectable tumours. This approach should be adopted initially in a pilot area with relatively good access to diagnosis and treatment.

Countries with medium levels of resources should use low-cost and effective community approaches to promote early diagnosis of all priority detectable tumours.

Countries with high levels of resources should use comprehensive nationwide promotion strategies for early diagnosis of all highly prevalent, detectable tumours.

Screening (asymptomatic populations)

Where level of incidence of the cancer justify it, and the necessary resources can be made available, screening for cancers of the breast and cervix is recommended. This is feasible mainly in medium- and high-resource level countries. Screening for other cancer sites must be regarded as experimental and cannot be recommended at present as public health policy. All countries implementing screening policies should consider the programmatic factors that determine whether or not the programmes achieve effectiveness and efficiency.

In low-resource countries, if there is already infrastructure for cervical cytology screening, the recommendation is to provide high coverage of effective and efficient cytology screening for women 35–40 years old once in their lifetime or, if more resources are available, every 10 years for women 30–60 years old.

Low-income countries that do not have screening facilities should be discouraged from initiating cytology screening. They should wait until the cost-effectiveness of a low cost approach (VIA) is demonstrated.

Countries with medium levels of resources should aim to provide national coverage by cytology screening for cervical cancer at 5-year intervals to women 30–60 years old.

Countries with high levels of resources should reinforce and improve the performance of national screening for cervical cancer and breast cancer if those cancers are common.

DIAGNOSIS AND TREATMENT OF CANCER

6

DIAGNOSIS OF CANCER

The first step in cancer management is to make an accurate diagnosis. This calls for a combination of careful clinical assessment and diagnostic investigations, including endoscopy, histopathology, imaging, cytology, and laboratory studies. Early cancer diagnosis increases the possibility of cure in many, but not all cancers, and reduces the morbidity resulting from the disease and treatment.

Efforts must be made to obtain adequate and appropriate material for cytological or histopathological examination. Relevant clinical information must accompany the material. Light microscopic examination of formalin fixed and haematoxylin and eosin (H & E) stained slides remains the benchmark for histopathological examination. Giemsa's method is the benchmark for haematology. There are few exceptions to the need for histological confirmation before radical management is undertaken.

Cancer diagnosis may be made by direct visualization of the area concerned, for example, by bronchoscopy, oesophagoscopy, mediastinoscopy, colonoscopy, or colposcopy. Even though the tissue appears malignant, a biopsy must be performed to confirm malignancy. Tissue biopsy can be obtained using a fine needle (fine needle aspiration biopsy – FNAB), by a gross needle (core) biopsy, or by total (excisional) or subtotal (incisional) biopsy.

Once a diagnosis is confirmed, it is necessary to undertake further assessment of the patient to ascertain the extent of cancer spread (staging). The goals of cancer staging are:

- to aid in the choice of therapy;
- for prognostication;
- to facilitate the exchange of communication (global communication);
- to determine when to stop therapy;
- to standardize the design of research treatment protocols.

TREATMENT OF CANCER

Treatment should be considered as one component of the national cancer

control programme. While the basic principles of treatment are the same throughout the world, the emphasis accorded to treatment will depend upon local patterns of the disease, that is, the commonest types of cancer and the relative proportions of early and late stages. These proportions result not only from prevailing circumstances, but also from the success of early detection and screening programmes for those cancers for which early detection is feasible, affordable and effective. The specific treatment approaches adopted in each country will also depend on the availability of human, physical, and financial resources, as well as the political will to make changes. Decisions on therapies to be offered, and in particular which types of patients should be referred to oncology treatment centres, should preferably be made by a treatment committee designated within the management structure of the national cancer control programme.

The primary goals of cancer treatment are:

- cure;
- prolongation of useful life;
- improvement of quality of life.

Cure in this instance is defined as the attainment of normal life expectancy and has three important components:

- recovery from all evidence of disease (complete remission);
- attainment of a stage of minimal or no risk of recurrence or relapse;
- restoration of functional health (physical, developmental and psychosocial).

In health care, the values that are treasured include autonomy, dignity, prevention of complications of disease, access, justice, cost control, and equity in provision of care. It is important to consider the limitations of cancer therapy in order to avoid expenditure on large treatment centres that serve only a fraction of the population, and deflect resources from areas where they could be used more effectively. Although cure of many common cancers (for example, of the lung and stomach) is not generally possible, curative and palliative treatments are not mutually exclusive. Increasingly, treatment choices will include coordinated curative and palliative elements, evaluated biologically, socioeconomically, and spiritually (see Chapter 7).

Aims and limitations of treatment for cancer

The principal methods of treatment are surgery, radiotherapy, chemotherapy (including hormonal manipulation), and psychosocial support. Although each has a well-established role and can cure some types of cancers, multidisciplinary management is more effective than sequential independent management of the patients. Combined modality approaches result in more

cures and improved organ and function preservation. For instance, breast cancers, bone sarcomas and paediatric tumours are now largely treated by combined modalities, and this effects more cures and requires less radical surgery than when single modalities were used. Surgery and radiotherapy are suitable for local and regional disease, and may effect cures in the early stages of cancer, especially when there is an early detection policy. In patients with extensive but localized tumours, surgery and radiotherapy may prove valuable in improving quality of life and potentially in prolonging life. Consideration of their use in such patients must weigh the expected benefits (which will vary with tumour type and stage) against the possible diversion of limited resources from other areas. In general, surgery and radiotherapy have a limited role in the treatment of widely disseminated cancer.

The effectiveness of cancer treatment varies greatly with the site of disease and with a number of social factors. Even within a single country, there may be substantial variation according to such socioeconomic considerations as access to the best available therapy. In some circumstances, it may be appropriate to carry out clinical trials to determine the usefulness of therapy in a particular setting. Such trials should be undertaken only where there are good facilities for data management and where resources are adequate for clinical research.

Except for the surgery of very limited disease or precancer (as for high grade lesions of the uterine cervix), oncological services are dependent on a sound tertiary hospital infrastructure, especially making demands for diagnosis and staging on imaging studies (including, when available, nuclear medicine) and on anatomical pathology and histology.

Role of surgery

Surgery plays an important role in the diagnosis, staging and treatment of local tumours. Even with tumours that show high responsiveness to radiotherapy and chemotherapy, surgery can contribute through removal of tumour masses, palliation and treatment of some complications, such as impending or established pathologic fractures or spinal cord compression. Surgery requires the support of other specialties, including anesthesiology, antibiotic therapy, blood transfusion services, pathology and critical nursing care. The cost-effectiveness of surgery varies according to the stage of disease being treated and, in some patients, the availability of alternative therapies. With early detection programmes, facilities must be available for simple diagnostic and therapeutic surgery at local or district hospitals. Since accurate staging is required in order to limit unnecessary surgery in patients where cure is not possible, reliable diagnostic imaging equipment should be

provided. The primary care team must know where and to whom to refer patients with apparently curable malignancies.

The first step for good surgical practice and cancer care is correct diagnosis. Different biopsy techniques (aspiration biopsy, needle biopsy, incisional biopsy, excisional biopsy) should be learned and be performed by well-trained surgeons. Cytopathologic and histopathologic examination requires professional expertise with a strong background in oncopathology.

In many instances, especially with early diagnosis programmes in place, surgery that encompasses a sufficient margin of normal tissue is sufficient therapy. Surgery can effect cures in early stage solid tumours, such as Dukes A or T₁ colon tumours, early prostate, breast, *in situ* (up to stage IIA) carcinoma of the cervix, oral cavity cancers, and early skin tumours, including malignant melanomas, and does not require high technological approaches. Thus surgical skills and facilities for such surgery should be available at the district level. Although some other cancers, such as oesophagus, lung, liver, and stomach, may be cured by surgery alone, the numbers of early stage patients are very small, and their treatment may make large demands on skills and resources.

The objective of surgery for residual disease post chemotherapy or radiotherapy is to provide local cancer control and better chances for adjuvant therapy. The major benefit of such surgery is related to the availability of adjuvant therapy.

Cytoreduction (surgery for debulking) is critical in certain solid tumors, such as ovarian cancer. Except in rare palliative care settings, there is no role for reductive surgery in patients in whom little other effective therapy is possible. Surgery is rarely indicated for metastatic patients (for example, with solitary metastases to lung, liver or brain).

In oncology emergencies, surgery can relieve bowel obstruction, promote cessation of bleeding, close perforations, relieve compression and provide drainage of ascites or pleural effusions. Each category of emergency is unique and treatment must be individualized.

Surgical techniques for reconstruction and rehabilitation can improve function and cosmetic appearance, thus helping to improve quality of life and sometimes restoring patients to occupational activities. Palliative neurosurgical procedures can provide pain relief and relieve functional abnormalities, and thus improve the quality of life of some patients.

Role of radiotherapy

Radiotherapy ranks with surgery as the most important methods of curing local cancer. Radical radiotherapy can effect cures in head and neck cancers,

cancer of the cervix, prostate and early Hodgkin disease, and a number of unresectable brain tumours of young people.

Radiotherapy is often administered before surgery (preoperative, neoadjuvant), after debulking surgery with gross residual tumour, or after surgery without clear excision margins (adjuvant) when this surgery is undertaken to preserve function. Radiotherapy either facilitates surgery or consolidates surgical gains, and reduces local recurrence following anal and rectal carcinomas, brain tumours, and breast-conserving surgery for breast cancer.

Palliative radiotherapy is of value in life-threatening situations, such as profuse bleeding from a tumour or the superior vena cava syndrome. Radiation also provides effective palliation in cases of pain secondary to bone metastasis, tumours causing bleeding or compressive syndromes, such as spinal cord compression or cerebral metastatic disease.

Radiotherapy is a capital-intensive specialty, requiring high technology equipment and skilled technicians, found only in tertiary centres. Nevertheless, the costs per patient treated are low if the equipment is used optimally, as most of the costs are initial capital expenditure with relatively low running costs or consumables. Thus savings on personnel, that reduce machine use, increase the costs per patient treated to a level far beyond the savings realized.

If radiotherapy is indicated, the patient may be treated using two broad groups of equipment: teletherapy—treatment from a distance; or brachytherapy—treatment with radioactive sources placed temporarily within body cavities or tissues. For both techniques, quality assurance is essential, with demands on imaging and medical physics services.

Teletherapy may be administered by cobalt machines or by accelerators. Both machines serve the same purpose and the clinical outcomes will be identical. Cobalt machines are less expensive and more robust. The dose rate is predictable and minimal checks are required. Maintenance of machines is simple. The source should be changed at regular intervals of about 5–6 years to keep the treatment time as short as possible. A single dose fraction, or a small number of fractions, will often have an appreciable palliative effect and obviate the need for protracted therapy schedules.

Accelerators are more expensive and require sophisticated maintenance and frequent calibration. The requirements for stable electrical power and water supplies are high. In the absence of a service contract, breakdowns of major components may incur significant emergency funding. The higher dose rates that accelerators can provide will reduce treatment times, and they will also permit more exact limitation of the fields, but improved imaging, planning and immobilization are required to realize these advantages. A further advantage is the availability of electrons, which are used in about 15% of all radiotherapy patients in advanced radiotherapy departments, espe-

cially for the treatment of neck nodes, sparing dose to the spinal cord and skin tumours. For the majority of treatable cancers in developing countries, however, accelerators offer little advantage over cobalt therapy.

To ensure optimal use of teletherapy resources, extended treatment days are advantageous. Two shifts, starting at 06.00 extending to 20.00, are feasible and achievable in some countries.

Brachytherapy may be delivered by a number of different devices: low dose rate (LDR) using caesium and high dose rate (HDR) using iridium or cobalt. LDR is predominantly confined to the treatment of cervical cancer. HDR can be used in the treatment of cervical cancer plus other cancers (for example, nasopharynx and oesophagus), reduces the need for hospital bed occupancy, but demands more expertise and has higher costs.

In planning a national cancer control programme, the accessibility of radiotherapy services in the country has to be carefully considered. A single centre may suffice in small countries, or even in large countries with a small population if transport services between centres of population are adequate. In general, however, a network of oncological services will be required, with a radiotherapy centre within each region of a country. In all eventualities, the treatment committee should define which types of patients should be referred for radiotherapy. For those patients living at a distance from the radiotherapy centre, funding will have to be set aside to pay for the costs of transport and accommodation facilities.

The staffing needs of radiotherapy services should also be reviewed. Where possible, training should be undertaken in programmes with patients, training and equipment relevant to the needs of the country. Radiotherapy staff should be required to obtain a registerable qualification.

Role of chemotherapy

Chemotherapy can effect cures in certain cancers. Even when disease is disseminated, chemotherapy can lead to cures in Hodgkin disease and high grade non-Hodgkin lymphomas, including Burkitt lymphomas, in germ cell tumours, leukaemias and limited stage small cell lung cancer. Chemotherapy is also valuable for palliation in many disease states, including metastatic breast cancer, prostate cancer, and low-grade non-Hodgkin disease. Intensive chemotherapy, such as treatment for lymphomas, requires highly trained physicians. The drugs are expensive and their use demands close monitoring of laboratory tests and skilled nursing support. However, some less toxic chemotherapy agents, such as chlorambucil or prednisolone, and hormonal agents, such as tamoxifen, can be given in primary or district level treatment centres.

Adjuvant therapy is treatment given in addition to primary definitive

therapy in the absence of macroscopic residual disease. The goal is to avoid metastases, prolong life, and improve quality of life. Adjuvant chemotherapy and endocrine therapy have been shown to prolong life in breast cancer, while adjuvant chemotherapy has been shown to be of value in colorectal cancers.

Neoadjuvant (induction) chemotherapy has proved useful in osteogenic sarcomas. Clinical trials are under way to ascertain its usefulness in head and neck tumours and in breast cancer.

- Tumours can be categorized in terms of their curability (Table 6.1):
- Category 1 tumours are those for which there is evidence that the use of one drug, or a combination of drugs, alone or in conjunction with other therapeutic measures, will result in the cure of at least some patients.
 - Category 2 tumours are those where the average survival is prolonged when chemotherapy is used as an adjuvant to surgery or radiotherapy in the early stages of disease.
 - Category 3 tumours are those for which there is evidence that the use of a single drug or combination of drugs will cause tumour shrinkage and possibly improvement in the quality of life; survival may be prolonged, but this may be of short duration.
 - Category 4 tumours are those where local control may be improved by the use of chemotherapy before, during or after surgery or radiotherapy.
 - Category 5 tumours are those for which there are currently no effective drugs. Although some drugs have been shown to cause a degree of tumour shrinkage, the effect is so marginal that quality of life is unlikely to be improved in any but extremely rare instances, and is more likely to be compromised; survival time of patients with category 5 tumours may even be shortened by chemotherapy.

More than 100 cytotoxic drugs are currently available. WHO has established a list comprising 17 drugs that, on the basis of their cost-effectiveness and life-saving potential, are needed to treat the 10 most common cancers or category 1 or 2 cancers (Sikora et al., 1999) (Table 6.2). This list of drugs should form the basis of national policies concerning the chemotherapy to be offered in the light of the

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Table 6.1
Categorization of tumours in terms of their curability with chemotherapy or hormone therapy

Category 1 – Curative	
Germ-cell cancers	Trophoblastic cancers
Acute lymphoblastic leukaemia	Acute myeloid leukaemia
Acute promyelocytic leukaemia	Hairy-cell leukaemia
Hodgkin disease	Non-Hodgkin lymphoma
Category 2 – Adjuvant	
Breast cancer	Colorectal cancer (Dukes C)
Ovarian cancer	Osteosarcoma
Ewing sarcoma	Neuroblastoma
Retinoblastoma	Soft tissue sarcoma
Wilm tumour	
Category 3 – Palliative	
Small-cell lung cancer	Non-small-cell lung cancer
Chronic lymphocytic leukaemia	Chronic myelogenous leukaemia
Anal cancer	Bladder cancer
Endometrial cancer	Prostate cancer
Kaposi sarcoma, non-HIV	Oesophageal cancer
Indolent AIDS-related lymphoma and Kaposi sarcoma	Head and neck cancer
Cervical cancer	Stomach cancer
Category 4 – Neoadjuvant	
Oropharyngeal cancer	Nasopharyngeal cancer
Category 5 – Ineffective	
AIDS-related central nervous system lymphoma	Hepatobiliary cancers
Melanoma	Pancreatic cancer
Renal cell cancer	Thyroid cancer
	Central nervous system cancers

Source: Sikora K. et al. Essential drugs for cancer therapy. *Annals of Oncology*, 1999, 10:385-390

cancer problem in the country concerned. Generic forms of these drugs are available, though confirmation of their biological activity is essential.

Development of a treatment policy

It is important to underscore the close link between early detection and treatment. An excellent screening programme would be inappropriate without effective treatment measures. Similarly, it is not useful to develop treatment capacity without encouraging early detection.

The application of effective treatment policies requires a “team” approach in which social workers and family members, as well as health care professionals, provide specific and supportive care for patients with cancer. Education of the patient and family members should thus be considered as components of the management of cancer.

The development of a treatment policy as part of the national cancer control programme requires the establishment of a treatment subcommittee, chaired by a member of the cancer control programme committee. All relevant health care professions should be represented on the subcommittee;

membership should therefore include a radiotherapist, surgeon, chemotherapist, nurse, and social worker. Since treatment policy will depend on the predominant forms and stages of cancer and the available resources, epidemiologists and representatives of the health ministry should either become permanent members of the subcommittee or provide relevant information to the subcommittee, such as information on the predominant types and stages of cancer in the geographical region concerned.

The treatment subcommittee should set specific targets, so that progress in the establishment and implementation of the national cancer control programme can be measured. These may include short-term goals,

Table 6.2
Essential drugs
for oncology and
their indications

Drug	Top 10 cancers	Category 1 or 2 tumours
Bleomycin	+	+
Chlorambucil	+	+
Cisplatin	+	+
Cyclophosphamide	+	+
Doxorubicin	+	+
Etoposide	+	+
5-Fluorouracil	+	+
Methotrexate	+	+
Prednisolone	+	+
Procarbazine		+
Tamoxifen	+	+
Vinblastine	+	+
Vincristine	+	+
Cytarabine		+
Dactinomycin		+
Daunorubicin		+
6-Mercaptopurine		+

Source: Sikora K. et al. Essential drugs for cancer therapy.
Annals of Oncology, 1999, 10:385–390

such as the establishment of treatment guidelines for specific cancers, and longer-term goals, such as the collection of data that allow measurement of the success of the treatment policy. Guidelines for treatment of each stage of each cancer should be established, based on realistic estimates of the chance of cure, as well as the availability of resources. For example, in early cervical cancer, since there is no evidence to show whether surgery or radiotherapy produces the better outcome, the recommended treatment may depend upon the availability and expected use of surgical and radiotherapy resources for other major tumours in the region. Even when a particular method of treatment has been shown to be superior, a less effective method might still be legitimately chosen if it leads to more efficient overall use of resources and ultimately to greater success in saving lives or improving the quality of life. At all times, allocation of resources should give precedence to patients with the highest potential for cure over those with incurable or probably incurable tumours, who should be identified for palliative care (Table 6.3).

It is more cost-effective to treat with curative intent cervix, breast, oral cavity, and colon cancers than lung, liver, stomach, and oesophagus, as in the latter group all modalities are largely ineffective, especially for advanced disease (Table 6.4). Stage by stage, treatment is as effective in the elderly as the young, though clearly the potential years of life gained are greater for the young than the old, and as the old have more co-morbidity, treatment will be tolerated better by the young. With the information currently available, the following cost-effective policy guidelines can be suggested:

- Use existing referral systems to provide treatment for patients with early stage tumours that are potentially curable, as for example of the cervix, breast, oral cavity, and colorectal cancers.

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Table 6.3 Five-year relative survival (%) for all stages of cancer of various sites in cases diagnosed in the United States of America (whites), Europe, and the range for developing countries

Site of cancer	USA (white)		Europe 1985–1989 ¹		Developing countries ²
	1974–1986	1986–1991	Males	Females	1982–1992
Oesophagus	9.4	12.7	7.4	12.2	3.3–26.5
Stomach	16.8	19.5	19.3	23.6	7.5–28.2
Colon	55.2	62.5	46.8	46.7	29.1–45.4
Rectum	53.9	61.8	42.6	42.9	22.6–45.7
Liver	6.5	10.3	4.6	4.7	0.6–12.9
Pancreas	4.2	5.6	4.1	3.9	2.5–7.2
Lung	14.6	15.7	8.9	9.9	3.2–13.8
Skin melanoma	81.5	87.2	68.2	81.4	39.2–47.0
Breast (Females)	76.1	83.6		72.5	44.1–72.7
Cervix	68.2	70.1		61.8	28.0–64.9
Corpus uteri	88.8	88.2		73.2	58.7–76.7
Ovary	45.1	53.2		32.9	33.6–45.0
Prostate	75.3	88.9	55.7		34.5–45.9
Bladder	81.1	86.1	65.2	59.7	23.5–66.1
Kidney	56.4	64.0	47.7	49.3	19.1–49.2
Hodgkin disease	77.3	79.6	70.7	73.1	30.5–59.0
Non-Hodgkin lymphoma	55.7	54.2	45.2	48.4	17.7–37.4
Leukaemia	39.9	48.1	33.5	35.3	4.7–22.6

1 Source: Berrino F. et al., eds. *Survival of cancer patients in Europe: the EURO-CARE-2 Study*. Lyon, International Agency for Research on Cancer, 1999 (IARC Scientific Publications, No. 151).

2 Source: Sankaranarayanan R., Black R.J., Parkin D.M., eds. *Cancer survival in developing countries*. Lyon, International Agency for Research on Cancer, 1998 (IARC Scientific Publications, No. 145).

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Treatment of
Cancer*

- Refer children and young adults with leukaemia, lymphoma, brain and germ cell tumours to tertiary centres where they can optimize their chances of cure.
- Provide cheap oral drugs, such as tamoxifen, for metastatic breast cancer at primary levels.
- Provide supportive care facilities and centres for pain management for the majority of cancers that are incurable. These facilities should be community-based, and staffed by community members. Most of the activities should be undertaken on an out-patient basis. If possible, facilities for the terminally ill should be made available.

Development of a follow-up policy

Some cancers may need regular reviews at a referral or a specialist cancer centre, while others can be adequately reviewed and followed up by the family physician or general practitioner or even a physician assistant or clinical assistant. These health care professionals need to be made aware of what to look for at each follow-up visit and what should prompt referral to a specialist at a referral or a cancer centre. Follow-ups can be labour-intensive, and they may provoke unnecessary anxiety. The follow-up policy and guidelines should depend on the types of cancers commonly seen in a given region or country and the resources available (human, material, and fiscal), as well as on the medico-legal requirements regarding irradiated patients. Such guidelines should specify the tests to be performed at each visit.

Table 6.4 Various approaches to treatment of common cancers, taking into consideration biology, stage on presentation, combined therapies, applicability in developing countries, and other prognostic factors

CANCER	Early detection	Surgery	Radiation	Chemotherapy/ hormonal adjuvant therapy	Neoadjuvant therapy	Palliative care
Mouth/ Pharynx	+	++	+++	+	–	+++
Oesophagus	–	+	++	–	–	+++
Stomach	+	+	–	–	–	+++
Colon/ Rectum	++	+++	++	+++	–	+++
Liver	–	+	–	–	–	+++
Lung	–	+	++	–	–	+++
Breast	+++	+++	++	+++	–	+++
Cervix	+++	++	+++	–	–	+++

Key: – = no role; + = small role; ++ = modest role; +++ = major role

Development of referral policies

Efficient implementation of the treatment policy will require careful consideration of the health system organization and distribution of resources, and the establishment of clear guidelines on referral between the various levels of treatment centres in the region. Triage of patients is essential at the time of initial referral: decisions must be made on whether to undertake comprehensive evaluation with a view to therapy (if this is feasible) or to provide palliative care. For each form of cancer, tumours that are considered to be curable in a high proportion of cases, those curable in a lower proportion of cases, and those that are incurable must be clearly identified, and optimal specific treatment or palliative care defined for each. Where resources are inadequate to treat the expected numbers of patients in these categories, the treatment subcommittee may either request additional resources or modify the treatment approach, for example by reducing the number of radiotherapy treatments, accepting a minor reduction in efficacy in order to treat more patients within a given period of time. In general, the more limited are the available resources, the greater should be the emphasis on outpatient treatment, short-duration therapy, and radiotherapy or surgery without chemotherapy. With respect to policy on chemotherapy, it may be advantageous to use the same treatment protocol for several diseases, for example, 5-fluorouracil or a combination of drugs such as 5-fluorouracil and etoposide for all cancers of the upper gastrointestinal tract in which adjuvant therapy is deemed appropriate.

Decisions on the potential for curative therapy need to be made at the primary care level. It is pointless to refer a patient to a major hospital centre if all that can be offered there is palliative care. However, once a decision has been made to refer a potentially curable patient, there should be some means of ensuring that he or she does in fact attend the treatment centre, otherwise the potential for cure will be lost. This is particularly critical for patients identified as a result of early diagnosis or screening programmes.

Within the national cancer control programme guidelines should be established for integrating treatment resources with early diagnosis and screening programmes, and for providing optimal therapeutic management of the most frequently occurring cancers. The management guidelines should specify essential treatments according to the curability of the disease, coverage of patients by available types of therapy, and analysis of the cost-effectiveness of the various approaches.

Compliance

The effectiveness of treatment can be drastically reduced due to poor com-

pliance with therapy. Poor compliance negatively affects health outcomes while increasing health care costs. Factors that influence the rate of compliance include the patient, the health-care team, illness and treatment, and the health system. WHO is currently developing a cost-effective, comprehensive set of strategies to improve compliance (adherence), for inclusion as a routine component of health care for all patients.

Psychosocial services

For those diagnosed with cancer, psychosocial services should be available and should include the assessment of patients for the presence of anxiety and depression, support to help patients adhere to treatment plans, skill building for coping with cancer stress and basic emotional support. For those with clinical range anxiety or depression, care should be available to help ameliorate symptoms. Psychosocial support should also be available for families of cancer patients and staff members who treat cancer patients.

Rehabilitation

Physical, psychological and social rehabilitation aims at improving the quality of life of persons with impairments due to cancer by assisting them to recover their ability to perform everyday activities to live as independently as possible. The type and intensity of the rehabilitation depends on the type and severity of the impairment, and the type and magnitude of the treatment provided. The characteristics of the person and the social environment are also important factors determining the nature of rehabilitation. In general terms, physical and psychological rehabilitation should be provided as early as possible after treatment and within the community where the person lives. Rehabilitation should include support for mobility, self-care, emotional well being, spirituality, vocational pursuits and social interactions.

Some ethical considerations in cancer treatment

Important ethical principles to consider when treating cancer are autonomy and distributive justice. Respect for patients' autonomy necessitates that they be given the opportunity to make choices. However, the disclosure of information to allow for truly informed consent, as is demanded by most developed countries, is not universally accepted and caregivers need to be sensitive to, and respect the values of their patients, especially if they are from different cultural backgrounds. Equitable distribution of resources is an important ethical concern in cancer treatment. The equipment and drugs are both expensive and likely to consume a large component of the

health care budget, sometimes for only a few patients (e.g. bone marrow transplantation). The role of the care professional is no longer only to act as an advocate for the individual patient, but as much a gatekeeper of resources for the entire population. For instance, local preferences might be for the use of scarce resources to treat a form of cancer that is relatively uncommon, but for which there is a good chance for cure, as is the case with Burkitt lymphoma in some parts of Africa. Alternatively, local values may dictate that resources be directed in the management of tumours that are common, though incurable, and therefore the provision of palliative care facilities would be given precedence. These considerations should also take account of the problems that may arise with the use of treatments that rely on advanced technology. If such technology is imported from developed countries into less developed areas, due regard should be taken of local circumstances, and for the need for medical and technical personnel trained in its use.

PRIORITY ACTIONS FOR CANCER TREATMENT ACCORDING TO RESOURCE LEVELS

All countries should ensure the accessibility and effectiveness of diagnosis and treatment services by establishing evidence-based clinical and management guidelines, an essential drugs list, good referral, follow-up and evaluation systems, and continuous training of the different health professionals involved. Furthermore, guidelines should emphasize the avoidance of offering curative therapy when cancer is incurable, and patients should be offered palliative care instead.

Countries with low or medium levels of resources should organize diagnosis and treatment services to give priority to common, early detectable tumours, or to those with high potential for cure.

Countries with a high level of resources should reinforce the development of comprehensive cancer treatment and palliative care centres that are especially active for clinical training and research, and that can act as reference centres within the country as well as at the international level.

As in other fields of medicine, palliative care for cancer patients has progressed over the past decade. The earlier WHO definition of palliative care stressed its relevance to patients not responsive to curative therapy (WHO, 1990b). This statement might be interpreted as relegating palliative care to the last stages of care. Today, however, there is wide recognition that the principles of palliative care should be applied as early as possible in the course of any chronic, ultimately fatal illness. This change in thinking emerged from a new understanding that problems at the end of life have their origins at an earlier time in the trajectory of disease. Symptoms not treated at onset become very difficult to manage in the last days of life. People do not “get used to” cancer pain; rather, chronic unrelieved pain changes the status of the neural transmission of the pain message within the nervous system, with reinforcement of pain transmission, and activation of previously silent pathways.

Symptoms not only influence quality of life, but also influence the course of disease. Pain can kill (Liebeskind, 1991), and so can depression (Wulsin, 2000). Cachexia either directly accounts for the deaths of millions of patients each year, or serves as a major contributory cause (Tisdale, 1997). These symptoms are associated with a chronic stress reaction characterized by aberrations in cytokine production (Dunlop, Campbell, 2000) and activation of the neuroendocrine-hypothalamic systems. Unregulated cytokine production adversely affects many symptoms common in cancer patients, and can enhance tumour progression (Dunlop, Campbell, 2000). Therefore, impeccable control of symptoms throughout the course of illness may have an impact not only on quality of life, but also on length of life, through mediation of the cytokine–stress reaction associated with symptoms.

WHO DEFINITION OF PALLIATIVE CARE

Palliative care is an approach that improves the quality of life of patients and their families facing the problem associated with life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial and spiritual. Palliative care:

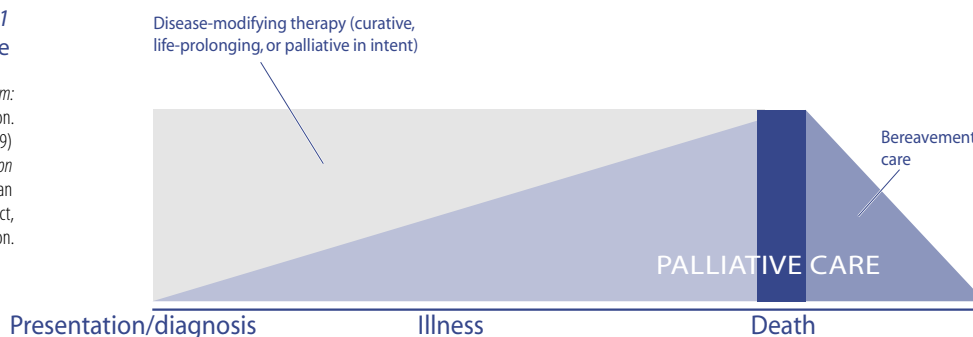
- provides relief from pain and other distressing symptoms;
- affirms life and regards dying as a normal process;
- intends neither to hasten or postpone death;
- integrates the psychological and spiritual aspects of patient care;
- offers a support system to help patients live as actively as possible until death;
- offers a support system to help the family cope during the patient's illness and in their own bereavement;
- uses a team approach to address the needs of patients and their families, including bereavement counselling, if indicated;
- will enhance quality of life, and may also positively influence the course of illness;
- is applicable early in the course of illness, in conjunction with other therapies that are intended to prolong life, such as chemotherapy or radiation therapy, and includes those investigations needed to better understand and manage distressing clinical complications.

A continuum of care associated with palliative care is described graphically in Figure 7.1. Therapy intended to modify the disease declines as the illness progresses. The provision of palliative care increases as the person nears the end of life and provides support for the family during this entire period. After the patient dies, bereavement counselling for family and friends is also important.

The quality of life dimensions of palliative care are illustrated in Figure 7.2. Palliative care is concerned with not only all aspects of the patient's needs, but also the needs of the family and of the health care providers.

Figure 7.1
Continuum of Care

Adapted from:
American Medical Association.
Institute for Medical Ethics (1999)
*EPEC: education for physicians on
end-of-life care*. Chicago, Ill: American
Medical Association: EPEC Project,
The Robert Wood Johnson Foundation.



WHO DEFINITION OF PALLIATIVE CARE FOR CHILDREN

Pain Relief and
Palliative Care

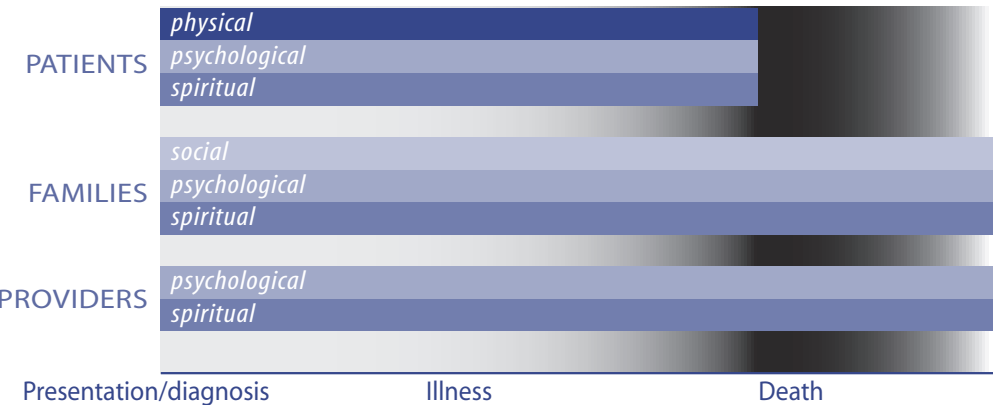
Palliative care for children represents a special, albeit closely related field to adult palliative care. WHO’s definition of palliative care appropriate for children and their families is as follows; the principles also apply to other paediatric chronic disorders (WHO, 1998a):

- Palliative care for children is the active total care of the child’s body, mind and spirit, and also involves giving support to the family.
- It begins when illness is diagnosed, and continues regardless of whether or not a child receives treatment directed at the disease.
- Health providers must evaluate and alleviate a child’s physical, psychological, and social distress.
- Effective palliative care requires a broad multidisciplinary approach that includes the family and makes use of available community resources; it can be successfully implemented even if resources are limited.
- It can be provided in tertiary care facilities, in community health centres and even in children’s homes.

Medicine has always emphasized early recognition of a problem in order to alleviate it or prevent its full development. Similarly, palliative care should be recognized as an exercise in prevention—prevention of ultimate suffering through prioritizing the diagnosis and skilful management of sources of distress, both in the form of physical symptoms and of psychosocial and spiritual concerns, at the earliest possible moment (MacDonald, 1991).

The acceptance of the integral role of palliative care in the management of cancer, AIDS and other noncommunicable and ultimately fatal disorders, will enhance its overall understanding and support by the community, political leaders, and health professionals alike.

Figure 7.2
Quality of life
dimensions of
palliative care



RELEVANCE

Despite an overall 5-year survival rate of nearly 50% in developed countries, the majority of cancer patients will need palliative care sooner or later. In developing countries, the proportion requiring palliative care is at least 80%. Worldwide, most cancers are diagnosed when already advanced and incurable (WHO, 1990b).

As discussed in Chapter 3, the incidence and mortality of cancer and of other noncommunicable diseases will increase in the next 20 years. For millions of people, access to palliative care will be the core essential need.

Patients with AIDS, and chronic, ultimately fatal, noncommunicable disorders other than cancer suffer with problems similar to those commonly encountered in cancer patients. Pain, dyspnoea, wasting, confusional states, psychosocial distress, and other devastating symptoms commonly afflict AIDS patients and those with chronic noncommunicable diseases. As symptom etiology (AIDS wasting is a possible exception) is often common across diseases, the principles of palliative care apply across a broad spectrum of disorders. As the roots of suffering in different disorders are common, palliative care programmes must prepare to enrol patients with a wide range of chronic, potentially fatal disorders. This principle is already well represented in paediatric palliative care. This tenet also underlines the importance of cooperation between programmes on cancer, AIDS and noncommunicable diseases to cooperate in the joint development and support of palliative care initiatives.

RESOURCE ALLOCATION

The fundamental responsibility of the health profession to ease the suffering of patients cannot be fulfilled unless palliative care has priority status within public health and disease control programmes; it is not an optional extra. In countries with limited resources, it is not logical to provide extremely expensive therapies that may benefit only a few patients, while the majority of patients presenting with advanced disease and urgently in need of symptom control must suffer without relief.

Throughout the world, governments, medical-nursing societies and nongovernmental organizations have expressed strong support for WHO's definitions of palliative care, and have endorsed the integration of their principles into public health and disease control programmes. Despite this acceptance, a yawning gap is evident between rhetoric and realization. A national disease control plan for AIDS, cancer and noncommunicable

disorders cannot claim to exist unless it has an identifiable palliative care component.

ASSESSMENT

Patients with advanced cancer suffer from multiple symptoms that need to be assessed and charted on a regular basis. This is essential for individual patient care, and as an outcome measure for programme development and evaluation. Simple numeric, verbal, or visual analogue measurement of symptoms has been recognized as an essential component of good palliative care.

Care of the dying extends beyond pain and symptom relief. It also supports the social, psychological and spiritual needs of the patients and their families. Therefore it is important to assess these needs and be able to respond with a holistic approach.

DRUG AVAILABILITY

A palliative care programme cannot exist unless it is based on a rational national drug policy. This policy must include the following elements:

- acceptance of the WHO essential drug list (Sikora, 1999);
- regulations that allow ready access of suffering patients to opioids—this may require licensing of specially trained nurses;
- fair pricing by the pharmaceutical industry—this should include access to essential drugs produced at low cost in developing countries, and inter-country or regional buying arrangements;
- a logistic plan for equitable in-country distribution;
- emphasis on training within professional schools on the application of the essential drugs.

EDUCATION

Education in pain relief and palliative care must be an essential component of training for all health workers who may be expected to treat patients with advanced chronic illness. In this regard, there is a need for guidance by ministries of health, backed up by regulations if necessary. Implementation of pain relief and palliative care measures would have a major impact on the quality of life of patients, but will not happen without strong political motivation and leadership (Stjernswärd, 1993). An example of a training

programme is the Education for Physicians on End-of-life Care (EPEC) Project developed by the American Medical Association in the United States (American Medical Association. Institute for Ethics, 1999).

GOVERNMENT POLICY

The government of each WHO Member State has a responsibility to establish a national policy and programme for pain relief and palliative care. Policy elements include measures to:

- ensure that the palliative care programme is incorporated into the existing health care system;
- ensure that health workers are adequately trained in cancer pain relief and palliative care;
- ensure that equitable support is provided for programmes of palliative care, particularly in the home, and revise national health policies if necessary;
- ensure that hospitals are able to offer appropriate specialist back-up and support for home care;
- ensure the availability of opioid, nonopioid, and adjuvant analgesics, particularly morphine, for oral administration.

COMPONENTS OF PALLIATIVE CARE

Pain relief

Relief from cancer pain can be achieved in about 90% of patients (United States Department of Health and Human Services, 1994). The main obstacles to pain relief in cancer are insufficient availability of opioid drugs, because of regulatory and pricing obstacles, ignorance, and false beliefs. In order to overcome these interrelated problems, a pain relief programme should be established within the broader palliative care programme. Policymakers therefore need to:

- identify and acknowledge the problem;
- be aware that the problem can be addressed using inexpensive drugs;
- define policy aims and goals;
- ensure that specific resources are available for cancer pain relief;
- examine resources available at the primary care level, and ensure that doctors and nurses are aware of the resources available and know how to obtain access to them.

Freedom from cancer pain must be regarded as a human rights issue (WHO,

1998b). Unrelieved pain in cancer patients is unacceptable because it is generally avoidable (see Box 7.1). The WHO cancer pain relief programme calls for:

- the establishment of a global network to disseminate knowledge of what can be done;
- increased public awareness that pain is almost always controllable;
- incorporation of cancer pain management in the undergraduate and post-graduate training of doctors and nurses;
- inclusion of pain management in standard cancer textbooks;
- treatment of cancer pain in general hospitals, in health centres and at home—not only in oncology departments and cancer centres;
- revision of national drug legislation to facilitate the availability of analgesic drugs to patients;
- additional funds from public and private sources to support local and national cancer pain relief programmes.

WHO has produced several publications on policies and guidelines for cancer pain relief and other aspects of palliative care (WHO, 1990b, 1996, 1998a, 1998b). National cancer control programmes should include responsibility for:

- distribution of the WHO guidelines to all relevant health workers and administrators;
- translation of the WHO guidelines into a form that is suitable for family members and non-medical personnel involved in palliative care;

Box 7.1 WHO Ladder for Cancer Pain

WHO has developed a relatively inexpensive yet effective method for relieving cancer pain in about 90% of patients. This method is called the WHO ladder for cancer pain relief, and it can be summarized in five phrases:

“By mouth”

Whenever possible analgesics should be given by mouth in order to permit wide applicability of this method.

“By the clock”

Analgesics should be given by the clock, that is, at fixed intervals of time. The next dose

should be given before the effect of the previous one has fully worn off, to relieve pain continuously.

“By the ladder”

The first step in the ladder is a non-opioid, typified by aspirin. If this does not relieve the pain, an opioid for mild to moderate pain, typified by codeine, should be added as the second step of the ladder. If this fails to relieve the pain, an opioid for moderate to severe pain, typified by morphine, should be used as the third step of the ladder. Additional drugs, called adjuvants, are used under certain

conditions. For example, psychotropic drugs are used to calm fears and anxiety.

“For the individual”

There is no standard dose for opioid drugs. The “right” dose is the dose that relieves the patient’s pain.

“Attention to detail”

The need for regular administration of pain-relief drugs should be emphasized. Ideally, the patient’s drug regimen should be written out in full for the patient and family to work from.

- provision for training doctors and other health workers in the elements of palliative care and the WHO three-step analgesic ladder (see Figure 7.3);
- ensuring that drug regulators give full consideration to the availability of analgesics, notably oral morphine, and amend regulations which inhibit their use for cancer pain management;
- ready availability of analgesics at a cost that ensures that no patient, however poor, will be deprived of access to necessary drugs;
- home care for patients with advanced cancer;
- hospitals in offering appropriate back-up and support.

Psychological support

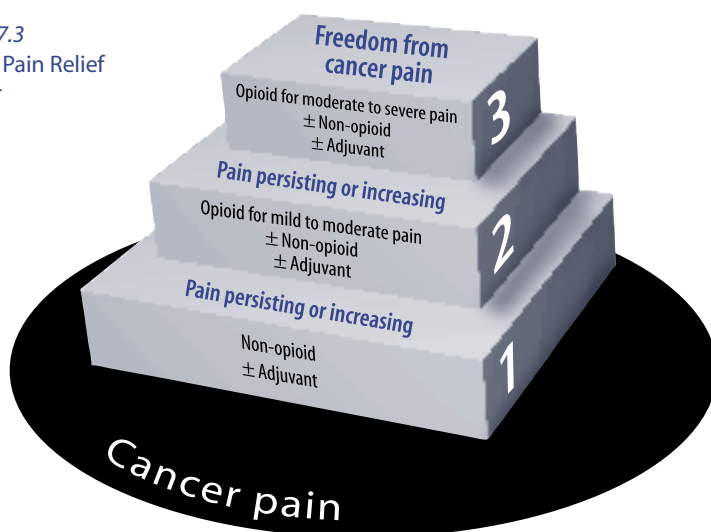
Good communication is the key to psychological support. Imparting information must be undertaken with honesty and openness, in an atmosphere of sensitivity and compassion, with adequate emotional support (Buckman, 1996). The level of information and pace at which it is given should be appropriate for an individual's ability, needs and culture.

Usually, patients want information on their illness (Centano-Cortes, Nunez-Olarte, 1994; Faulkner, Peace, O'Keeffe, 1993; Meredith et al., 1996; Sell et al., 1993; Simpson et al., 1991), but, in many parts of the world, information with ominous portent is withheld from patients. While this practice is based on compassion and family concern, a 'conspiracy of silence' and a 'conspiracy of words' may add to a patient's suffering. Progressive acceptance by the patient

of what is happening often occurs naturally and slowly, in a truly supportive environment. Unless patients are enabled to unburden themselves and share their anxieties and fears, pain and other symptoms may become the intractable avenue through which psychosocial distress is expressed (Twycross, 1994).

Although it may be impossible to offer hope of a cure, it is always possible to offer pain relief, psychosocial support, improved

Figure 7.3
WHO's Pain Relief
Ladder



quality of life, and comfort in dying. However, as with pain management, there is a need for specific training in communication skills (Faulkner et al., 1995).

Involving the family

The word “family” is used in a broad sense to include actual relatives and other people important to the patient. The role of families in palliative care is very important. Patients and families may have little knowledge of the disease and its prognosis, and may have low expectations of pain relief or unrealistically high expectations of anticancer treatment. Every effort should be made to empower the patient and family by:

- involving them in decision-making with regard to treatment;
- explaining treatments in such a way that they can give informed consent (or informed refusal);
- facilitating a continuing sense of their being in control by providing appropriate advice and practical support.

PRIORITY ACTIONS FOR PALLIATIVE CARE ACCORDING TO RESOURCE LEVELS

All countries should implement comprehensive palliative care programmes with the purpose of improving the quality of life of the majority of patients with cancer, or other life-threatening conditions, and their families. These programmes should provide pain relief, other symptom control, and psycho-social and spiritual support. All countries should promote awareness among the public and health professionals that cancer pain can be avoided, and should ensure the availability of oral morphine in all healthcare settings.

In low-resource settings it is important to ensure that minimum standards for pain relief and palliative care are progressively adopted at all levels of care in targeted areas, and that there is high coverage of patients through services provided mainly by home-based care. Home-based care is generally the best way of achieving good quality care and coverage in countries with strong family support and poor health infrastructure.

Countries with medium levels of resources should ensure that minimum standards for cancer pain relief and palliative care are progressively adopted at all levels of care, and that, nationwide, there is increasing coverage of patients through services provided by health care workers and home-based care.

Countries with high levels of resources should ensure that national pain relief and palliative care guidelines are adopted by all levels of care and that, nationwide, there is high coverage of patients through a variety of options, including home-based care.

The goal of cancer control research is to identify and evaluate means of reducing cancer morbidity and mortality, as well as of improving the quality of life of cancer patients and their families. Research is thus a key component in the development, implementation and evaluation of a national cancer control programme, which needs to have a scientific basis for identifying the causes of cancer, and for effective strategies for the prevention, treatment, and control of cancer, as well as for evaluating overall programme performance.

DEVELOPMENT OF NATIONAL CAPACITY FOR CANCER RESEARCH

The *Report on Health Research 2000* defines research capacity development as “a process in which individuals, organizations and societies develop abilities (individually and collectively) to perform functions effectively, efficiently and in a sustainable manner that respond to key questions on the major needs of the country and the entire population. This implies research capacity development is an ongoing learning and teaching process that involves individual researchers, their institutional environment, the policy makers and the people who will ultimately benefit from it” (Global Forum for Health Research, 2000).

The planning of a general research strategy and the setting of research priorities should be a continuous activity within a national cancer control programme. The planning, monitoring, and evaluation processes are critical not only for implementing the national programme, but also for the identification of gaps in available knowledge. The availability of national mechanisms to make objective decisions regarding the allocation of research resources and react rapidly to emerging problems and opportunities is of particular importance.

Research should be sensitive to local cultural norms and its focus should be specific to the country concerned (see Box 8.1). It should be linked as closely as possible to the most important cancer problems, to existing health services research, and to financial and other resources that will influence the scope of national cancer control efforts. Thus in one country, the

most urgent problem may be one of maximizing the effectiveness of cervical screening programmes, while taking account of available treatment resources. For another country, the highest priority may be evaluation of approaches to providing palliative care services to all individuals with advanced disease.

Cancer control research is an important component of a national cancer control programme, but it should be carried out in collaboration with other programmes, rather than duplicating their work. This is particularly important in cancer prevention, as many components of cancer prevention are common to other chronic (noncommunicable) diseases. Moreover, cancer control research should be designed to provide information that can be shared with other disease control programmes.

RESEARCH AIMS

The three general research aims of cancer control research are fundamental research, translational research, and applications research (National Cancer Institute, (U.S.) 2002). Fundamental research aims to reduce the gap between ignorance and knowledge about cancer. While there has been dramatic progress in understanding the biological mechanisms underlying this disease and the development of effective treatment strategies, it is clear that many complex questions remain. *Translational research* aims to reduce the gap between knowledge and the translation of that knowledge into actions that can reduce morbidity and mortality from cancer. A solid base of scientific knowledge permits the rational development of prevention and

Box 8.1 Criteria for setting priorities in national cancer control research

The criteria for establishing priorities in cancer control research include the following elements:

- magnitude of cancer problem;
- expected cost-effectiveness of the intervention researched;
- effect on equity;
- probability of finding the solution;
- scientific quality of the research proposed;
- feasibility of the research proposed;
- ethical acceptability.

Adapted from: Global Forum for Health Research (2000) Global Forum for Health Research: An overview. Geneva, WHO.

treatment strategies, rather than a trial and error approach. *Applications research* aims to reduce the gap between what looks promising and what really works. Clinical trials and other field studies attempt to establish or refute the real benefit of new approaches to preventing or treating cancer, or to refute spurious claims. Programme evaluation is another form of applied research.

MAJOR AREAS OF RESEARCH

Research in cancer occurs in a wide range of scientific fields. The major categories of research are:

- laboratory;
- epidemiological;
- clinical;
- psychosocial and behavioural;
- health systems and health policies.

Most laboratory research is currently conducted in industrialized countries. It focuses on the elucidation of the biological mechanisms underlying cancer. Recent investigations of genetic and molecular/biological processes have produced dramatic and very promising results. Despite this, the causes underlying some of the most common cancer types are not yet well understood.

Epidemiology helps to identify environmental or human behavioural factors associated with cancer, even if the underlying mechanism is not clear, thus enabling decision-makers to implement effective intervention policies. The International Agency for Research on Cancer (IARC) in Lyon, France, is part of WHO and plays a fundamental role worldwide in cancer epidemiology.

Clinical trials are the basis for identification of promising therapies and determination of the most effective therapeutic strategies. The vast majority of clinical trials occur in developed countries and these account for the largest share of research resources. They serve as the basis for the licensing of drugs and other interventions, as well as the determination of optimal therapies to be included in national treatment guidelines. Trials for the prevention and early detection of cancer are often categorized as clinical research because of their nature and the similarity of research methodology to that of clinical trials.

Psychosocial and behavioural research also play an important role in cancer control. Scientific evidence to date indicates that thoughts and behaviour can have a significant impact on cancer onset and course, and vice versa. A

major proportion of cancer in the world today is associated with lifestyles, such as the use of tobacco and alcohol, unhealthy diet, physical inactivity, and obesity. Psychosocial aspects also influence adherence to screening programmes or treatment modalities. The diagnosis and treatment of cancer are considerable sources of stress to patients, their families and health care providers, and this has a socioeconomic impact of great relevance to the effectiveness of cancer control programmes.

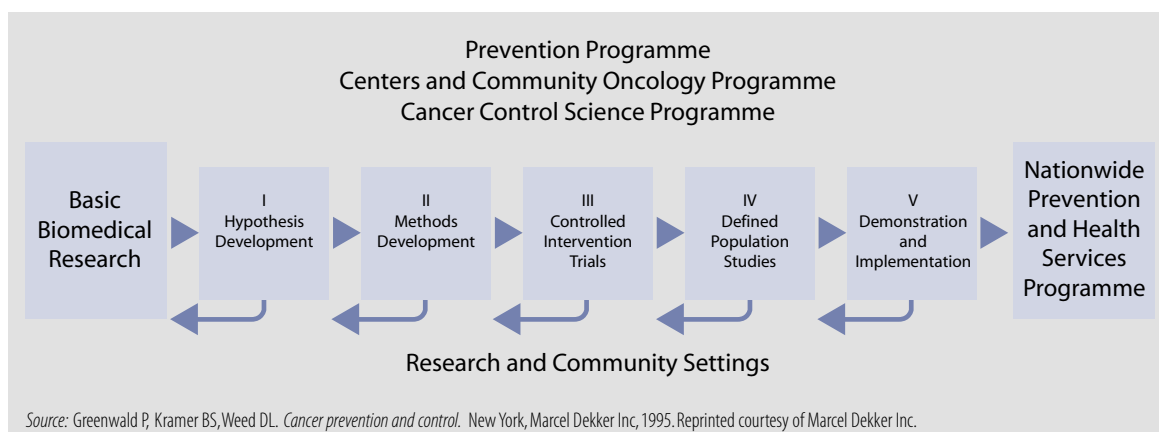
Research on cancer policies and health systems is needed to establish evidence-based priorities and determine how preventive, treatment and palliative care services can best be implemented and organized in order to achieve effectiveness, efficiency and equity of access.

As in other fields, cancer research involves the use of multi-disciplinary teams. For example, programmes for the prevention of tobacco-associated cancers involve active collaboration among clinicians, educators, legislators, behavioural scientists, economists, and agronomists. A randomized clinical trial brings together the skills of clinicians, nurses, laboratory scientists, ethicists, regulatory specialists, biostatisticians, computer scientists, and professional data managers.

PHASES OF RESEARCH

The classification of cancer control research by phase is illustrated in Figure 8.1. This classification system presents a stepwise structure that is useful for both research planning as well as determining the level of reliability of the supporting scientific evidence for a cancer control strategy.

Figure 8.1
Classification of
cancer control
research by phase



Hypothesis development (phase I)

Investigations to develop hypotheses include observational epidemiological studies, such as case control studies associating specific types of cancer with previous dietary habits. A particularly useful type of phase I epidemiological investigation is a migrant study that involves comparisons of individuals of different origin living in the same place for different lengths of time. Such studies help define the relative importance of genetic and environmental factors in cancer causation and indicate the potential preventability of different cancers by showing the effect that a change in environment may have on the risk.

Methods development (phase II)

Studies to develop methods build upon the results of a hypothesis development investigation. They determine the feasibility of a specific intervention and gather preliminary information on whether the benefits of the intervention outweigh the risks involved. For example, a recent phase II study demonstrated the practicality of the early detection of asymptomatic cases of early cervical cancer by visual inspection with acetic acid (VIA) (Sankaranarayanan et al, 1997). The potential benefit of this low cost approach in developing countries is substantial, not only because it reduces the need for cytology screening laboratories, but because it also provides an immediate result, thereby avoiding the necessity of a patient tracking and recall system.

Controlled intervention trials (phase III)

A key phase in research is the controlled intervention trial. Such studies are frequently designed to compare a new intervention with the current standard intervention, using randomization to establish comparable patient groups for scientific comparison. Often involving hundreds of subjects, these studies are designed according to stringent scientific principles to provide a definitive answer to the extent of benefit, or lack thereof, that a new intervention offers. For example, a phase III randomized investigation comparing two groups of about 30 000 women demonstrated a 30% reduction in breast cancer mortality associated with mammography screening and clinical examination for women more than 50 years of age (Shapiro, 1997).

Defined population studies (phase IV)

A defined population study should be done after an intervention has been

shown to be effective in a controlled comparison study. In a controlled comparison (phase III) study, the subjects are usually very motivated and the research environment is highly structured. A defined population study (phase IV) typically evaluates mechanisms to implement the intervention in a realistic general population situation, such as a city, state or region, and includes the generation of information on practical programme implementation and cost-effectiveness. For example, a defined population (phase IV) study of the prevention of cancer by smoking cessation would involve public education methods to encourage heavy smokers to join smoking cessation groups, conducting group programmes for smoking cessation, and individual counselling approaches.

Demonstration and implementation (phase V)

Ideally, national programme implementation should occur only after an intervention has successfully passed through each of the first four phases. The earlier phase III study should have provided clear scientific evidence demonstrating the extent of benefit of the intervention, and the phase IV study should have provided information about the practical implementation of the programme in a typical geographic region.

An understanding of these five phases of research can help determine the level of evidence that is available to support a cancer control intervention. The phase of research that has been completed indicates the strength of the scientific evidence available. For example, national cytology-based cervical cancer screening programmes in some Scandinavian countries have demonstrated a substantial national level decrease in the incidence of invasive cervical cancer. These results constitute phase V level information. The promising VIA approach to cervical cancer screening has successfully passed phase II, but still requires comparison (phase III) and defined population (phase IV) investigations before national level implementation should be considered. It is sometimes not possible to carry out all phases of cancer control research before promoting a cancer control intervention. For example, so far there has been no successful Phase III trial that has demonstrated the efficacy of cessation of tobacco smoking in the prevention of lung cancer, nor of cytology screening in preventing the development of invasive cancer of the cervix. Yet both these interventions have been successful in cancer control, as shown by evaluation of Phase V applications in several populations. Similarly, it seems unlikely, given the time that would be required, that there will ever be a Phase III trial that shows that dietary modification reduces the incidence of colorectal cancer. Yet colorectal cancer incidence and mortality are falling in North America, probably at least in part because of dietary modification, primarily introduced to control cardiovascular dis-

ease. Therefore, cancer control measures have to be introduced with regard to their likely efficacy and safety, and then evaluated carefully in the population to ensure they do in fact result in the expected impact, as discussed further in Chapter 12.

PROMOTING EVIDENCE-BASED CANCER CONTROL

Evidence-based cancer control means that the policies and practices employed in the prevention, early detection and treatment of cancer are based on principles that have been proven through appropriate scientific methods. For example, clinical treatment decisions should be based on the published reports of phase III randomized clinical trials. If more than one or two clinical trials have evaluated a specific therapeutic strategy decision, a systematic analytic mechanism—the meta-analysis—can be used to synthesize the available information. However, as with other analytic tools, care needs to be taken that such evaluations are undertaken meticulously using objective methodology.

Evidence-based medicine is the systematic, scientific and explicit use of current best evidence in making decisions about the care of individual patients. It is based on the assumption that clinical experience is crucial, but that systematic observations are necessary in order to summarize evidence. Knowledge of the basic mechanisms of the disease is also necessary, but is an insufficient guide for selecting treatments for clinical practice. An understanding of certain rules of evidence is necessary in order to interpret the literature correctly. With hundreds of medical journals worldwide, the number of published studies is increasing at a rapid rate. But the quality of published investigations continues to vary widely, and clinicians need training in how to identify reliable studies and evaluate their results.

Evidence-based medicine has evolved to include both clinical practice and health care for populations. Evidence-based healthcare (Gray, 2001) provides health managers and policy makers with the best evidence available about the financing, organization and management of healthcare.

RESEARCH IN DEVELOPING COUNTRIES

Research studies to determine the most cost-effective cancer control strategies are especially relevant in developing countries, perhaps even more so than in industrialized countries. When the available resources are extremely limited, there is no room for inefficient approaches or misuse of available funds.

The range of disease control strategies is often very restricted in developing

countries. Expensive drugs, complex treatment strategies, costly diagnostic equipment and nurse-intensive approaches are not feasible. Nevertheless, an active research programme can determine the optimal use of the limited local resources. National capacity development for cancer research should be especially encouraged in less developed countries, to allow such countries to deal effectively and efficiently with their own cancer problems through evidence-based decision-making.

PRIORITIES FOR GLOBAL CANCER RESEARCH

While it is not feasible to list here all the areas of cancer control research that should be pursued, the following areas hold particular promise for the control of the most common cancers worldwide.

Policy research

There is a global need, especially in the less developed world, to promote and support the development of *evidence-based discipline* in policy development—which is the systematic, scientific and explicit use of current best evidence in making decisions about intervention strategies. Evidence-based cancer control guarantees that policies and practices employed in the prevention, early detection and treatment of cancer are based on principles that have been proven through appropriate scientific methods. For example, clinical treatment decisions should be based on the published reports of phase III randomized clinical trials, and screening for cervical cancer should rely on phase IV studies. If more than one or two of such studies have evaluated a specific intervention strategy, a systematic analytic mechanism—the meta-analysis—can be used to synthesize the available information. *Cost-effectiveness analyses* are also key studies that should be fostered, especially in less developed countries, to support effective policy development in cancer control. They are a useful in assisting policy makers and programme managers to decide between different ways of spending their limited resources to reduce the cancer burden. These studies generally compare new interventions to current practice. Realistically, it is not possible for studies to be undertaken on every possible intervention in every country. Therefore, it is necessary to investigate ways in which the results of studies can be adapted or applied to different settings.

Programme implementation

Research to evaluate innovative methodologies for implementing evi-

dence-based cancer control strategies in less developed countries should be encouraged. This may lead to models that can be adapted to similar settings. Evaluation of the performance of existing cancer control programmes using the quality dimensions of performance of health services (described in Chapter 12) is key to making progress in cancer control and achieving effectiveness and efficiency.

Psychosocial and behavioural research

Research on optimizing behaviour to achieve healthy lifestyles, as well as studies about psychosocial aspects that influence adherence to early detection programmes and long-term treatment, are greatly needed, especially in developing countries. Further research is required to elucidate whether psychosocial factors, through a direct influence on the physiological system, for example, through neuroendocrine and immune functioning, have a meaningful influence on the onset or course of cancer (Epping-Jordan, 1999).

Tobacco eradication

Tobacco elimination would dramatically reduce the number of cancer deaths, especially cancers of the lung and oral cavity, as well as deaths from cardiovascular disease and other chronic diseases. Research to determine the most effective way to significantly reduce tobacco use in populations should have the highest priority. A multi-factor approach is clearly needed, as the range of interventions includes public information, childhood education, modification of individual behaviour, modification of governmental and nongovernmental organization behaviour (for those that rely upon tobacco taxes, promotion and sale), agriculture (crop alternatives), and legislation. But perhaps the most important of all is the development of effective education strategies to ensure that young people do not initiate a tobacco habit, an area in which efforts to date have largely been ineffective (Tubiana, 1999).

Identification of effective strategies for prevention

The use of infant vaccines to prevent disease is a well-established and cost-effective global strategy. While the potential now exists to prevent a substantial number of liver cancers by infant vaccination with hepatitis B vaccine, major efforts should be made to extend this prevention strategy to other cancers. Of particular interest would be the development of low-cost effective human papillomavirus vaccines for the prevention of cervical cancer, *Helicobacter pylori* vaccines for the prevention of stomach cancer, and

Epstein–Barr virus vaccines for the prevention of lymphoma and cancer of the nasopharynx.

While the link between diet and cancer has been clearly demonstrated, few specific dietary determinants of cancer risk have been established. Large-scale, controlled investigations comparing various dietary strategies need to be conducted in order to determine the health benefits of specific healthy diet recommendations.

Early detection of breast and cervical cancer

Currently, effective screening programmes for breast cancer using mammography are only feasible in the few most highly industrialized countries, because of the considerable expense involved. Recent reviews of previously conducted controlled investigations have raised doubts regarding the overall effectiveness of mammography screening. Additional controlled investigations are needed, not only to settle the issue regarding the role of mammography, but also for the majority of the world's women to establish the extent of benefit, if any, that would be seen with breast cancer screening using clinician examination, breast self-examination, or other approaches.

Although cytology screening programmes for the early detection of cervical cancer can currently be recommended for developed countries and middle-income countries, cervical cancer is also a major health problem for women in the least developed countries, where cytology screening would place too many demands on available resources. Effective low-cost screening strategies appropriate for all resource settings need to be investigated. Of particular promise for cervical cancer is visual inspection with acetic acid (VIA). This low-technology approach has successfully demonstrated feasibility and is currently being investigated for effectiveness.

Widely applicable curative treatments for cancer

There has been a steady stream of advances in the treatment of many forms of cancer. The general trend has, however, also been an increasing complexity in diagnostic and therapeutic techniques. Some of the more recent treatments can only be administered at specialized cancer treatment centres in the industrialized countries. Some therapies can only be given at few, if any, hospitals in developing countries, and often not even in general hospitals in industrialized countries. As a result, the vast majority of cancer patients in the world are unable to benefit from the available cancer treatment. These realities should be kept in mind when designing, and choosing to fund, such trials. Those responsible for cancer control programmes

should strongly encourage the development of trials that test technologies and applications that could be feasibly implemented in a variety of settings, including less developed countries.

*Cancer Control
Research*

Development of effective palliative care delivery models

WHO has developed effective, low-cost strategies for the relief of pain and palliative care. However, effective approaches for bringing these benefits to patients in the community have not yet been developed for many settings. Various models for the delivery of palliative care, especially for the patient at home, need to be developed and investigated. Effective palliative care models would not only benefit patients with cancer, but also patients with HIV/AIDS and other diseases.

Surveillance is the continuous collection of data for public health decision-making. In the context of a national cancer control programme, a surveillance programme should provide data on a continuing basis on incidence, prevalence, mortality, diagnostic methods, stage distribution, treatment patterns, and survival. It can also provide information about important risk factors and the prevalence of exposure to those factors in the population. Surveillance, therefore, plays a crucial role in formulating the cancer control plan, as well as in monitoring its success. An effective surveillance system requires substantial and continuous effort. Benefit comes only from careful analysis of the collected data, and it is therefore essential to allocate adequate resources for that purpose when a surveillance system is planned.

A comprehensive national cancer control programme requires a system of surveillance of cancer, its determinants, and outcomes. Over the past 50 years, the concept of cancer surveillance has evolved, centred upon the population-based cancer registry as a core component of the cancer control strategy (Greenwald, Sondik, Young, 1986; Armstrong, 1992). The roles of cancer surveillance are:

- to assess the current magnitude of the cancer burden and its likely future evolution;
- to provide a basis for research on cancer causes and prevention;
- to provide information on prevalence and trends in risk factors;
- to monitor the effects of prevention, early detection/screening, treatment, and palliative care.

MEASURING THE BURDEN OF CANCER

Various statistics are available for assessing the burden of cancer, and of different types of cancer, in the population.

Incidence

Incidence of disease is clearly an important measure of burden, since it describes the new cases that will require medical attention. It is the key

measure when considering prevention. Measurement of incidence requires the identification of all new cases of disease in a defined population through some kind of case-finding mechanism, with record-linkage to ensure that persons are not confused with events. This is the function of the population-based cancer registry. Cancer registries may present incidence according to histological subtype of cancer, or stage of disease at diagnosis.

Mortality

Mortality rates have been more widely used, since these have been available for a much longer period, and usually for large (national) populations. They are used in evaluations comparing disease rates between different populations, and over time to study differences in disease risk. They also provide a measure of disease outcome for evaluating, for example, the effectiveness of programmes of prevention, early detection and treatment of cancer.

Person-years of life lost

The concept of person-years of life lost (PYLLs) refines traditional mortality rates by providing a weighting for deaths at different ages. This measure is widely used in health services planning. This approach has been taken a step further, with the development of indices such as quality-adjusted life years (QALYs) and disability-adjusted life years (DALYs). Essentially, these quantify the spectrum of morbidity in terms of its duration and severity between onset of a disease and death or recovery.

Survival

Survival from cancer is the measure most often used to evaluate cancer treatment. Computation of survival depends upon follow-up of diagnosed cancer patients, and the calculation of the proportion surviving after different intervals of time. Stage of disease is one of the most important determinants of survival. Overall survival in the population reflects many factors—the stage of disease (influenced by early diagnosis or screening) and the availability of, access to, and effectiveness of treatment. Stage-specific survival provides a more relevant indicator of effectiveness of therapy (although accuracy with which stage of disease is measured varies between populations, and over time).

Prevalence

Prevalence of cancer is a measure of cancer burden (Hakama et al., 1975)

indicating the number of patients alive who require medical care. However, there is no standard definition of a prevalent case of cancer. In theory, it should refer to someone once diagnosed as having cancer who is still alive; but this includes long survivors who are 'cured', and scarcely relates to 'burden', if the latter is being used to determine resource allocations. A reasonable compromise is to regard only patients alive between 0 and 5 years after diagnosis as 'prevalent' cancers, since this approximates the period of active treatment and follow-up of cases. Prevalence can be estimated directly by some cancer registries from their files of registered cases who have not died. Alternatively, prevalence can be estimated from the incidence of disease and survival curves, either for short-term survivors (for example, up to 5 or 10 years) or, if incidence and survival data are available for long periods, including long-term survivors also.

POPULATION-BASED CANCER REGISTRY

Disease registers are part of the surveillance system for several diseases, but they have been more important, and successful, for cancer than for any other condition. This is because of the serious nature of most cancers, which means that, except in a few societies without access to medical care, patients will almost always present for diagnosis and treatment. This 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 (Jensen et al., 1991).

The population-based cancer registry collects data on every person with cancer in a defined population, usually comprising people resident in a well-defined geographical region. The cooperation of the medical profession and health care services is vital to the success of cancer registration. The population-based cancer registry provides incidence rates, and the emphasis is on epidemiology and public health.

A major source of information and advice about population-based cancer registries and international data from such registries is the International Agency for Research on Cancer (IARC), a part of WHO. Located in Lyon, France, IARC should be called upon to assist in any planned development or reorganization of a cancer registry.

The emphasis of a cancer registry should be on the quality of the data collected, rather than on the quantity. Some of the most successful and productive registries collect only a very limited amount of data for each patient. Registries in developing countries should collect only the basic information common to all registries. This includes subject identification (including age and sex), ethnicity, incidence date, site and histology of the tumour, and

the most valid basis of diagnosis. Other items, which are extremely useful, include the extent of disease (stage) and disease outcome for survival.

The establishment of a population-based cancer registry is highly desirable in the development of a national cancer control programme. Such registries are useful in the context of documenting the cancer patterns in a given region/country, in measuring cancer burden and in studying survival from cancer as well as in evaluating trends in the incidence of cancers over time. Thus they are valuable for the evaluation of national cancer control programmes. Hospital-based information systems provide valuable sources of information regarding methods of diagnosis, stage distribution, treatment methods, response to treatment, and survival, although accurate information on cancer incidence is unobtainable because of case referral and population coverage issues.

STATISTICS ON CANCER MORTALITY

Information on deaths from cancer in the population is collected by civil registration systems recording vital events (births, marriages, deaths). The responsible authority varies between countries, but usually the first level of data collection and processing is the municipality or province, with collation of national statistics being the responsibility of the Ministry of Health, or Ministry of the Interior. Mortality data are derived from death certificates on which information about the person dying and the cause of death is certified, usually by a medical practitioner. The International Classification of Diseases (ICD) (WHO, 1992) 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, which may not necessarily equate with the presence of a particular tumour.

About two-fifths of the world population is covered by national vital registration systems producing mortality statistics on cancer. This includes all of the developed countries, but only some developing countries. Even when national statistics are published, their quality is not the same in all countries. In some, coverage of the population is incomplete, and the mortality rates produced are implausibly low. In others, quality of cause of death information is poor.

THE WHO STEPWISE APPROACH FOR MEASURING KEY RISK FACTORS

The WHO stepwise approach to surveillance (STEPS) is the WHO-recommended surveillance tool for measuring key risk factors for noncommunicable

diseases. WHO is building one common approach to defining core variables for surveys, surveillance and monitoring instruments. The goal is to achieve data comparability over time and between countries. STEPS offers an entry point for low-income and middle-income countries to get started in the prevention of noncommunicable disease. It is a simplified approach providing standardized materials and methods as part of technical collaboration with countries, especially those that lack resources.

Because many factors associated with disease cannot be modified, emphasis in any surveillance system should be on those risk factors that are amenable to intervention. Surveillance of just seven selected risk factors (see Table 9.1) that reflect a large part of the future burden of noncommunicable diseases can provide a measure of the success of interventions.

The rationale for selecting these core risk factors is that: they have the greatest impact on the mortality and morbidity associated with noncommunicable diseases; modification is possible through effective primary prevention; measurement of these risk factors has been proven to be feasible and reliable; and measurements can be obtained using acceptable standard methodologies.

The stepwise approach encourages the development of an increasingly comprehensive and complex surveillance system depending on local needs (see Figure 9.1). Countries take the first step by adopting standardized questionnaires and adding modules, as appropriate, regarding behaviours such as tobacco and alcohol use. Questions that form the core data for each of these areas are simple and few in number and assure international comparability. Once the first step is in place, countries can build upon it by providing physical measurements in the second step. The third step involves

Table 9.1
Risk factors
common to major
noncommunicable
diseases

Risk factor	Cancer	Cardiovascular disease ¹	Diabetes	Respiratory diseases ²
Tobacco use	✓	✓	✓	✓
Alcohol	✓	✓		
Unhealthy diet	✓	✓	✓	✓
Physical inactivity	✓	✓	✓	✓
Obesity	✓	✓	✓	✓
Raised blood pressure		✓		

¹ Including heart disease, stroke, and hypertension

² Including chronic-obstructive pulmonary disease and asthma

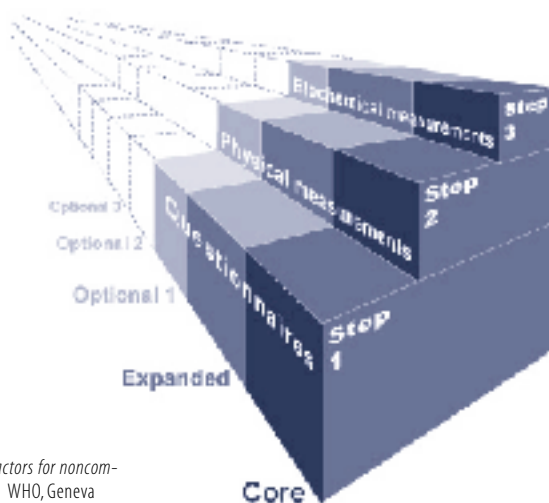
the collection of biochemical measurements, most often by blood samples. At each step there is a core of information for each risk factor, an expanded core, and optional information, with the information of greater complexity being added sequentially as resources allow. WHO emphasizes that for surveillance to be sustainable, small amounts of good quality data are more valuable than large amounts of poor quality data.

At the country level, the implementation of this stepwise approach provides basic strategic public health information that can serve as the basis for planning and monitoring national prevention programmes as well as serving as an international standard for comparison purposes. The stepwise sequential process builds national capacity in a manner that is sustainable for the implementation of effective disease prevention programmes.

SURVEILLANCE INFRASTRUCTURE

Establishment of an effective surveillance system depends upon a continuing commitment of resources, including personnel and technology, for communication, data collection and analysis. A central or lead agency should be identified to coordinate the surveillance activities and produce a periodic overall surveillance report. A partnership approach should be used that includes receiving input from all participating agencies, collaboratively planning surveillance activities and the expansion of those activities, jointly interpreting the surveillance data, and jointly evaluating the performance and weaknesses of the surveillance system. The partners, whether at the national or local level, will thus share ownership of the system and the surveillance information produced.

Figure 9.1
The WHO stepwise
approach to
surveillance (STEPS)



Source: Bonita et al., (2001) *Surveillance of risk factors for noncommunicable diseases: The WHO STEPwise approach*. WHO, Geneva

Managing a National Cancer Control Programme

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 evidence exists that would allow us to prevent at least one-third of the 10 million cancer cases that occur annually throughout the world. Current knowledge would also allow the early detection and effective treatment of a further one-third of those cases. Pain relief and palliative care can also improve the quality of life of patients and their families. With competent management that includes careful planning, implementation, monitoring and evaluation, the establishment of national cancer control programmes offers the most rational means of achieving a substantial degree of cancer control, even where resources are severely limited. It is for this reason that the establishment of a national cancer control programme is recommended wherever the burden of the disease is significant, there is a rising trend of cancer risk factors and there is a need to make the most efficient use of limited resources.

Planning a national cancer control programme means assessing strategic options and choosing those that are feasible, effective, and cost-effective, bearing in mind the specific conditions of the country concerned (Chapter 10).

Implementing a programme requires resources and processes, all of which have to be well managed. This issue is discussed in Chapter 11, along with the range of global initiatives that national cancer control programmes can draw on for experience and support. Moreover, in order to ensure that activities contribute to achieving the priorities that have been established, the programme will also need to be monitored and evaluated (Chapter 12).

PLANNING A NATIONAL CANCER CONTROL PROGRAMME

10

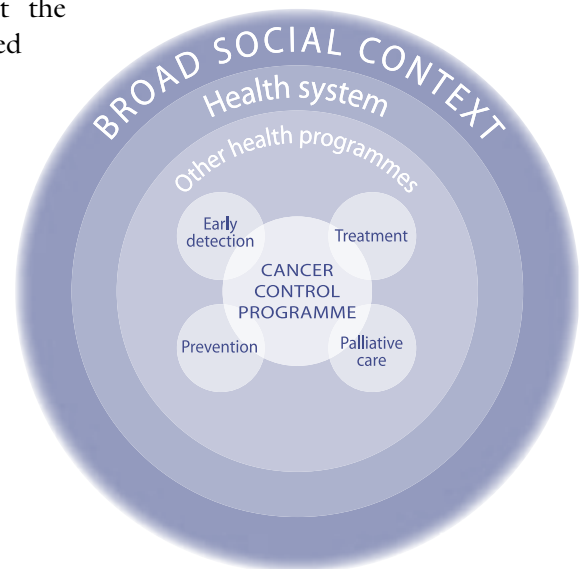
WHAT IS A NATIONAL CANCER CONTROL PROGRAMME?

A national cancer control programme is a public health programme designed to reduce the incidence and mortality of cancer and improve the quality of life of cancer patients in a particular country or state, through the systematic and equitable implementation of evidence-based strategies for prevention, early detection, treatment, and palliation, making the best use of available resources.

The following list summarizes the principles essential to a national cancer control programme based on quality management (ISO, 1997):

- *goal orientation* that continuously guides the processes towards improving the health and quality of life of the people covered by the programme;
- *focused on the needs of the people*, which implies focusing on the target population while addressing the needs of all stakeholders and ensuring their active involvement;
- *systematic decision-making process*, based on evidence, social values, and efficient use of resources, that benefits the majority of the target population;
- *systemic and comprehensive approach*, meaning that the programme is a comprehensive system with interrelated key components at the different levels of care, sharing the same goal, integrated with other programmes, to the health system and tailored to the social context (Figure 10.1), rather than a vertical programme operating in isolation;
- *leadership* that creates clarity and unity of purpose, and that encourages team building, broad participation, ownership of the process, continuous learning, and mutual recognition of efforts made;
- *partnership*, enhancing effectiveness through mutually beneficial relationships, built on trust and complementary capacities, with partners from different disciplines and sectors,

Figure 10.1
National cancer control
programme: a systemic
and comprehensive
approach



- *continuous improvement, innovation and creativity* to maximize performance, and to address social and cultural diversity, and the new needs and challenges presented by a changing environment.

WHY ESTABLISH A NATIONAL CANCER CONTROL PROGRAMME?

Previous chapters of this monograph have provided the scientific background to current knowledge of the causes of cancer, and the components of cancer control: prevention, early detection, treatment and palliative care, cancer control research, and cancer surveillance. With careful planning and appropriate priorities, the establishment of a national cancer control programme offers the most rational means of achieving a substantial degree of cancer control, even where resources are severely limited. For this reason, the establishment of a national cancer control programme is recommended wherever the burden of the disease is significant, there is a rising trend of cancer risk factors, and there is a need to make the most efficient use of limited resources.

Without careful planning, there is a risk that the resources available for cancer control will be used inefficiently, and that the benefits to the population that should flow from the use of such resources will not be realized. In the absence of any national coordinating mechanism, it is possible that limited resources will largely be consumed for the treatment of cancer by prestigious hospitals. Such institutions often serve only selected sub-populations and may do little to reduce the national cancer burden. In contrast, an effective cancer control programme comprises an integrated set of activities covering all aspects of cancer prevention and control, and it operates with an appropriate allocation of available resources among the various activities and equitable coverage of the population.

WHICH COUNTRIES HAVE NATIONAL CANCER CONTROL PROGRAMMES?

A WHO survey of 167 countries in 2001 assessed national capacity for prevention and control of cancer, as well as of other noncommunicable diseases (WHO, 2001b). The results of this survey (see Table 10.1) show that nearly half of the 167 countries responding indicated that they had a cancer control policy or plan. About two-thirds of the countries indicated the availability of national guidelines for prevention, and almost half specified that cancer management guidelines had been produced. While objective

data are difficult to obtain (two-thirds of the countries did not provide supporting documents confirming the existence of these plans and guidelines), this survey demonstrates an awareness in many countries of the need for the planning of programmes to prevent and control cancer.

According to the information collected for a WHO meeting in 2000 on national cancer control programmes, only a few countries have developed nationwide, comprehensive cancer control programmes that include prevention, early detection, treatment and palliative care. Various countries have developed important initiatives at the state or provincial level; others have focused on one or two priority areas, achieving national coverage in some cases.

The major elements of national cancer control programmes in the Americas and in the Western Pacific are described, respectively, in Tables 10.2 and 10.3, by way of example. In the Americas, comprehensive cancer control strategies that address the full spectrum of prevention, early detection, diagnosis, treatment and palliative care for one or more cancer sites exist in five countries: Brazil, Canada, Chile, Colombia and the United States. Most countries are involved in specific cancer efforts, which may not be comprehensive in nature, but that are designed to reduce risks and address some aspects of cancer control. In Latin America, palliative care services for people with advanced cancers are just beginning to be included as part of cancer care.

In the Western Pacific, cervical cancer screening, national tobacco control programmes and routine hepatitis B vaccination are among the activities

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*Table 10.1 National
capacity for cancer
prevention and
control*

Region	Number of countries responding (%)	Countries with cancer control policy or plan	Availability of national guidelines		Primary health care (anti-neoplastic drugs)	
			Prevention	Management	Availability	Affordability
Africa	39 (85%)	15%	29%	43%	22%	11%
The Americas	33 (95%)	50%	83%	48%	57%	30%
Eastern Mediterranean	17 (77%)	56%	60%	33%	77%	36%
Europe	41 (80%)	62%	84%	59%	91%	90%
South-East Asia	10 (100%)	78%	43%	43%	43%	17%
Western Pacific	27 (100%)	64%	65%	47%	74%	64%
Overall	167 (87%)	48%	67%	48%	60%	46%

Source: World Health Organization (2001b) Assessment of national capacity for noncommunicable disease prevention and control. The report of a global survey. Geneva, WHO.

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implemented. Legislation to make morphine available has been passed in fewer than half of the countries, and the monitoring of progress in cancer control is routinely done in only four countries in this region.

The experience of the cancer control programme in Kerala, India, is described in Box 10.1.

Common hindrances to a national cancer control programme and benefits often seen after development of such a programme are summarized in Table 10.4.

Table 10.2 Cancer control in the Americas*
(Countries with a partial or comprehensive national cancer policy/strategy)

Country	Major elements of the strategy
Cuba	Breast cancer screening policy; cervical cancer programme
Ecuador	Cervical cancer programme; breast cancer screening policy
Peru	Cervical cancer programme
Venezuela	Cervical cancer plan; breast cancer policy
Mexico	Breast and cervical cancer programmes
Brazil	Comprehensive cancer control strategy
Panama	Breast cancer screening programme
Costa Rica	National cervical cancer programme
Colombia	Strategies for information systems, education, intersectoral coordination, research and legislation
Chile	Prevention, cervical and breast cancer programmes, curable tumours and palliative care
Barbados	Cervical cancer plan
Canada	Canadian Strategy for Cancer Control; Canadian Breast Cancer Initiative
USA	Targets: lung, breast, cervix, colorectal, oral, prostate and skin cancer

* Countries are listed in ascending order of their per capita health expenditure

Table 10.3. Cancer Control in the Western Pacific*
(Countries with a multi-sectoral policy for cancer control activities)

Country	Major elements of the strategy
Mongolia	Cervical cancer screening; tobacco control programme, cancer treatment guidelines; morphine available for cancer pain relief
Cambodia	Tobacco control programme
China	Cervical and breast cancer screening; cancer treatment guidelines
Niue	Cervical and breast cancer screening; tobacco control programme
Philippines	Cervical and breast cancer screening, tobacco control programme; cancer treatment guidelines; morphine available for cancer pain relief
Samoa	Cervical cancer screening; tobacco control programme
Malaysia	Cervical and breast cancer screening; tobacco control programme; cancer treatment guidelines
Fiji	Cervical cancer screening, cancer treatment guidelines and morphine available for cancer pain relief
Singapore	Tobacco control programme; cancer treatment guidelines; morphine available for cancer pain relief
Korea, Rep.	Cervical and breast cancer screening; tobacco control programme; cancer treatment guidelines; morphine available for cancer pain relief
New Zealand	Cervical and breast cancer screening; tobacco control programme; cancer treatment guidelines; morphine available for cancer pain relief
Australia	Cervical and breast cancer screening; tobacco control programme; cancer treatment guidelines; morphine available for cancer pain relief

* Countries are listed in ascending order of their per capita health expenditure

WHO SHOULD BE INVOLVED IN PLANNING A NATIONAL CANCER CONTROL PROGRAMME?

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The motivation to initiate a national cancer control programme or improve the performance of an existing programme can come from different sectors within the country or can be a combined effort with international organizations. In close collaboration with its Member States and other partners, WHO has developed a global strategy for the prevention and control of noncommunicable diseases in which cancer control appears as one of the major priorities. WHO headquarters, regional and country offices can be

Box 10.1 The cancer control programme of Kerala, India

The national cancer control programme of India was formulated in 1984, focusing on: the primary prevention of tobacco-related cancers, as 50% of all cancer in India was due to tobacco use; early detection of cancers of accessible sites, as the three major forms of cancer were accessible; augmentation of treatment facilities; and establishment of equitable pain control and a palliative care network throughout the country, as more than 80% of cancer patients reported in very late stages.

In 1988, Kerala was the first state in India to formulate a cancer control programme (called a 10 year action plan), with the same goals as the national plan. Kerala is a state in southwest India with a population of 31 million. The well-integrated health service is provided by the government and the private sector. A hospital cancer registry, started in 1982, was a major source of information for planning the programme.

Tobacco habit prevention

Two state-wide programmes targeted teenagers, through the schools. In one programme, 126 000 families were declared “tobacco free”. A second programme, using a similar approach, was implemented in over 6 000 schools.

Training regarding anti-tobacco messages was given to 5 000 doctors and over 9 000

other health workers. More than 130 000 volunteers were trained to support the anti-tobacco messages throughout the villages. Executive orders have banned smoking in educational institutions, government offices, public transport and other public places. A reduction in tobacco consumption of 1% per year has been seen in the Trivandrum Oral Cancer Screening project area.

Early detection programme

Because high technology methods were beyond reach, activities focused on education to improve awareness, followed by diagnosis and treatment. Screening camps were organized periodically, with the support of the government and voluntary organizations. Self-examination of the oral cavity, breast self-examination and physician breast-examination were taught; cytology-based screening for cervical cancer augmented this initiative. At the village level, 12 600 volunteers were trained to create awareness of early signs of cancer, and motivate people to undergo tests and therapy, if needed. The success of Kerala's programmes can be greatly attributed to the Early Cancer Detection Centres (ECDC), which serve as focal points for coordination of the early detection activities and the provision of clinical examination, cytology and histopa-

thology. Initially established as government programmes, two are now run by the Regional Cancer Centre and five by nongovernmental organizations. The public sees the role of ECDCs to be the screening of normal (asymptomatic) people, whereas hospitals are recognized as places for sickness management. The ECDC at Erankulam has screened more than 80 000 people since its inception in 1984.

Pain relief and palliative care

A pain control and palliative care division was started by the Regional Cancer Centre in 1986. In 1988 it was the first institution in India to manufacture and supply morphine liquid. Morphine tablets were first made available in 1991 and are now locally manufactured. A cancer pain relief network has been established, consisting of two nodes and 16 peripheral centres. A unit to make home visits to terminally ill patients and to train the relatives of these patients in principles of cancer pain control was initiated in 2000, and will be expanded.

Evaluation

This programme was found to achieve a reduction in tobacco consumption, down-staging of advanced tumours, augmentation of comprehensive therapy programmes, and a network of palliative care centres.

called upon to provide technical assistance and advice in support of the promotion of national cancer control programmes at the country or state level.

With appropriate mobilization of all the stakeholders, 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.

People involved in formulating and implementing the overall strategy for the national cancer control programme should be health professionals with experience in disease control and large-scale health programmes, cancer experts, other health service workers, patients' groups, and representatives from other sectors involved. Governmental and nongovernmental leaders in the cancer field need to work together closely to develop a successful programme. The national cancer control programme should involve the general public, whose knowledge and awareness of the problem can, and should, become a major force in combating cancer. As a significant and growing aspect of a nation's health problems, cancer requires the attention of the highest levels of government as well as community involvement.

Political commitment is essential. It should be the responsibility of health leaders to persuade political leaders, health practitioners, and the public as to the magnitude of the national cancer problem and inform them what can be done to overcome it. It is particularly important to emphasize the multifaceted nature of the problem, the essential role of prevention to reduce the future cancer burden, and the current role of early detection, as well as treatment and palliative care.

Table 10.4
Common
hindrances to
and benefits
from a national
cancer control
programme

Hindrances	Benefits
Low priority given to cancer by Ministry of Health	Promotes equal coverage of services (social justice)
Lack of public support	Raises political awareness of the issues
Shortage of resources	Better use of available funds, avoiding misuse
Excess reliance on treatment	Puts priorities into perspective, especially the role of prevention
Uncritical use of Western approach	Local technology can be used
Shortage of trained staff	Education of health professionals first
Cultural and religious factors	Programme development leading to process ownership
Lack of understanding by health professionals	Identifies scientific basis of activities
Limited access to oral morphine	Ethical obligation to relieve suffering at reasonable cost
Viewed as vertical programming	

HOW TO PLAN A NATIONAL CANCER CONTROL PROGRAMME?

Planning a National Cancer Control Programme

Ideally, the process of establishing a national cancer control programme 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 a national cancer control programme, there is a need to address managerial, technical and financial needs, with evidence-based policy development and involvement of all stakeholders. The aim should be balanced cancer control actions extending to the whole country in an equitable way. Although it is clear that objectives and priorities need to be tailored to the specific country context, the planning processes to be undertaken in all countries – whether a programme is to be introduced for the first time or an existing programme is to be revised to make it more effective – are sufficiently similar to allow for the use of models. Since the first edition of this WHO publication, various countries have developed frameworks for comprehensive cancer control programmes that add new value to the original model elaborated by WHO. An example of such a model is shown in Figure 10.2.

The following model is based on those experiences and comprises phases for planning and implementing a national cancer control programme. As in the model illustrated in Figure 10.2, the phases require the active participation of stakeholders, follow a circular path, and experience a continuous exchange of information for adequate decision making, thus allowing for sustained improvement and adjustment to new needs and knowledge.

The planning process is described below. Chapter 11 proceeds to deal with implementation, and Chapter 12 looks at monitoring and evaluation.

Assessing the magnitude of the cancer problem

As an initial step, a national cancer control programme requires an analysis of the cancer burden and risk factors in the target area, as well as a capacity assessment (analysis of existing facilities, programmes and services in the broader social context).

Four categories of information are needed for the initial analysis:

- demographic data;
- cancer and risk factor data;
- data on other diseases;
- capacity assessment.

Demographic data

Generally speaking, demographic data, with appropriate projections, 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 and cancer risk factor data

Epidemiological data on the occurrence of cancer, and knowledge of causative factors and of how to avoid those factors, provide a basis for determining where the emphasis of cancer control efforts should be placed. Details on the processes required for surveillance of cancer are provided in Chapter 9. A cancer surveillance programme, built around a population-based cancer registry, has a major role in providing the data to justify the establishment of a national cancer control programme, as well as in monitoring the progress of implementation of the cancer control programme.

For a comprehensive assessment of the cancer burden, it is desirable to have incidence, survival and mortality data for all forms of cancer combined, and for each of the most common forms of the disease. Other indicators of “burden”, such as prevalence, (PYLL), (DALY), may also be calculated. Such information is essential for setting priorities for the national cancer control programme, including the planning of cancer-related health care services. If a population-based cancer registry does not exist, incidence will have to be estimated.

When incidence or mortality data are available for several years, an evaluation of time trends in cancer, and how these vary according to age group (or year of birth), sex, or other characteristics of the population, is possible. These data may be used to project the likely evolution of the cancer pattern in future years. The most important variables for forecasting the future burden are overall population trends, changes in the age structure of the population, and the prevalence of important risk factors, especially tobacco use 20–30 years earlier. In assessing the future cancer burden, potential changes in the relative importance of various cancers, the impact of cancer control measures, and forecasting of trends in incidence and mortality are valuable. Projections usually involve the assumption that past trends in rates of incidence or mortality will be maintained, and will apply to projected changes in the population. This assumption is often in error. Experience shows that, for many cancers, past trends will not be maintained because of changes in environmental risk factors, and the development of new techniques for prevention, early detection, and treatment. Projections nevertheless provide a useful benchmark against which the impact of all future changes, including the interventions of the national cancer control programme, can be evaluated.

Estimates of the numbers of cancer cases and deaths due to cancer may be higher than the numbers known to the health services. In countries where

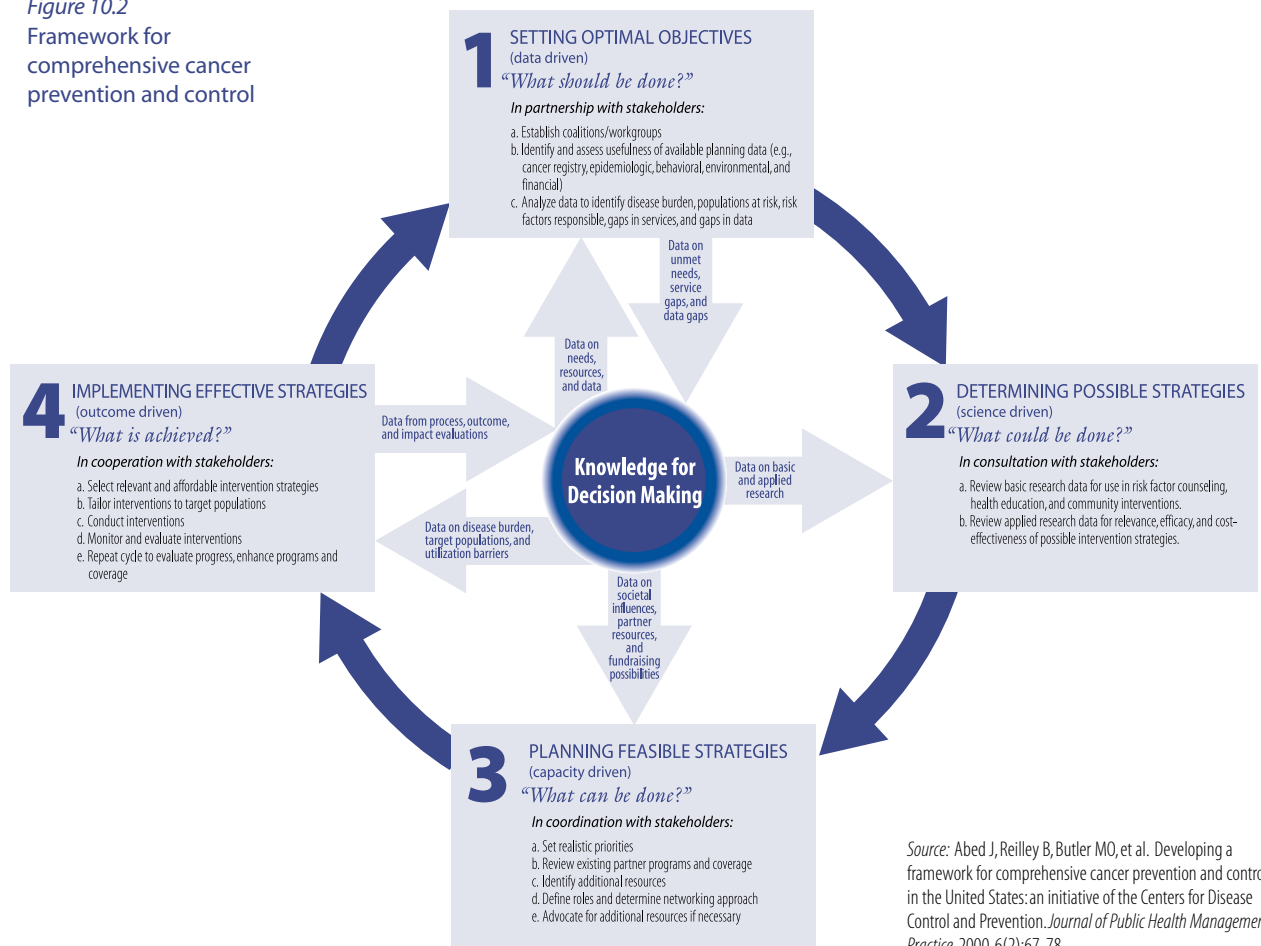
awareness of cancer is low and access to health care is limited, only a small proportion of actual cases are known to the health services. With greater awareness of cancer, a higher proportion of people with the disease will present to the health services for care. Thus, demands for care will rise more rapidly than the increase in need resulting from increased incidence.

Planning a National Cancer Control Programme

Data on other diseases

It is essential to establish the importance of cancer relative to that of other diseases. 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.

Figure 10.2
Framework for
comprehensive cancer
prevention and control



Source: Abed J, Reilley B, Butler MO, et al. Developing a framework for comprehensive cancer prevention and control in the United States: an initiative of the Centers for Disease Control and Prevention. *Journal of Public Health Management Practice*, 2000, 6(2):67-78.

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, a decrease in deaths from infectious diseases or cardiovascular disease is followed by an increase in the number of cancer deaths. The net result is that deaths from cancer will constitute an increasing proportion of all deaths.

Capacity assessment

According to the United Nations Development Programme, “capacity can be defined as the ability of individuals and organizations or organizational units to perform functions effectively, efficiently and sustainably in a given socio-political context”. This definition implies that capacity is not a passive state but part of a continuing process and that individuals, both providers and beneficiaries, are central to capacity development. The overall context in which organizations function is also a key element. (United Nations Development Programme, 1998).

Capacity assessment in the area of cancer involves collecting and analysing data on:

- the *overall context*, implying an examination of the broad economic, social, cultural and political conditions that are directly or indirectly related to the development of a national cancer control programme;
- the policy, and institutional environment of the *existing health system*¹ that directly or indirectly relate to cancer;
- overall health system performance (WHO, 2001c), health policies, laws, regulations, financing, organization and management of services according to levels of care, definitions of responsibilities of the public and private sectors;
- existing programmes and services for cancer prevention, early detection, treatment and palliation, including their organization, facilities, personnel, drugs and technologies, budgeting, and information and evaluation systems;
- quality performance indicators, such as effectiveness, efficiency, appropriateness, accessibility, and sustainability, which measure the interaction between the system and beneficiaries of cancer prevention and control activities;
- existing education and continuous training programmes in the technical and management field;

1 According to *The World Health Report 2000*, a health system is defined as: all organizations, institutions, and resources devoted to the production of health actions. Health actions are defined as any efforts whether in personal health care, public health services, or through intersectoral initiatives, whose primary purpose is to improve health.

- linkages of cancer prevention and control activities with other programmes, both in the health sector and other sectors, and partnerships between governmental and nongovernmental organizations.

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The capacity assessment can be done quite simply, or at a greater level of complexity, depending on practical constraints such as budget, time, and availability of information. Whatever the degree of complexity, it is important to maintain a systemic approach that focuses on how the problem being studied interacts with the other constituents of the system. Instead of isolating small components, the systemic approach expands its view to take into account a large number of interactions. For example, a cytology cervical screening programme cannot be viewed as an isolated project. It should be considered as a subsystem of a cancer early detection programme, with various interacting components (primary health care clinics, pathology, colposcopy, and so on). At the same time, interaction with other programmes or initiatives, such as reproductive health, breast cancer screening, and clinical preventive services at the primary level of health care is essential (see Figure 10.3).

After the above-mentioned data have been collected and reviewed, they must be analysed to identify needs and gaps in services, as well as gaps in data. This analysis should provide a solid basis for setting objectives for the national cancer control programme.

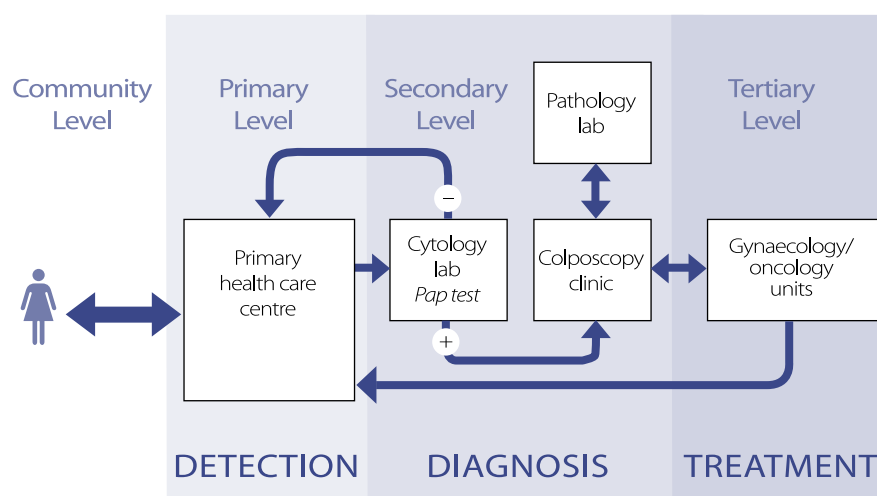


Figure 10.3
Example of pro-
gramme processes
in cervical cancer
screening

Setting measurable cancer control objectives

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

The overall aims of a national cancer control programme are to reduce the incidence and mortality of cancer, as well as to improve overall survival and the quality of life of cancer patients and their families.

The goals of a national cancer control programme may be summarized as follows:

- to prevent future cancers;
- to diagnose cancers early;
- to provide curative therapy;
- to ensure freedom from suffering;
- to reach all members of the population.

Objectives are more specific than general aims, and are formulated to achieve the goals. They cannot be fully specified in the absence of a detailed situation analysis or performance evaluation. Decisions on objectives for any particular country must “ensure that the limited resources are directed to areas of greatest need and support efforts with the highest probability of success” (Mertens, 1999). Cancer control objectives should be compatible with general health objectives and can be formulated along the lines of quality dimensions such as effectiveness, efficiency, and accessibility. Examples of possible objectives are listed below:

Reducing the risk of cancer:

- to reduce tobacco smoking rates among health care professionals and patients attending primary care clinics;
- to avoid passive smoking in the workplace, public transportation and public places;
- to increase physical activity and reduce overweight rates among young adults.

Detecting cancer earlier:

- to improve early diagnosis rates of cervical, breast, oral, colorectal, and skin cancers through raising awareness of early signs and symptoms;
- to develop an effective and efficient cytology screening programme for cervical cancer.

Provide curative therapy:

- to improve access to good quality, standardized treatments for all patients having early detectable cancers or cancers having high potential of curability;

- to ensure the use of non-invasive procedures for all patients with pre-cancerous cervical lesions.

End of life care:

- to improve control of symptoms and prolong physical autonomy in all patients with advanced cancer;
- to provide psychosocial assistance and facilitate spiritual support to the majority of incurable patients and their families.

Reduce inequalities:

- to ensure that prioritized cancer preventive and control services are provided to all sectors of the population.

Evaluating possible strategies for cancer control

The activities, standards and guidelines of a cancer strategy need to be based on sound and current scientific evidence. This requires expertise to critically review scientific information and evaluate the costs of various interventions. In particular, those designing the strategy need to understand how to analyse the evidence or undertake systematic reviews. If this expertise is not available within a country, outside experts should be called upon to assess the evidence. This assessment should highlight points for discussion and identify points of contention. For example, if there are conflicting research results, the original papers should be presented and the differences between them, including methodological differences, should be discussed.

Cost-effectiveness studies should be considered in the critical review. These usually consider only direct medical costs, an approach that works well in a public system with set pricing. It is, however, also important to assess cost-effectiveness based on societal perspectives, and to include non-medical as well as direct medical costs when evaluating strategies.

Further, the effectiveness of interventions needs to be defined as a function of tangible outcomes, based on epidemiological or clinical knowledge. The assumptions inherent in the stated outcomes need to be considered, especially as to whether or not they are applicable in a developing country.

Choosing priorities for initial cancer control activities

Once possible strategies are identified there is a need to choose those that are feasible to implement and that are acceptable and relevant to the society. In developed and developing countries alike, resources for cancer control (funds, trained people, equipment, and facilities) 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, therefore, 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;
- estimating the cost of the activity.

A number of models have been developed by WHO and others to facilitate this process (Eddy, 1986; WHO, 1986a). It must be recognized, however, that the validity of a model is entirely dependent on the validity of the assumptions made and of 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 would be nearly a third less than the cost of screening starting at age 20 (Eddy, 1986). Either of these options, however, would be far more cost-effective than screening for stomach cancer, also a common cancer in Chile.

ASSESSMENT OF STRATEGIES FOR EIGHT COMMON CANCERS

Table 10.5 assesses the strategies for eight common cancers worldwide. In order to make the best use of resources, it is important to identify both effective strategies and strategies that are largely ineffective. Although it is difficult to place a cost on the various strategies for cancer control because of variations between countries, including different levels of existing infrastructure and differences in local strategy implementation, an approximate relative indicator of expense is also included in Table 10.5. In general, prevention and palliative care require less national resources commitment than early detection (screening) and treatment. However, the benefits of a cancer prevention programme will only be realized 20–30 years after effective implementation of the programme.

Since cancer control depends on the application of existing knowledge, no activity should be introduced unless its effectiveness is strongly supported by

Table 10.5 Assessment of strategies for eight common cancers

Site of cancer	Prevention		Early detection		Curative therapy		Palliative care	
Mouth/pharynx	++	\$	–	\$\$	+	\$\$	++	\$
Oesophagus	+	\$	–		–		++	\$
Stomach	++	\$	+	\$\$	–		++	\$
Colon/rectum	++	\$	+	\$\$	+	\$\$	++	\$
Liver	++	\$	–		–		++	\$
Lung	++	\$	–		–		++	\$
Breast	+	\$	++	\$	++	\$	++	\$
Cervix	+	\$	++	\$	++	\$	++	\$

++ effective; + partly effective; – largely ineffective

\$ less expensive; \$\$ more expensive

Sources: Adapted from: Stjernswärd J. *Cancer control: Strategies and priorities*. *World Health Forum*, 1985, 6: 160–164

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, for example, 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, and so on).

FORMULATING THE NATIONAL CANCER CONTROL PROGRAMME POLICY

Ideally, the national cancer control programme policy should be formulated once the planning process has been completed. It will provide a solid platform for implementing and maintaining the national cancer control programme.

A policy may be defined as an explicit commitment by government and its partners that provides objectives for a balanced cancer control programme, specifies the relative priority of each objective and indicates the resources and measures required to obtain the objectives. It should cover the following elements:

- the challenges posed by cancer, both now and in the future: current challenges are identified by the cancer data described above, together with information (if available) on the stage at diagnosis of the important cancers in the country;

Box 10.2 Cancer Policy as part of the National Health Plan

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 a nation's health programme.

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 a total national health plan. Equity, within both oncology and other health services should be promoted.

Cancer prevention policy as a component of integrated health promotion and noncommunicable disease prevention policies

WHO has developed, in close collaboration with its Member States and other partners, a global strategy for the prevention and control of noncommunicable diseases in which cancer control appears as one of the four major priorities. The global strategy was endorsed by the 53rd World Health Assembly held in May 2000 and emphasizes the need for an integrated approach to health promotion and noncommunicable disease prevention strategies. Because tobacco use, alcohol, nutrition,

physical inactivity and obesity are risk factors common to other noncommunicable diseases, programmes to prevent cancer, cardiovascular disease, diabetes and respiratory diseases can effectively use the same surveillance and health promotion mechanisms. Close collaboration among the disease-specific stakeholders is necessary to maximize the effectiveness of the available resources and achieve the desired population behavioural changes. Regional networks are also recognized as an important approach to facilitate national programme development. The CINDI programme (Countrywide Integrated Noncommunicable Disease Intervention) in Europe and CARMEN programme in the Americas are regional networks. Both are repositories of a wealth of experience, especially regarding programme implementation.

Intersectoral aspects of a cancer control policy

Because the control of cancer involves so many social vectors—economic, educational and political—a broad, society-based approach is required; expertise in the disease alone will not suffice. The intersectoral approach requires analysis of all the social elements that can affect the control of cancer. Those concerned with cancer control must work with authorities in agriculture, commerce, communications, education, industry, and law in order to achieve success.

The spirit and philosophy of full participation must be part of the planning process. It is critical that the ministry of health understand, accept and adopt a stakeholder-driven

approach. The importance of involving a range of multiple stakeholders in the process must not be overlooked, since successful implementation depends on recommendations for the strategy originating from the groups that will eventually be expected to execute the strategy. Particularly important is ensuring the involvement of community representatives, notably cancer survivors who can offer insights into programme design based on their needs and experiences with the health care system. This is exemplified by the need to control tobacco use as a means of preventing cancer. Social and economic pressures are the key factors in the initiation and maintenance of tobacco addiction. Controlling tobacco use, therefore, requires a multisectoral and comprehensive approach. This may entail dealing with international agencies, governments, nongovernmental organizations, the media, the health professions, childhood education, as well as with civil society, to curb the tobacco epidemic. 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 coming from different sectors, 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 broad aims of the cancer control policy, which are:
 - prevention of cancer;
 - early detection, coupled with effective and efficient treatment of potentially curable disease;
 - relief of pain and palliative care to improve the quality of life of patients;
- the principles on which the policy is to be based;
- an explicit statement of goals, objectives and priorities within the policy;
- the programmes, both new and revised, that will be required to carry out the policy;
- the resources currently available and those that will be required to carry out the policy in full;
- the roles and responsibilities of those involved in carrying out the various activities at the different levels of the health system;
- 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 evaluating the national cancer control programme.

