OECD Health Policy Studies

Cancer Care

ASSURING QUALITY TO IMPROVE SURVIVAL

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BETTER POLICIES FOR BETTER LIVES

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Foreword

Cancer remains a major health care challenge in OECD countries and the financial burden associated with cancer is also growing. However, despite recent improvements in cancer treatment and prevention, countries are not doing as well as they could to fight the disease: an estimated one-third of cases could be cured if detected on time and adequately treated, and another one-third could be prevented entirely if more far-reaching public health measures were in place. Furthermore, cancer survival data show almost a four-fold difference across OECD countries. While some countries are lagging behind in cancer care performance, other countries have designed systems that make them global leaders in the fight against cancer.

This report aims to share best practice and improve cancer care performance across countries. Drawing on questionnaires and structured interviews conducted with cancer experts in 35 countries, it describes variations in the resources countries allocate to cancer care, care practices and governance systems for cancer care. It explores the policy trends in cancer care across countries over the past decade and identifies which policy approaches are associated with the best cancer survival. The report concludes by offering concrete recommendations for creating and supporting high-quality cancer care systems.

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Acronyms and abbreviations

ACS	American Cancer Society
AIFA	Agenzia Italiana del Farmaco
CanNET	Cancer Service Networks National Demonstration Programme
CoC	Commission on Cancer
CS	Colonoscopy
CSR	Cancer Statistics Review
CT	Computed Tomography
DALY	Disability adjusted life year
DCO	Death Certificate Only
EMEA	European Medicines Evaluation Agency
EUnetHTA	European Network for Health Technology Assessment
FDA	US Food and Drug Administration
FOBT	Faecal occult blood test
FS	Flexible sigmoidoscopy
FTCS	Federal Tobacco Control Strategy
GDP	Gross domestic product
GHS	French Diagnosis-Related Groups (DRG)
HAS	Haute Authorité de Santé
HCQI	OECD Health Care Quality Indicators
HEP	Hospital Evaluation Programme
HTA	Health Technology Assessment
IOM	Institute of Medicine
ISCC	International Cancer Survival Standard
LVL	Latvian Lat
MBA	Medical Board of Australia
MRI	Magnetic resonance imaging
NCCP	National Cancer Control Plan
NCDB	National Cancer Data Base
NHS	National Health System
NICE	National Institute of Health and Clinical Excellence
NMR	Nuclear magnetic resonance
PANDA	Programa Adulto Nacional de Drogas Antineoplásicas (Chile)
PET	Positron emission tomography
PIP	Practice Incentives Programme
PPP	Purchasing power parities
PROM	Patient-Reported Outcome Measure
PSA	Prostate specific antigen

PTT	Temporary therapeutic protocol
QA	Quality assurance
SEER	Surveillance Epidemiology and End Results
SHA	System of Health Accounts

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Executive summary

The continuing burden of cancer

Cancer remains a major health care challenge in all OECD countries. More than 5 million new cases of cancer are diagnosed every year in OECD countries, averaging about 261 cases per 100 000 people. Cancer is responsible for more than one-quarter of all deaths and, in terms of potential life years lost, is a bigger problem than heart attacks and strokes for both men and women.

The financial burden associated with cancer is also growing. The increasing incidence of cancer, prolonged survival and high costs of novel drugs and technologies mean that growth in spending on cancer, which currently consumes around 5% of all health care costs, is likely to increase further. Cancer patients and their carers also bear significant costs, both financial and social. Once these are taken into account, the global economic impact of premature death and disability from cancer is around USD 900 billion, larger than that for heart disease.

Health systems need to do better

Countries are not doing as well as they could to battle cancer. An estimated one-third of cases could be cured if detected on time and properly treated, and another one-third could be prevented entirely if more far-reaching public health measures were in place. Although death rates from cancer have declined slightly in most OECD countries since 1995, the decline has been more modest than for heart disease and stroke, and some countries have not shown any reduction in cancer deaths. Furthermore, cancer survival shows almost a four-fold difference across the OECD and is persistently lower in eastern European countries than elsewhere in the OECD.

The characteristics of good clinical cancer care are well established, so it is important to follow evidence-based clinical guidelines covering the whole patient pathway: early detection, diagnosis, treatment, monitoring and palliative care. Preventive strategies are also vital phases of cancer care. Across the cancer care pathway, a holistic approach, including psychosocial support and effective communication between clinical teams, patients and carers, is critical.

Answering the policy challenge posed by cancer is less evident. How can policy makers design a cancer care system to ensure that high-quality care is consistently available to all cancer patients? How can they ensure that the quality of care is continuously improving? While some countries are lagging behind in cancer care performance, other countries' survival and mortality rates suggest that they have designed cancer care systems that make them global leaders in the fight against cancer.

What works?

This report aims to share best practice, spur health care reform and improve cancer care performance. Drawing on questionnaires and structured interviews conducted with cancer experts in 35 countries, it describes variations in the resources countries allocate to cancer care, their care practices and their governance systems for cancer care. It also examines the extent to which international variations in cancer survival are associated with different cancer care policies. It explores the policy trends in cancer care across countries over the past decade and identifies which policy approaches are associated with the best survival and mortality rates for breast, cervical, colorectal and lung cancers.

It identifies three main policy areas that help improve the quality of cancer care: *resources* (drugs, equipment, institutions and workforce); *practices* (timely and affordable access to evidence-based care, including preventive work and screening); and *governance* (national plans setting out targets, guidelines for care and means for monitoring progress, plus regulatory aspects of care such as service accreditation and professional licensing). Drawing on this framework, the report concludes by offering concrete recommendations for creating and supporting high-quality cancer care systems.

Key recommendations

In the fight against cancer, countries should:

- *Put adequate and effective resources into cancer care.* Cancer care is expensive and consumes a significant portion of the national spend on health care. Each country will decide for itself how much money, in absolute terms and relative to competing priorities, it wishes to dedicate to cancer. Whatever the allocation, however, resources must be well spent. Expensive health care is not necessarily the best care: countries need the right policies in place to use resources effectively and fairly.
- *Ensure that cancer care is both rapidly accessible and high quality.* Perhaps the most critical element in improving an individual's chances of surviving cancer is diagnosing it at an early stage and starting treatment quickly. Countries need rigorous, high-quality national screening programmes in place. Once cancer is diagnosed, patients need to access high-quality care quickly, with minimal waiting times to see specialists. As a policy priority, countries should develop a clear understanding of the pattern of excessive or inequitable waiting times for cancer care in their population and respond with policies suited to the local context.
- *Continuously improve services by strengthening the governance of cancer care.* The bedrock of governance is a national cancer control plan (NCCP). NCCPs can focus political and public attention on the performance of cancer care systems and on outcomes, attract new resources, and drive debate on difficult topics such as resource allocation. They offer opportunities to consider cancer care in combination with other services, such as social care, thus improving quality across the entire care pathway and reinforcing the common goals shared by patients, physicians, researchers, health care providers and other stakeholders. NCCPs are essentially about setting standards, both in terms of what the cancer care system is expected to achieve (with targets), and in how it goes about it (through guidelines).
- *Monitor and benchmark performance through better data.* Countries vary in their ability to measure cancer care systems and outcomes. Systematic measurement in the areas related to cancer care outcomes, costs, processes, and quality within and across

countries need to be strengthened. Countries should prioritise building rich information systems that can monitor the performance of their cancer care system while utilising existing sources in a structured manner. Public dissemination, benchmarking and financial or organisational incentives may also serve to focus minds and resources and ensure continuously improving cancer care.

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Chapter 1

Cancer care systems: Increasing burdens and existing performance gaps

Chapter 1 sets out why it is important to study cancer care. It shows that cancer remains a major challenge in all OECD countries, not only in terms of the immense human costs, but also with respect to the financial costs to the health sector, to patients and their families and to the wider economy. It also demonstrates marked differences in survival. This suggests an urgent need to understand whether particular policy approaches are associated with better outcomes.The chapter also explains the conceptual framework used to explore this policy question. Country-level information on cancer care systems and relevant policy approaches are gathered from standardised questionnaires based on this framework and interviews with cancer experts.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Introduction

With several million new cases a year, cancer presents a major health care challenge in all OECD countries. As the cause of more than a quarter of all deaths, cancer has a tremendous human cost in every country, and despite continuing improvements in care, mortality and survival, it is likely to place an increasing burden on countries in the future, including financially.

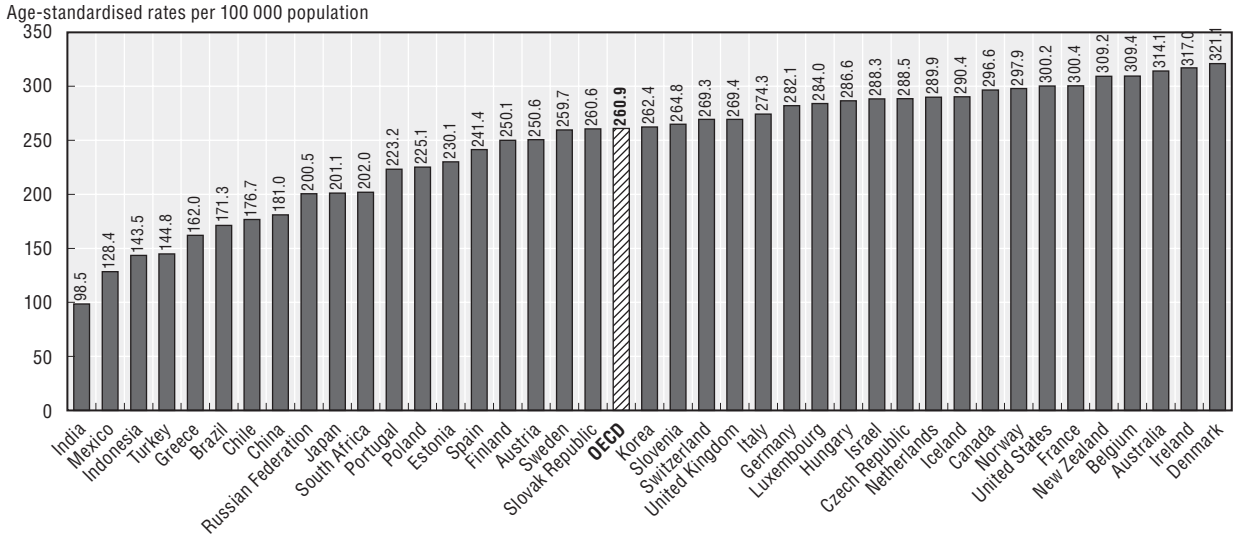
This chapter defines cancer and examines some recent trends in cancer incidence and survival, including some marked differences in survival between countries. This suggests an urgent need to understand whether particular policy approaches are associated with better outcomes.

Chapter 1 also explains the conceptual framework we have used to explore this policy question and describes the epidemiology of the four main types of cancer used by this report for the purpose of international comparison: breast cancer, cervical cancer, colorectal cancer and lung cancer. Country-level information on cancer care systems and relevant policy approaches are gathered from standardised questionnaires developed based on the conceptual framework and interviews with cancer experts. The chapter concludes with an explanation of how this report is structured.

Cancer: What it is and recent trends in rates of incidence

In 2008, an estimated 5.2 million new cases of cancer were diagnosed in OECD countries, i.e. an average of 261 cases per 100 000 population. As shown in Figure 1.1,

Figure 1.1. **All cancers incidence rates, total population, 2008**



Note: Mortality rates are standardised based on 1980 OECD population.
Source: OECD (2011), *Health at a Glance 2011: OECD Indicators*, doi: *10.1787/health_glance-2011-en*.

StatLink http://dx.doi.org/10.1787/888932866317

globally, high-income countries tend to have higher cancer incidence rates than middle- or lower-income ones, because people in high-income countries are more likely to be overweight, consume more alcohol and be inactive, each of which is a risk factor for several common cancers (smoking rates show a mixed picture and typically are falling in OECD countries whilst increasingly rapidly in some low- and middle-income countries). Furthermore, high-income countries have good records in diagnosing cancers, which contributes to higher reported incidence rates than countries where incidence may appear low due to lower detection rates (OECD, 2011).

Cancer incidence is higher among men than women across countries. Incidence is more than 50% higher for men in Spain, Turkey, Poland and Japan while the gender gap is small, within 10%, in Mexico, Israel and Denmark.

The most commonly diagnosed cancers in OECD countries in 2008 were colorectal (665 000 cases) and lung cancer (663 000 cases), each making up 13% of all new cases. Incidence of these cancers was higher among men across OECD countries; on average, new cases of colorectal cancer were 53% higher and those of lung cancer were as much as three-times higher. Among men, prostate cancer was the most common cancer (632 000 cases, or 23% of all new male cancers), followed by lung and colorectal. Among women, breast cancer was most common (639 000 cases, or 27% of all new female cancers), and then colorectal and lung cancer (OECD, 2011).

Cancer incidence rates increased up until around the year 2000, but since then have shown different trajectories. The rates decreased in recent years for cervical, colorectal and lung cancers. The decline in lung cancer incidence has followed the reduction in smoking over recent decades. But breast cancer incidence rates have increased in almost all OECD countries. These increases are largely due to improvements in diagnosis and the growing number of women who receive mammography screening, leading to a subsequent rise in the detection of new cases. Likewise, the rise in the reported incidence of prostate cancer in many countries since the 1990s is due largely to the greater use of prostate specific antigen (PSA) diagnostic tests (OECD, 2011), although the use of these tests has also fluctuated because of their cost and uncertainty about the long-term benefit to patients.

Box 1.1. **What is cancer?**

Cancer is a generic term for a large group of diseases that can affect any part of the body. Other terms used are malignant tumours and neoplasms.

Cancer arises from a single cell, which transforms into a malignant, rapidly reproducing colony of abnormal cells that grow beyond their usual boundaries, and which can then invade adjoining parts of the body and spread to other organs. This process is referred to as metastasis, and metastases are the major cause of death from cancer. The transformation from a normal cell into a tumour cell is a multistage process, resulting from the interaction between a person's genetic factors and three categories of external agents, including:

- physical carcinogens, such as ultraviolet and ionising radiation;
- chemical carcinogens, such as asbestos, components of tobacco smoke, aflatoxins (a food contaminant) and arsenic (a drinking water contaminant); and
- biological carcinogens, such as infections from certain viruses, bacteria or parasites.

Box 1.1. **What is cancer?** *(cont.)*

Ageing is another fundamental factor for the development of cancer. The incidence of cancer rises dramatically with age, most likely due to a build-up of risks for specific cancers that increase with age. The overall risk accumulation is combined with the tendency for cellular repair mechanisms to be less effective as a person grows older.

More than 30% of cancer deaths could be prevented by modifying or avoiding key risk factors, including:

- tobacco use;
- being overweight or obese;
- unhealthy diet with low fruit and vegetable intake;
- lack of physical activity;
- alcohol use;
- sexually transmitted HPV infection;
- urban air pollution;
- indoor smoke from household use of solid fuels.

Tobacco use is the single most important risk factor for cancer, causing 22% of global cancer deaths and 71% of global lung cancer deaths.

Source: WHO (2012), *www.who.int/cancer*.

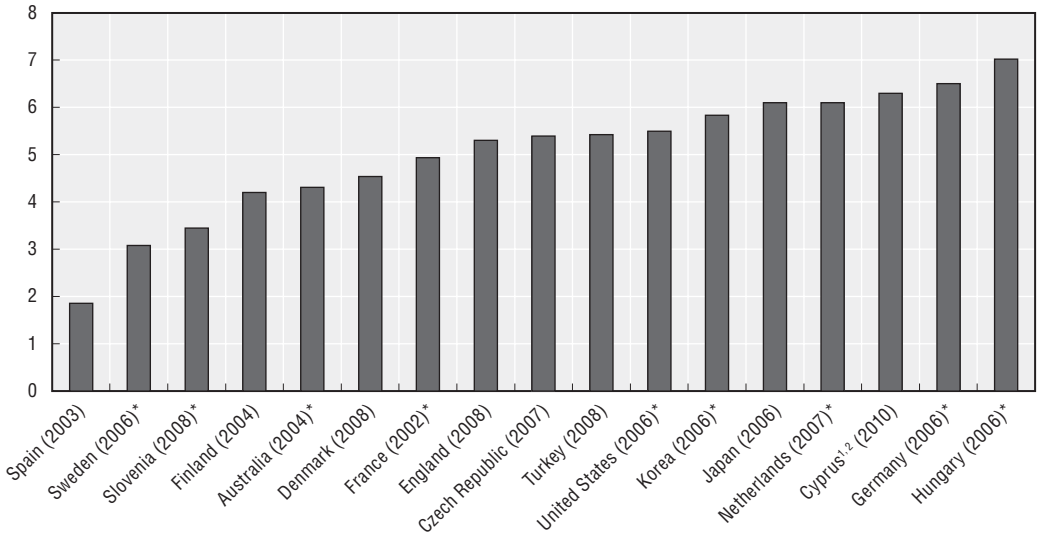
Cancer is associated with great financial cost, within the health care sector and beyond

Cross-national comparison of expenditure on cancer care is challenging as a uniform approach has not been applied across countries, but based on the OECD data, per capita spending on cancer care varied between USD PPP 32 per person per year in Turkey to over USD PPP 400 per person per year in the United States. As a proportion of total health expenditure, spending on cancer care ranged between 3% and 7% (Figure 1.2). It should be noted that the data are available for different years across countries, so the ranking of the countries needs to be interpreted with care.

The Lancet Oncology Commission (*The Lancet Oncology*, 2011) reported that the total costs of cancer care in the United States were estimated to be more than USD 124 billion for 2010, representing roughly 5% of total health care spending. Responding to the OECD Health Care Quality Indicators (HCQI) Questionnaire on Systems of Cancer Care, the English National Health System (NHS) reports that total cancer spending was GBP 5.13 billion in 2008, representing 5.3% of total health spending for the year, and Japan reports that cancer costs accounted for 6.1% of total health care spending in 2006.

The level of health care spending for a particular cancer generally reflects its prevalence and survival compared to other cancers. For example, spending is usually higher for breast cancer, reflecting its high incidence (71.6 cases per 100 000 women on average in the OECD) and survival (on average, 83.5% at five years), and ranges between 8.3% of total cancer costs in Australia to up to 19.0% in Denmark (compared to 8.1% and 13.6% respectively on colorectal cancer). For lung cancer, spending varies between 4.7% and 11.2% of total cancer costs and, for cervical cancer, between 0.4% and 3.7%.

Figure 1.2. **Percentage of total health expenditure spent on cancer care**



Note: Data from countries with an asterisk come from OECD Disease Expenditure Studies and data include expenditure for benign neoplasms. Data from other countries were collected through the OECD Questionnaire on Systems of Cancer Care 2010. Data for Sweden and Denmark refer to costs in hospitals only. Data for Finland do not include all costs related to medications. Further systematic efforts are needed to improve cross-national comparability of these data.

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Source: OECD Disease Expenditure Studies and OECD Questionnaire on Systems of Cancer Care 2010.

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Besides medical care costs, cancer patients also incur expenses on non-medical care, placing an additional burden on them and their caregivers. For example, in Korea, non-medical care costs are estimated to be at least 25% of the cost of medical care, and for breast cancer patients in Sweden the annual cost of the informal care provided by family and friends in the first year was estimated to be 21% of the medical costs (Lidgren et al., 2007).

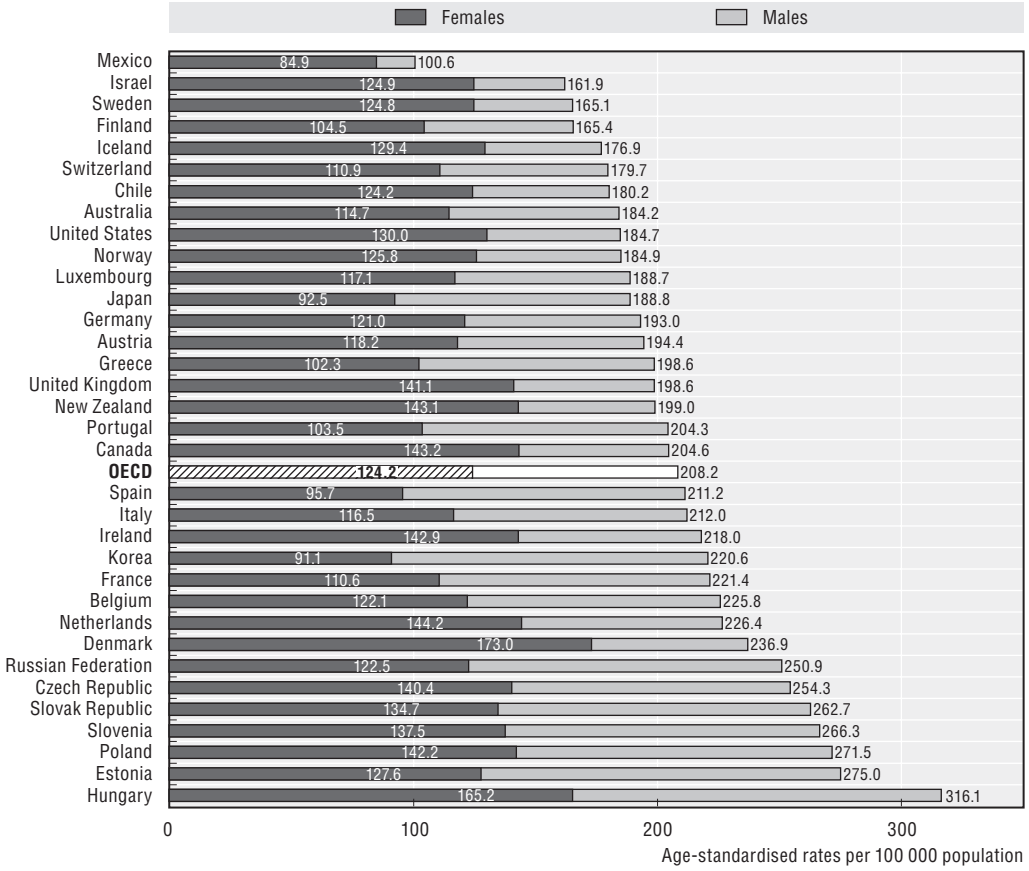
In addition to the significant costs of medical and social care related to cancer (Meropol and Schulman, 2007; Mariotto et al., 2011; National Cancer Institute, 2011), the economic cost is also substantial across countries as a result of premature deaths and lost earnings (Featherstone and Whitham, 2010). Cancer causes the highest economic loss of the leading causes of death worldwide. The economic toll from cancer is nearly 20% higher than for heart disease, the second-leading cause of economic loss (American Cancer Society, 2010). The American Cancer Society estimates the total economic impact of premature death and disability from cancer worldwide to have been USD 895 billion in 2008. This figure based on disability adjusted life year (DALY) and GDP per capita across countries does not include the direct costs of treating cancer but represents 1.5% of the world's GDP. The top three cancers that caused the most economic impact globally were lung cancer (USD 188 billion), colorectal cancer (USD 99 billion) and breast cancer (USD 88 billion).

Since cancer incidence is increasing, medical as well as non-medical costs are expected to grow in the future. For example, in Japan, total spending on cancer is estimated to have grown from USD 27 billion in 1990 to USD 90 billion in 2008 and is projected to reach USD 157 billion (in today's dollars) by 2020; this roughly amounts to a 600% increase in 30 years (*The Lancet Oncology*, 2011).

Cancer is causing an increasing numbers of deaths

Cancer is the second-leading cause of mortality in the OECD countries after diseases of the circulatory system. Worldwide, cancer accounted for 7.6 million deaths (around 13% of all deaths) in 2008, a figure that is projected to rise to over 13.1 million in 2030. Within the OECD countries, cancer accounted for 28% of all deaths in 2009. Cancer mortality rates were lowest in Mexico, Israel, Sweden and Finland and highest in the central and eastern European countries (Hungary, Poland, Slovenia, the Czech and Slovak Republics) and Denmark (Figure 1.3; OECD, 2011).

Figure 1.3. **All cancers mortality rates, males and females, 2009 (or nearest year)**



Note: Data refer to 2008 for France, Israel, Luxembourg, Poland Spain and Sweden, 2007 for Chile, Italy, Mexico, New Zealand, Switzerland and the United States, 2006 for Australia, Denmark and Russian Federation, and 2004 for Canada.

Source: OECD (2011), *Health at a Glance 2011: OECD Indicators*, doi: *10.1787/health_glance-2011-en*.

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Death rates from all types of cancer for males and females have declined at least slightly in most OECD countries since 1995, although the decline has been more modest than for cardiovascular diseases. The exceptions to this declining pattern are Greece, Portugal and Estonia, where cancer mortality has remained static. Cancer mortality rates are higher for men than for women in all countries, which is explained partly by the greater prevalence of risk factors among men, as well as the lesser availability or use of screening programmes for cancers affecting men, leading to lower survival after diagnosis.

This report focuses on four cancers, chosen for their public health burden and the availability of robust comparable data across OECD countries: breast, cervical, colorectal and lung. Furthermore, breast and cervical and colorectal cancers are considered curable if detected early enough. Information on the risks and disease burden associated with each is given below.

Breast cancer

Breast cancer is the most prevalent form of cancer in women, accounting for almost 460 000 deaths worldwide in 2008 (WHO, 2011). In the western industrialised countries, one in nine women will acquire breast cancer at some point in her life and one in thirty will die from the disease. There are a number of risk factors that increase a person's chance of getting this disease, such as age, family history of breast cancer, estrogen replacement therapy, alcohol use and others.

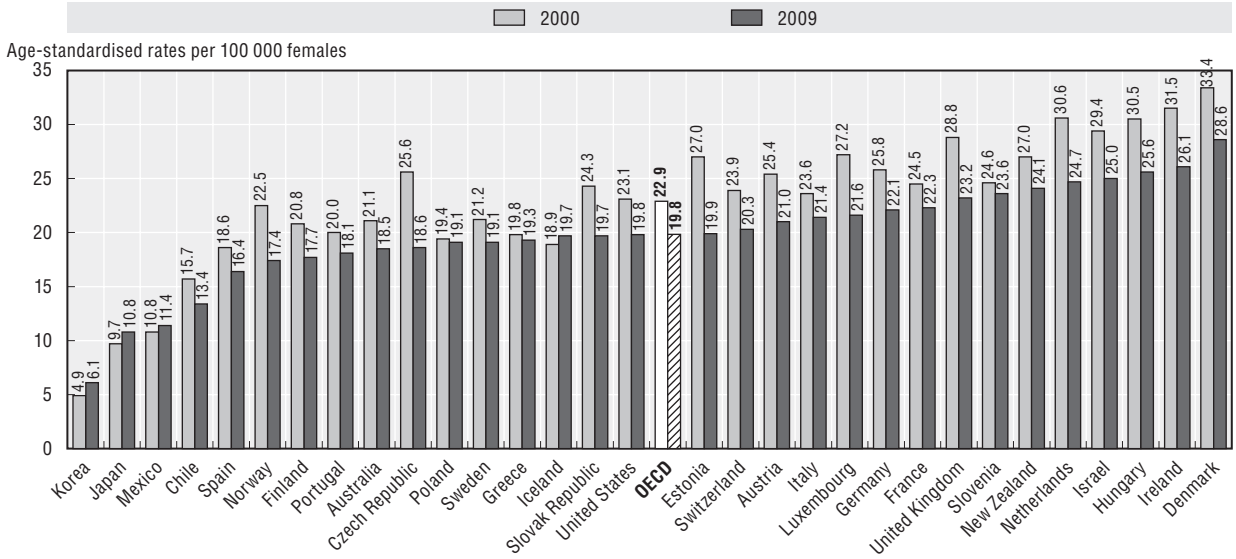
The promotion of screening mammography (European Union, 2003) has led to the detection of the disease at earlier stages. Most OECD countries have adopted breast cancer screening programmes as the most effective way for detecting the disease. The periodicity and population target groups vary across member states and are still the subject of debate. EU guidelines (European Commission, 2006), for example, promote a desirable target screening rate of at least 75% of eligible women in European countries. Further discussion on screening programmes is available in Chapter 3.

These improvements in the early detection and treatment of breast cancer have been reflected in mortality rates. Overall, breast cancer mortality rates have declined in most OECD countries over the past decade (Figure 1.4). The improvements were substantial in Estonia, the Czech Republic, the Netherlands, the United Kingdom,[1] Luxembourg and Norway. The exceptions are Korea, Japan, Iceland and Mexico, where the increases were modest and mortality rates continue to be among the lowest in the OECD countries.

Cervical cancer

Cervical cancer is preventable, and curable if detected early. The main cause of cervical cancer, accounting for approximately 95% of all cases, is sexual exposure to the human papillomavirus, HPV (IARC, 1995; Franco et al., 1999). The primary prevention of cervical cancer attributable to human papillomavirus types 16 and 18 by prophylactic vaccines has been shown to be highly effective and is now recommended in many countries worldwide (Shefer et al., 2008; Koulova et al., 2008). Two important methods for secondary prevention are Pap smears and HPV DNA testing. These facilitate the early detection of premalignant lesions that can then be treated more effectively than more advanced tumours. Population-based cancer screening programmes have been promoted by the Council of the European Union and the European Commission (European Union, 2003; European Commission, 2008), but since the introduction of HPV vaccination programmes there has been much discussion about whether cervical cancer screening needs to be re-evaluated. It

Figure 1.4. **Breast cancer mortality, females, 2000 and 2009 (or nearest year)**



Note: Data refer to 2008 for France, Israel, Luxembourg, Mexico, Poland, Spain and Sweden, 2007 for Chile, Italy, New Zealand, Switzerland and the United States, 2006 for Australia, Denmark and Russian Federation, 2005 for Belgium, and 2004 for Canada.
Source: OECD (2011), *Health at a Glance 2011: OECD Indicators*, doi: *10.1787/health_glance-2011-en*.

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may, for example, be appropriate in the case of HPV-vaccinated populations to initiate screening at older ages than is currently recommended (Goldhaber-Fiebert et al., 2008; Wheeler et al., 2009).

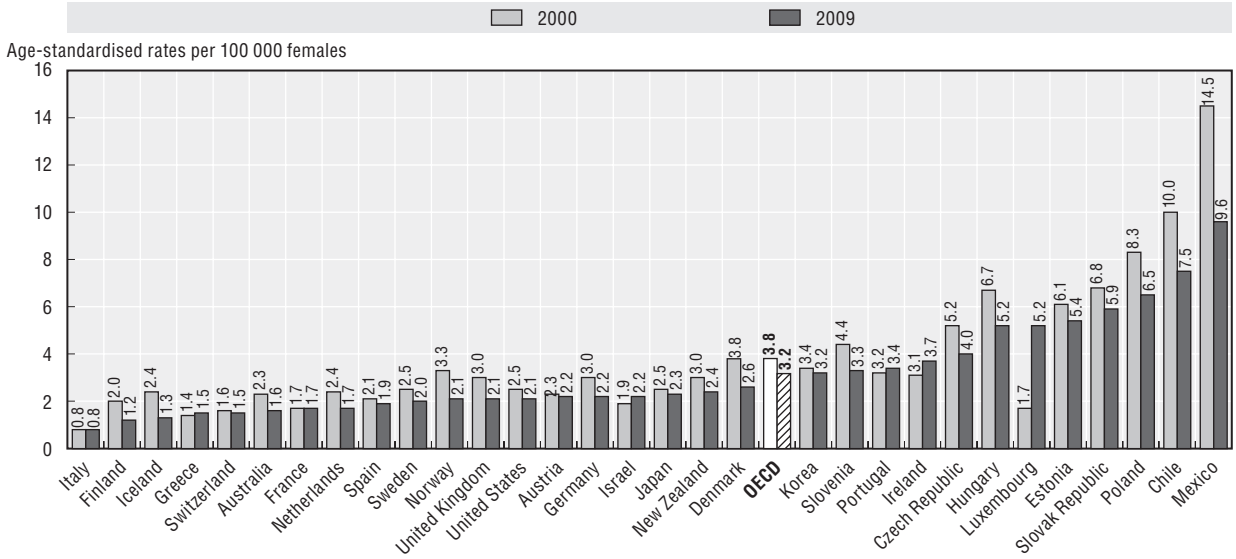
Mortality rates reflect the effect of cancer care in past years, particularly of improved diagnosis of early stage cancers with a better prognosis, as typically happens when screening is widespread. The mortality rates for cervical cancer declined for most OECD countries between 2000 and 2009, apart from Luxembourg, Ireland, Israel, Portugal and Greece (Figure 1.5). Mexico experienced a sharp decrease in cervical cancer mortality, from 14.5 per 100 000 females to 9.6, although it still has the highest rate among OECD countries.

Colorectal cancer

Colorectal cancer is the most common cancer diagnosed in the OECD countries; worldwide, approximately one million new cases are diagnosed per year (Parkin et al., 2005). There are several factors that place certain individuals at increased risk for the disease, including age, the presence of polyps, ulcerative colitis, a diet high in fat, and genetic background. The disease is more common in the United States and Europe, and is rare in Asia. However, in Asian countries where people are gradually adopting western diets, such as Japan, the incidence of colorectal cancer is increasing (IARC, 2011). It is estimated that approximately 610 000 people worldwide died due to colorectal cancer in 2008 (WHO, 2011).

Colorectal cancer screening is recommended in adults, using faecal occult blood testing, sigmoidoscopy or colonoscopy, beginning at around age 50 or later. Issues such as the precise age group targeted and the screening interval are determined by local cost-benefit analyses and the screening method used (USPSTF, 2008; NHSBCSP, 2008).

Figure 1.5. **Cervical cancer mortality, females, 2000 and 2009 (or nearest year)**



Note: 2000 data for the United Kingdom refers to 1999, and 2009 data refer to 2008 for France, Israel, Luxembourg, Mexico, Poland, Spain and Sweden, 2007 for Chile, Italy, New Zealand, Switzerland and the United States, and 2006 for Australia, Denmark and Germany.
Source: OECD (2011), *Health at a Glance 2011: OECD Indicators*, doi: *10.1787/health_glance-2011-en*.

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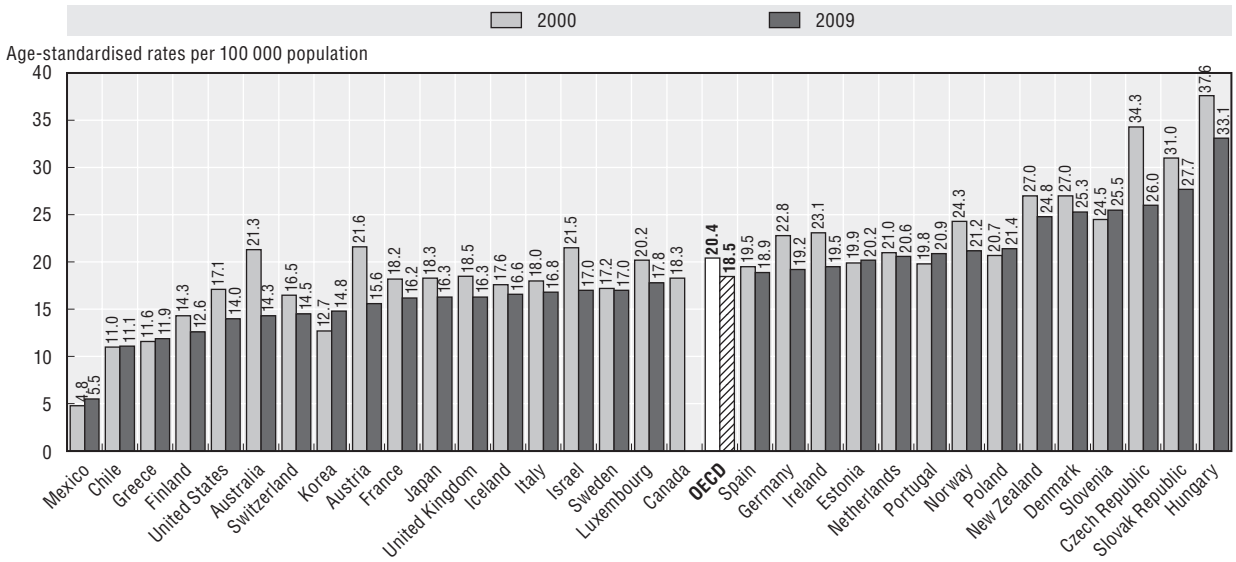
Most countries experienced a decrease in mortality for colorectal cancer between 2000 and 2009 (Figure 1.6), with the exceptions of Korea, Portugal, Slovenia, Poland, Mexico, Greece, Estonia and Chile. The central and eastern European countries tend to have higher mortality rates than other OECD countries. Despite a decrease in mortality for colorectal cancer over the past decade, Hungary continues to have the highest mortality rate for colorectal cancer, followed by the Slovak Republic and the Czech Republic.

Figure 1.6. **Colorectal cancer mortality 2000 and 2009 (or nearest year)**



Note: 2009 data refer to 2008 for France, Israel, Luxembourg, Mexico, Poland, Spain and Sweden, 2007 for Chile, Italy, New Zealand, Switzerland and the United States, and 2006 for Australia, Denmark and Germany.
Source: OECD (2011), *Health at a Glance 2011: OECD Indicators*, doi: *10.1787/health_glance-2011-en*.

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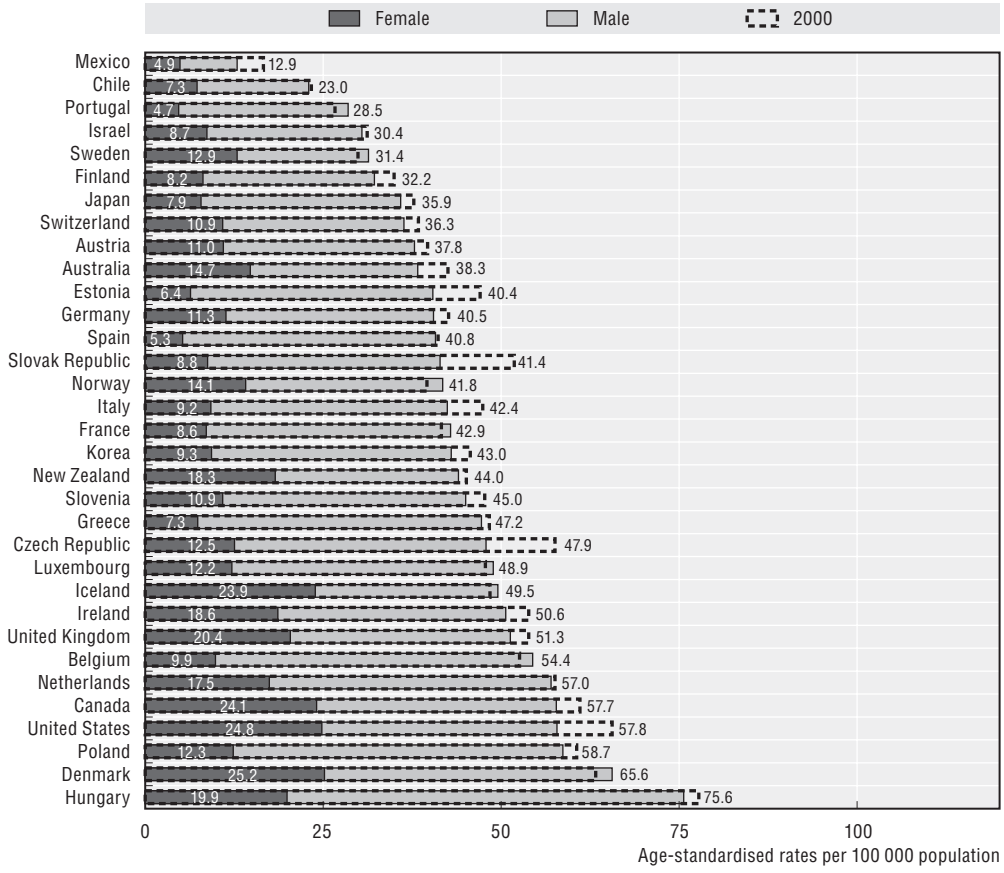
Lung cancer

Lung cancer is responsible for the largest number of cancer deaths among men in OECD countries, except in Sweden, Mexico and Chile, and is one of the main causes of cancer mortality among women. Tobacco smoking is the most important risk factor for lung cancer: smokers are 10-15 times more likely than non-smokers to develop lung cancer, and smoking accounts for 85% of all cases of lung cancer. In 2009, death rates from lung cancer among men were highest in Hungary, Poland, Belgium, Denmark, Greece and the Netherlands (Figure 1.7). These are all countries where smoking rates among men are relatively high. Death rates from lung cancer among men were low in Chile, Mexico and Sweden, which, in the latter two countries, reflects smoking rates.

Figure 1.7. **Lung cancer mortality rates, males and females, 2009 (or nearest year)**



Note: 2009 data refer to 2006 for Belgium and Denmark, 2007 for Switzerland, and 2008 for New Zealand and the United States.

Source: OECD (2011), *Health at a Glance 2011: OECD Indicators*, doi: *10.1787/health_glance-2011-en*.

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Following the declining trend of smoking in recent decades, the mortality rates of lung cancer have declined across countries. Between 2000 and 2009, the mortality rates fell in most countries except for Belgium, Denmark, France, Iceland, Luxembourg, Norway, Portugal, and Sweden (Figure 1.7). Cross-country variations and downward trend of smoking rates and anti-smoking policies are discussed in Chapter 3.

Performance of cancer care is uneven across countries

Together with cancer incidence and mortality, survival estimates are key measures of assessing quality of cancer care systems and they are commonly used as outcome measure to track progress in treating a disease over time. They reflect both how early the cancer was detected and the effectiveness of the treatment (Box 1.2).

Box 1.2. **Relative survival and mortality**

Relative cancer survival reflects the proportion of patients with a certain type of cancer who are still alive after a specified time period (commonly five years) compared to those still alive in the absence of the disease. Relative survival estimates capture the excess mortality that can be attributed to the diagnosis. For example, a five-year relative survival estimate of 80% does not mean that 80% of the cancer patients are still alive after five years, but that 80% of the patients that were expected to be alive after five years, given their age and sex at diagnosis, are in fact still alive. All the survival estimates presented in the report have been age-standardised using the International Cancer Survival Standard (ICSS) population.

The comparison of survival estimates is, however, challenging. First, cancer screening programmes and activities often contribute to improved survival statistics through lead time bias and overdiagnosis. Earlier diagnosis through screening may appear to prolong survival even without any change in the course of disease progression (lead time bias), and through screening, people may be diagnosed and treated even if they did not need treatment (overdiagnosis), adding surviving patients and inflating survival estimates. Screening methods and practices are different across countries and they lead to a varied extent of lead time bias and overdiagnosis, a different impact on survival estimates and consequently a complexity in cross-national comparisons of survival. Second, survival estimates are not adjusted for the tumour stage at diagnosis, which complicates assessment of the impacts of early detection initiatives and better treatment. Third, the OECD has been making efforts to collect cancer survival in a standardised manner but given the differences in the data availability across countries, calculation methods have not been completely harmonised yet.

Cancer mortality rates are based on the number of deaths with cancer as the underlying cause of death occurred in a country in a year divided by the size of the corresponding population and refer to all age groups. For international comparison, the rates have been age-standardised using the OECD standard population to remove variations arising from differences in age structure across countries and over time. The rates are per 100 000 population.

The EUROCARE and CONCORD studies have shown wide international differences in population-based cancer survival (Berino, 2007; Verdecchia, 2007; De Angelis, 2009; Coleman, 2008, 2011), suggesting wide variations in the performance of cancer care systems. Cancer survival trends reveal continuous increases in general, but also persistent differences between countries (Coleman, 2008). Survival for all major cancers is usually higher in the United States than in Europe. Despite the considerable increase in survival in eastern European countries due to improvements in cancer care and screening programmes (Verdecchia, 2007), the east-west gap in Europe, though narrower, still exists. There are also marked differences among western European countries (see Figures 1.8 to 1.11 for breast, cervical, colorectal and lung cancer survival).

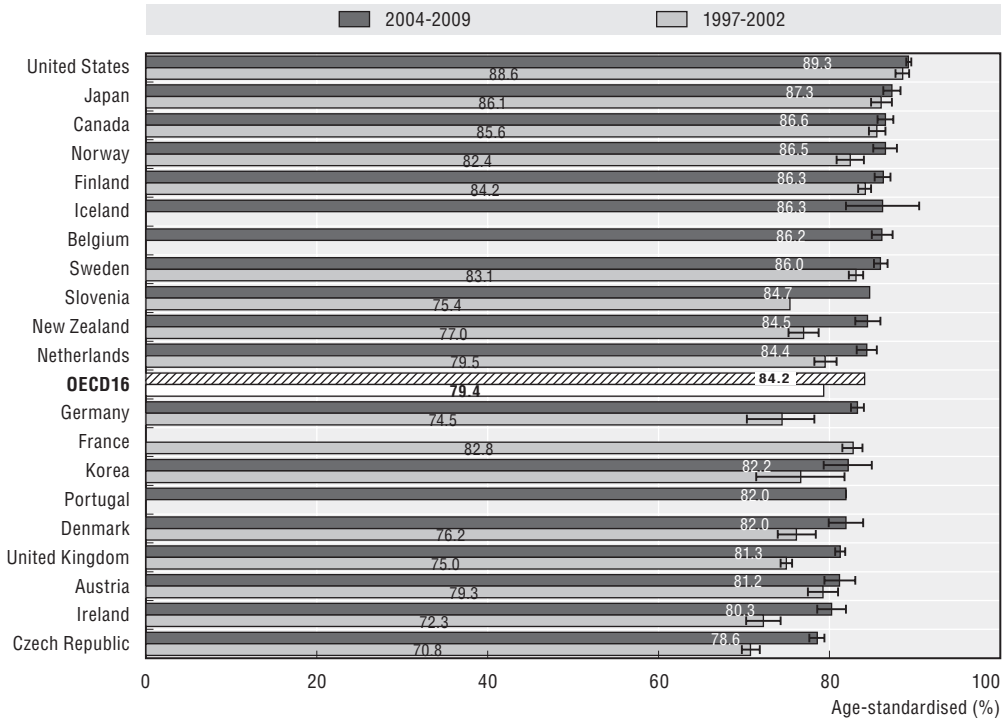
Further discussion of survival estimates of the four cancers considered in this report follows below.[2] When interpreting the data, caveats mentioned in Box 1.2 should be taken into account.

Variation in breast cancer survival

Breast cancer survival reflects advances in public health interventions, such as greater awareness of the disease, screening programmes and improved treatment. In particular, the introduction of combined breast conserving surgery with local radiation and neoadjuvant therapy have increased survival as well as the quality of life of survivors (Mauri et al., 2008).

The relative five-year breast cancer survival has improved in all countries between 1997-2002 and 2004-09, but variations exist across countries (Figure 1.8). Most OECD countries have survival estimates of over 80% at five years, with notable increases in Ireland, the Czech Republic and Slovenia. Nevertheless, the difference in survival estimates is up to 11 percentage points between the highest and the lowest countries.

Figure 1.8. **Breast cancer five-year relative survival, 1997-2002 and 2004-09[1] (or nearest period)**



Note: 95% confidence intervals are represented by H. 1997-2002 data for Japan refer to 1999-2004, and 2004-09 data refer to 2000-05 for Japan, 2002-07 for Canada, 2003-08 for the Czech Republic, Finland, Germany, Ireland and the United States, and 2005-10 for Iceland. Data for Slovenia is updated using period analysis.

1. These figures show the relative proportions of people diagnosed with breast cancer in 1997 and 2004 who are still alive five years later, compared to healthy cohorts from the same years of a similar age and sex. See Box 1.2.

Source: OECD (2011), *Health at a Glance 2011: OECD Indicators,* doi: *10.1787/health_glance-2011-en* and cancer registry of the Republic of Slovenia.

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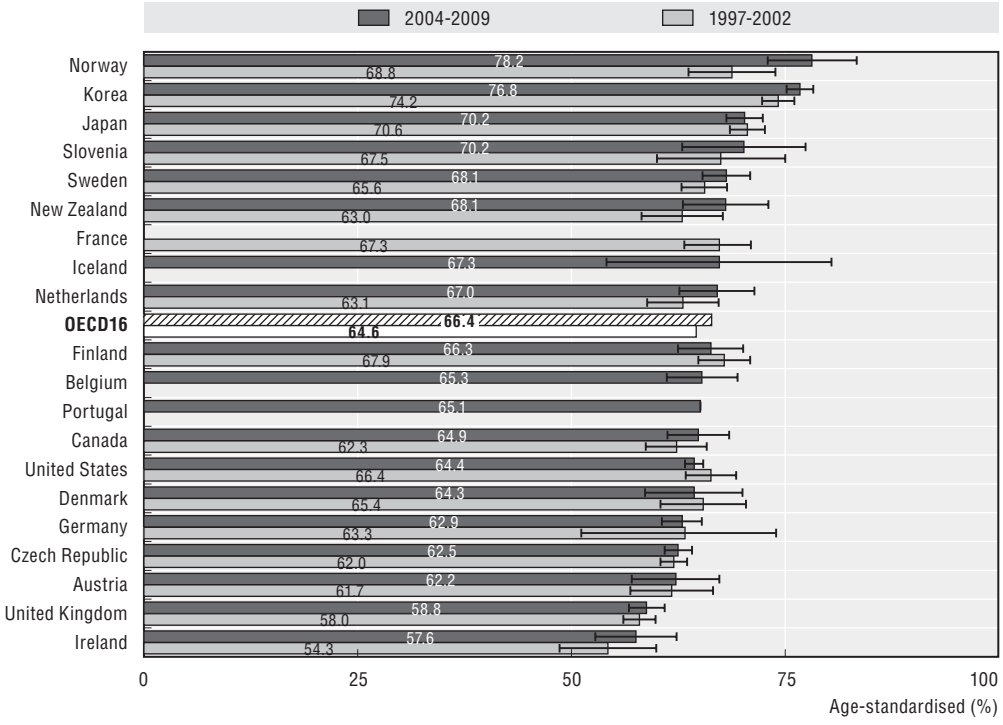
Variation in cervical cancer survival

Over the periods 1997-2002 and 2004-09, the five-year relative survival from cervical cancer improved in most countries due to the improved effectiveness of screening and treatment (Figure 1.9). Survival estimates were below 60% in Ireland and the United Kingdom and above 75% in Norway and Korea. Age, co-morbidities such as smoking, and the tumour stage at diagnosis are all important determinants of cervical cancer survival, underlining the role of screening and other public health programmes. But a significant difference still exists between countries, with a cross-country gap of up to 21 percentage points, larger than that for breast cancer.

Figure 1.9. **Cervical cancer five-year relative survival, 1997-2002 and 2004-09 (or nearest period)**



Note: 95% confidence intervals are represented by H. 1997-2002 data for Japan refer to 1999-2004, and 2004-09 data refer to 2000-05 for Japan, 2002-07 for Canada, 2003-08 for the Czech Republic, Finland, Germany, Ireland and the United States, and 2005-10 for Iceland.

Source: OECD (2011), *Health at a Glance 2011: OECD Indicators*, doi: *10.1787/health_glance-2011-en*.

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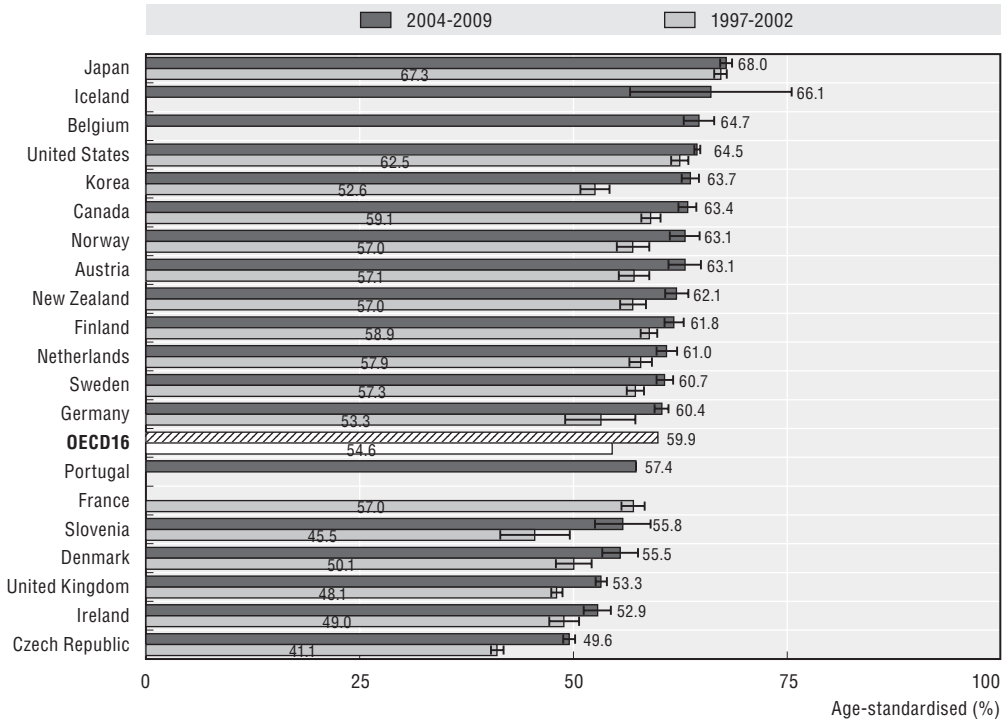
Variation in colorectal cancer survival

Advances in diagnosis and treatment have increased survival over the last decade in colorectal cancer too, but the speed of progress differs across countries. There is compelling evidence in support of the clinical benefit of improved surgical techniques, radiation therapy and combined chemotherapy, but cancer care systems have not always applied these advances. All countries show improvements in survival between 1997-2002 and 2004-09 (Figure 1.10), but a significant difference still exists. Japan and Iceland had the highest relative survival estimates, at over 66%, while the Czech Republic has the lowest

Figure 1.10. **Colorectal cancer, five-year relative survival, 1997-2002 and 2004-09 (or nearest period)**



Note: 95% confidence intervals are represented by H. 1997-2002 data for Japan refer to 1999-2004, and 2004-09 data refer to 2000-05 for Japan, 2002-07 for Canada, 2003-08 for the Czech Republic, Finland, Germany, Ireland and the United States, and 2005-10 for Iceland.

Source: OECD (2011), *Health at a Glance 2011: OECD Indicators*, doi: *10.1787/health_glance-2011-en*.

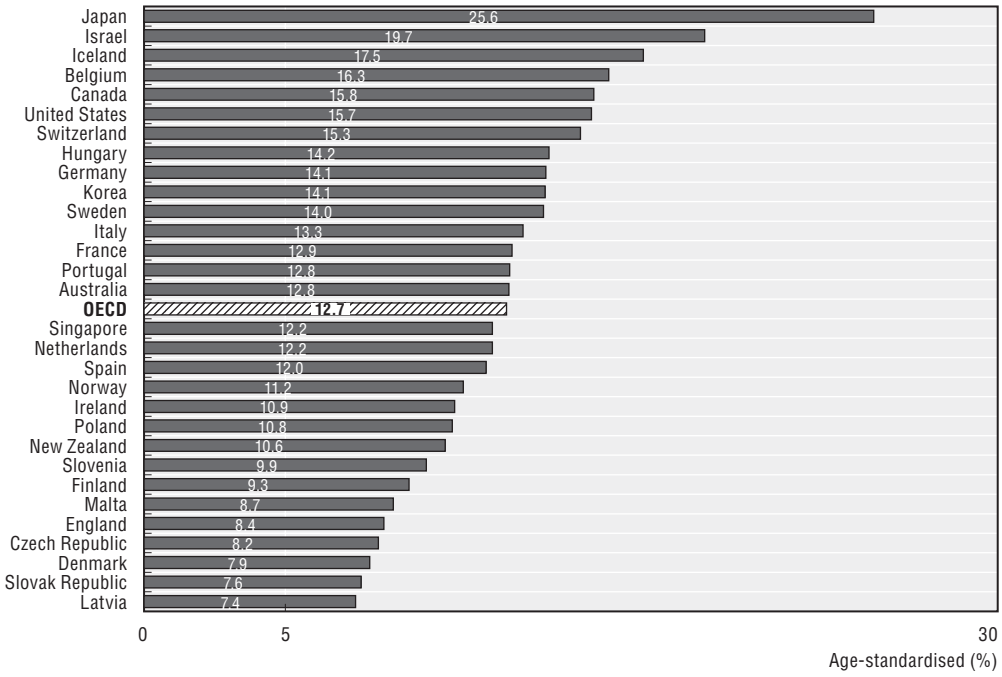
StatLink http://dx.doi.org/10.1787/888932866488

estimate, more than 18 percentage points lower than the highest countries, although recent data show that survival for colorectal cancer is continuing to increase, particularly in central and eastern Europe (Verdecchia et al., 2007).

Variation in lung cancer survival

Lung cancer continues to be associated with very poor survival and with large cross-country variations (Figure 1.11). Patients often present late in the course of their disease (no safe or cost-effective population screening options are currently available), and lung cancer is often rapidly progressive. Within the time period studied here, Japan reported the best five-year survival, at just over 25%. On the other hand, the five-year survival was less than 10% in Slovenia, Finland, Malta, England, the Czech and Slovak Republics, Denmark and Latvia, suggesting that there is substantial room for improving the cancer care systems for detecting and treating lung cancer patients in these countries.

Figure 1.11. **Lung cancer relative five-year survival, up to 2003**



Note: Countries not participated in the EUROCARE-4 study provided data based on the calculation methods proposed in the study (period analysis).
Source: De Angelis, R. et al. (2009), "The EUROCARE-4 Database on Cancer Survival in Europe: Data Standardisation, Quality Control and Methods of Statistical Analysis", *European Journal of Cancer*, Vol. 45, pp. 909-930; US SEER and OECD.

StatLink http://dx.doi.org/10.1787/888932866507

A fundamental question: Do certain cancer care policies lead to fewer deaths?

Given the high burden of cancer and persistent cross-country variations in cancer mortality and survival, countries need to know which policies perform better in the fight against cancer. *Cancer Care: Assuring Quality to Improve Survival* tries to respond to this need.

The Institute of Medicine's widely recognised work on improving health care quality (IOM, 2001) tackles the complex task of defining "quality" by considering the various points at which health care systems come into contact with people: when *staying healthy* (managing risk factors), when *getting well* (detection, diagnosis and treatment), when *living with illness* (on-going monitoring and treatment) and at *end of life* (palliative care). High-quality health care needs certain activities and policies to be in place at each point; in the case of cancer care, these include effective screening and early diagnosis programmes, having sufficient cancer care beds and specialist staff, rapid access to diagnostic and treatment facilities and adequate provision of care for terminally ill patients and their families (see Box 1.3).

Beyond these necessary and fundamental clinical activities, policy makers are increasingly focusing attention on variations in the *organisation and governance* of cancer care. Governance refers to how a system of care is steered and managed, particularly with respect to outcomes and to quality improvement, at a macro-level as well as an institutional level. Hence policy makers are asking how health systems ensure that they have the right organisational structures and governance in place to ensure effective and equitable delivery of these clinical activities, as well as whether inter-country differences

Box 1.3. **What constitutes good quality clinical care for cancer?**

Although the details of clinical management will vary from cancer to cancer, certain elements characterise high-quality clinical management irrespective of cancer type. These are:

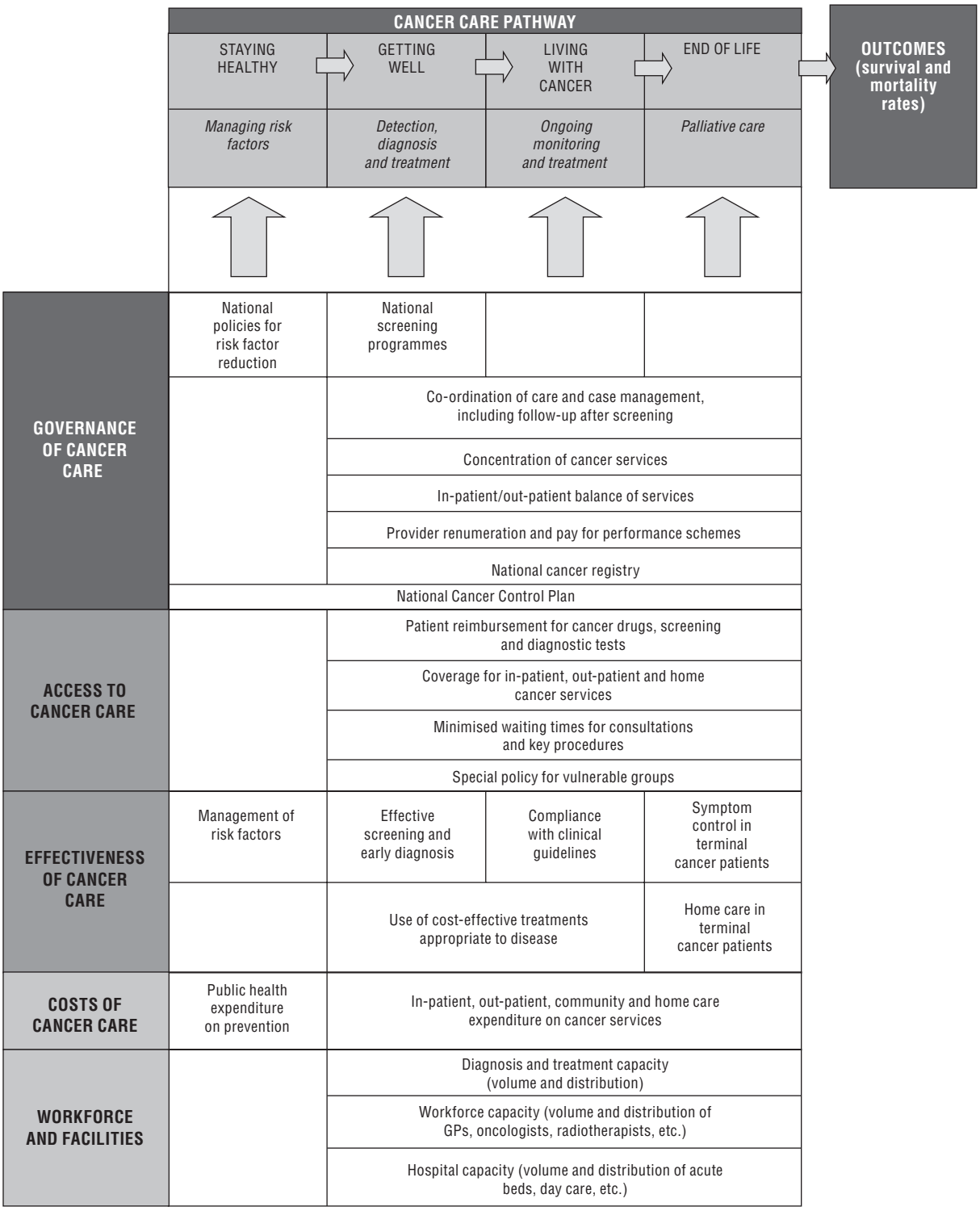
- *Prevention strategies*, including increased avoidance of the risk factors listed earlier (especially smoking and excess body weight and alcohol consumption), vaccination against human papillomavirus (HPV) and hepatitis B virus (HBV), controlling occupational hazards, reduced exposure to sunlight.
- *Early detection*, including clinician awareness or incentive programmes and intiatives so that the public are better informed of the symptoms and signs characteristic of cancer. Screening programmes may be appropriate if there is a valid screening test and the implementation of such a screening programme has been proven to be associated with more benefit than harm.
- *Clear information and effective communications*, including clinical nurse specialists available at all stages of care to support patients and carers, with particular thought for speakers of other languages and those with specific communications difficulties.
- *Accurate diagnosis and staging* using investigations that give the most information about diagnosis and staging with the least risk to the patient.
- *Prompt access to appropriate treatment* with surgery, radiotherapy, chemotherapy alone or in combination.
- *Managing complications* via rapid access to a team capable of providing support for complications of cancer and/or its treatment, including psychosocial support.
- *Regular specialist follow-up*, particularly in the first months or years after treatment is completed.
- *Palliative care* or treatment to relieve, rather than cure, symptoms caused by cancer where there is little chance of cure. Most palliative care should take place at home, or in community settings.

in the organisation and governance of cancer care explain the marked differences observed across countries in cancer mortality and survival.

There are indeed significant inter-country differences in organisation and governance. A recent review of national cancer control plans across Europe in 2009, for example, found that only 16 out of the 31 European countries studied had launched a national control plan, and of those that did, five did not specify responsible organisations for governance and delivery, and four did not contain measurable targets to monitor success (Atun et al., 2009). A recent study showed 24 out of 29 European countries had some kind of national cancer control plan but its content varied across countries (Gorgojo et al., 2012).

Given the importance of organisation and governance, we have built upon the IOM's stages of care to develop the conceptual framework shown in Figure 1.12. For each stage of care, the critical activities and policies that should be in place are set out and gathered into three cross-cutting themes: resources, cancer care practice, and governance of cancer care.

Figure 1.12. **Conceptual framework**



Source: Authors for the OECD.

How this report is structured

The same conceptual framework also provides the structure used for the report. Health systems are organised differently across countries (Paris et al., 2010) and these differences may have some impact on cancer care performance through patient pathway, but this report focuses on a resource, practice and governance of a subsystem, the cancer care system.

The report uses 2010 information collected through surveys and structured telephone interviews with national experts on cancer care systems in 35 countries.[3] To complement this information, the report also uses the data collected through the OECD's Health Data, the System of Health Accounts and OECD Disease Expenditure Studies. The list of experts who contributed to the study is available in Annex A.

Efforts were made to ensure international comparability of the information presented in this report through several rounds of validation with experts. But as only a few experts were designated by country, information compiled may not reflect the views of other experts within the country.

Chapter 2 reports the findings from an international survey of experts regarding the *resources* put into cancer care in each country. As well as access to cancer drugs and devices such as MRI scanners and radiotherapy equipment (paying particular attention to the issue of high-cost novel therapeutics) and the distribution of specialist cancer care clinicians, the chapter illustrates cross-national variations in the availability of resources and policy trends related to this. The issue of pursuing increasingly specialised cancer care by concentrating resources and expertise into fewer, high-volume institutions is given particular attention.

Chapter 3 uses findings from the same survey to consider *public policy and clinical practice*, focussing on the extent to which policy and practice facilitate patients' access to effective cancer care. Public health measures to reduce cancer incidence (such as tobacco control and screening programmes) are discussed, as well as initiatives to facilitate early diagnosis and rapid access to appropriate treatment, such as clinical guidelines and fast-track pathways.

Chapter 4 considers *governance*. Survey responses are used to describe the extent to which countries use comprehensive and coherent frameworks to manage the provision of high-quality cancer care (whether at national or regional level) by setting targets, clarifying tasks and responsibilities and implementing quality assurance tools. Such tools include the accreditation of hospitals and the licensing of the professionals who deliver cancer care. Policy trends are discussed, such as increasing interest in the patient experience as an important dimension of health care quality.

Chapter 5 uses *quantitative techniques* to explore whether the five-year survival from breast, cervical, colorectal and lung cancer are associated with differences in some of the system characteristics discussed above. This quantitative work was undertaken using data from 31 countries.[4]

Finally, Chapter 6 provides *recommendations* for organising and governing cancer care systems based on findings from the previous chapters.

Notes

1. The United Kingdom provided some information specific to England, Northern Ireland, Scotland and Wales, and where possible, the country-specific data and information are included in this publication but otherwise data and information refer to the United Kingdom as a whole are used.
2. Figures 1.8-1.10 show five-year cancer survival for breast, cervical and colon cancer from *OECD Health Data 2011*. The estimates analysed in Chapter 5 come from the EUROCARE-4 project (De Angelis et al., 2009). While country coverage is slightly different, and years and underlying sources also differ slightly, correlations between these two data sources are high, generally above 0.8. *OECD Health Data* does not include relative survival for lung cancer. Hence, Figure 1.11 shows five-year lung cancer survival using data from the EUROCARE-4 and US SEER projects.
3. Australia, Belgium, Canada, Chile, Cyprus, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Luxembourg, Malta, the Netherlands, New Zealand, Norway, Poland, Portugal, Singapore, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and the United States. The United Kingdom provided some information specific to England, Northern Ireland, Scotland and Wales and where possible, the country-specific data and information are included in this publication but otherwise data and information for the United Kingdom as a whole are used. The publication uses three-letter country codes defined by the International Organization for Standardization (ISO). GBR refers to the United Kingdom and CHE refers to Switzerland; for England, ENG is used.
4. Australia, Belgium, Canada, the Czech Republic, Denmark, England, Finland, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Malta, the Netherlands, New Zealand, Norway, Poland, Portugal, Singapore, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey and the United States.

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Chapter 2

Resources for cancer care

The variations in cancer care outcomes and spending described in Chapter 1 suggest cross-country differences in resources dedicated to cancer care, in cancer care practice and in the governance of cancer care systems. Chapter 2 covers resources for cancer care, one of the important domains in assessing the performance of cancer care systems.

This chapter illustrates the cross-national variations in the availability of resources for cancer care, such as pharmaceuticals, medical devices and specialised institutions and health professionals, along with related policy trends.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Introduction

Chapter 2 illustrates the cross-national variations in the availability of resources for cancer care such as pharmaceuticals, medical devices and specialised institutions and health professionals. The amount and distribution of resources going into cancer care systems are critical for cancer care performance, and their rational use is also important to ensure sustainability.

This chapter also describes policy trends related to the resources of cancer care systems. Countries have responded differently to the rising costs of pharmaceuticals and delays in making new pharmaceuticals available, but there has been a relatively modest policy response in relation to increasing diagnostic equipment and services. With regards to the institutions and professionals providing cancer care, many countries have been challenged by shortages and inadequate geographic distribution, but in order to ensure high-quality cancer care and to increase efficiency gains, a number of countries are pursuing centralised cancer care delivery by concentrating resources and expertise at specialised institutions.

Chapter 2 mainly uses 2010 information collected through the OECD Health Care Quality Indicators (HCQI) Questionnaire on Systems of Cancer Care, together with subsequent interviews and data submitted in response to requests to 35 countries.[1] The experts who provided inputs are listed in Annex A.

Availability of cancer drugs is expanding with consideration for financial sustainability

Drugs for cancer treatment and their speedy uptake are important for providing modern and advanced treatment options for cancer patients. While this often contributes to the survival of cancer patients, it also adds financial pressure on the health systems. In fact, significant amounts of money are spent on pharmaceuticals across countries, but the availability and the speed of uptake vary cross-nationally.

To advance the rational use of medicines, many countries have applied cost-effectiveness principles through the Health Technology Assessment (HTA), and some countries also require clinical monitoring related to the use of pharmaceuticals within reimbursement mechanisms. At the same time, many countries have also improved the availability of pharmaceuticals through different policy measures, such as within-country and cross-country collaboration on drug authorisation, an accelerated authorisation process, separate financial arrangements or changes in payment responsibilities to ensure independent and stable financial resources to pay for expensive medications. In addition, patients' financial access to innovative drugs has been expanded in some countries. A few countries have sought to control pharmaceutical use and to raise revenues by introducing a copayment for cancer drugs.

Significant amounts of money are spent on pharmaceuticals across countries…

Spending on cancer drugs accounts for about 0.1-2.4% of total health expenditure across countries, according to the data collected through the OECD HCQI Questionnaire on Systems of Cancer Care. This may appear small, but given that cancer care costs are about 3-7% of total expenditure on health as described in Chapter 1, these costs actually comprise a significant part of spending in cancer care systems. Among the countries in which data were collected through the OECD questionnaire, Latvia and Spain spent less than 0.6% of total health expenditure on cancer drugs. The Slovak Republic and Australia spent more, with 2.2% of total health expenditure on brand and generic cancer drugs in the former, and 2.4% on nine selected pharmaceuticals in the latter with 0.15% of total health expenditure for breast cancer and 0.07% for colorectal cancer.[2]

The OECD's Disease Expenditure Study also shows that a significant part of cancer care spending generally flows into drugs for cancer care, the second largest care function after curative care (OECD, 2008). Considering the limited number of countries for which data are available, the proportion of pharmaceutical spending is highest in Hungary, at 41.4% of total cancer care (not total health expenditure) in 2006. Slovenia follows with 21.7% of cancer spending on prescribed medicines in 2006, and Korea with 12.6% of cancer care spending on prescribed drugs and 2.9% on over-the-counter medicines in 2005. On the other hand, spending was low in the Czech Republic, with 0.5% of total cancer expenditure going to cancer drugs in 2007.[3]

In recent years, the proportion of cancer drugs both in total pharmaceutical sales and in the total number of pharmaceuticals entering the market has been increasing (Wilking and Jönsson, 2005).

… but the availability of pharmaceuticals and speed of uptake vary cross-nationally

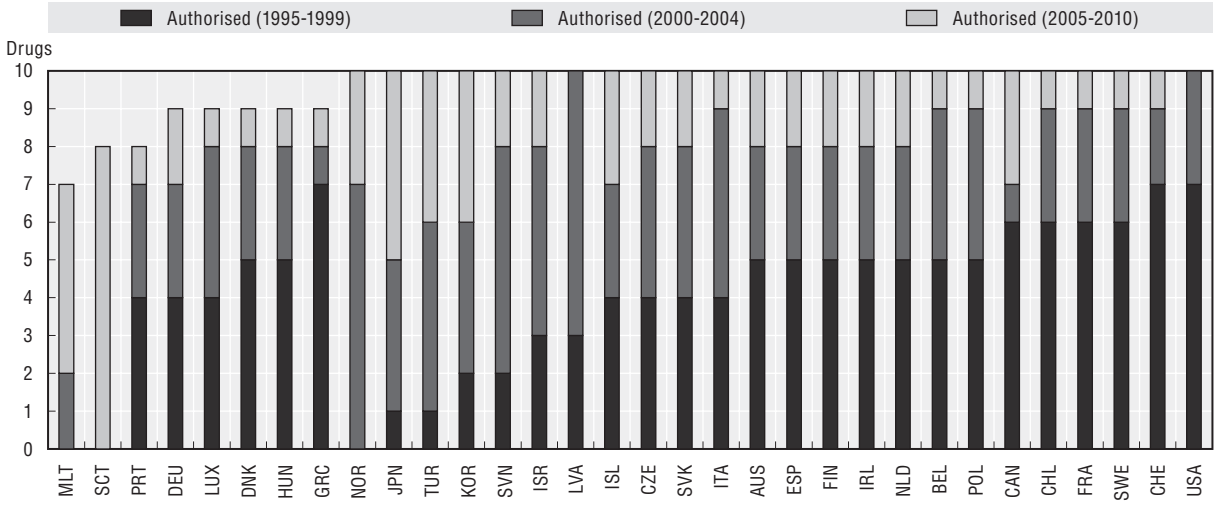
In many countries, a number of innovative cancer drugs have been authorised and used clinically in recent years. Figure 2.1 summarises the availability of the following ten drugs: Herceptin (trastuzumab), Avastin (bevacizumab), Aromasin (exemestane), Femara (letrozole), Arimidex (anastrozole), Evista (raloxifene), Erbitux (cetuximab), Eloxatin (oxaliplatin), Camptosar (irinotecan) and Xeloda (capecitabine).[4]

The United States generally authorised these ten drugs earlier than the other countries. They were also authorised rapidly in Switzerland, Chile, Sweden and France. For example, in the United States and Switzerland, seven out of the ten drugs were authorised before the year 2000. Some countries such as Japan, Norway and Turkey were initially slow in authorising these drugs but caught up with the others by 2010, authorising all ten drugs.

However, partly due to assessing the effectiveness, safety and high quality of new pharmaceuticals, some countries were slower in introducing at least one of the ten innovative cancer drugs studied. As of 2010, some were still not authorised in the following countries: Germany and Luxembourg (Camptosar), Malta (Evista, Erbitux and Xeloda) and Scotland (Evista and Camptosar). Several drugs were authorised but not used widely due to decisions on insurance coverage in some countries, including Belgium, Chile, Italy, Latvia, Malta, Poland, Spain and Turkey.[5] These delays, so-called drug lags, are often caused by the times and processes required for drug authorisation and insurance coverage decisions, as described in Box 2.1.

Similar trends are observed in other studies, and the speed and level of uptake are found to vary across countries. The speed and level of drug uptake should be considered

Figure 2.1. **Years of authorisation for ten selected innovative cancer drugs**



Source: OECD HCQI Questionnaire on Systems of Cancer Care.

StatLink http://dx.doi.org/10.1787/888932866526

alongside effectiveness of pharmaceutical use, but just comparing the speed and level of uptake, Austria, France, Switzerland and the United States are found to be leaders, while uptake is slow and low in New Zealand, Poland, the Czech Republic and the United Kingdom[6] (Jönsson and Wilking, 2007). Worldwide, the United States has been the first launch country for about a half of new oncology drugs in the past 11 years. According to another study (Wilking and Jönsson, 2005) that focuses on European countries,[7] Austria, Spain and Switzerland report the highest in per-patient sales of Herceptin (trastuzumab), which is used for breast cancer, while the Czech Republic, Hungary, the Netherlands, Norway, Poland and the United Kingdom were slower and lower in uptake up to 2004. As for Eloxatin (oxaliplatin) and Camptosar (irinotecan), used for colorectal cancer, Belgium, Italy and Switzerland had faster and higher uptakes. Furthermore, Xeloda (capecitabine), a breast and colorectal cancer drug administered orally, is sold in higher volumes per patient in Austria, Finland and Switzerland, while uptake has been slower in Belgium, the Czech Republic, France, Germany, Hungary and Poland.

In many countries, the time lags between drug authorisation and clinical use is about a year, but there is wide variation. For 67 cancer drugs sold before 2006, the drug lag was on average less than one year in the United States, Germany, the United Kingdom and Canada, but more than 2.5 years in Ireland (2.8 years), Belgium (2.9 years), Portugal (3.1 years) and Japan (3.4 years) (Jönsson and Wilking, 2007). In Greece, the budget for pharmaceuticals has been cut since 2011 with a goal of lowering drug spending to 1% of GDP by 2014, and as a consequence the time required for authorising and setting prices of new medications has been prolonged. The National Drugs Organization reports a delay of over two years in recent years.

Many countries have taken measures to promote the rational use of medicines

In order to advance the rational use of medicines, an increasing number of countries have been making a Health Technology Assessment (HTA) during the drug authorisation process, but the roles of HTAs differ across countries. According to an OECD study conducted in 2008/09, the majority of OECD countries studied (i.e. Australia, Austria,

Box 2.1. **Processes involved in authorising and ensuring access to new drugs**

A new pharmaceutical product usually gets marketing authorisation (licence) in a country after the approval of a national assessment agency. During the approval process, different aspects of the product, such as its quality, safety and efficacy, are assessed based on the evidence provided by the pharmaceutical company, but requirements for drug approval vary across countries, leading to differences in the time required for authorisation.

Once a drug is authorised in the domestic market, it becomes available for clinical use but some additional time may be needed to reach a decision on insurance coverage and then for the drug to come into wide use in treatment. In Germany and the United States, a study found that there is no further delay in making the drug available to a patient once it is authorised (Jönsson and Wilking, 2007). However, insurance coverage decisions take time in other countries. For instance, in Latvia, Herceptin was authorised in 2004 but was included in the positive list only in February 2010, and Avastin, authorised in 2005, had not been included in the List as of 2010. This takes time in Korea too, as the use of cancer drugs needs to be specified in an official notice announced by the Health Insurance Review and Assessment Service Agency for reimbursement purposes. Similarly, in the Netherlands, once a new pharmaceutical becomes available, the Health Care Insurance Board reviews the health effects and costs, and advises the minister whether it can be reimbursed by health insurance companies. If the minister decides that the new drug is part of the insurance coverage, the drug will be reimbursed. Expensive drugs used for small number of patients are sometimes allowed to be reimbursed temporarily, with a maximum of four years, as an evaluation of clinical- and cost-effectiveness and safety requires some time. After a few years, a new evaluation is conducted by the Health Care Insurance Board, and based on the advice, the minister decides that the drug remains in the insurance coverage, will be removed from the coverage, or remains in the coverage under certain conditions such as reimbursement only for a specific group of patients, only if prescribed according to specific guidelines, and/or only if arrangements with the manufacturer about the costs are made. Price negotiations and reimbursement decisions also contribute to drug lags (Wilking and Jönsson, 2005).

Belgium, Canada, Denmark, Finland, France, Germany, Hungary, Iceland, Ireland, Japan, Korea, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden Switzerland and the United Kingdom) reported that they have structure or capacity for HTA, but not the Czech Republic, Greece, Luxembourg and the Slovak Republic (Paris et al., 2010). As for the HTAs' role, usually HTA recommendations inform reimbursement rules and insurance coverage for pharmaceuticals and medical devices, but they are not always binding. In addition, there are cross-country variations in the methodologies used, as described in Box 2.2.

HTAs usually involve an evaluation of the efficacy/effectiveness and cost-effectiveness of pharmaceuticals. As some cancer drugs are expensive, the use of an HTA with a cost-effectiveness evaluation may possibly have a negative impact on access to these pharmaceuticals. One study found that the uptake of cancer drugs was not high and fast in countries that have played leading roles in developing HTAs (i.e. the Netherlands, Sweden and the United Kingdom) (Jönsson and Wilking, 2007). The benefits of using cost-effectiveness assessments and promoting the evidence-based rational and effective use of

Box 2.2. **Health Technology Assessment (HTA), its role, and cross-country variation in the methodology**

Most countries have a dedicated independent body that undertakes the HTA, with a few exceptions, including the United States. In the United States, the Federal Coordinating Council for Comparative Effectiveness Research co-ordinates research, examining the strengths and weaknesses of the medical interventions conducted by different federal government agencies.

The dedicated body usually has either an advisory or regulatory function. Some countries, including Denmark and the Netherlands, have advisory bodies, which recommend reimbursement and pricing policies, while others, such as Finland, France, Sweden and the United Kingdom, have regulatory bodies responsible for listing and pricing pharmaceuticals (Sorenson et al., 2007). For example, in England, the National Institute of Health and Clinical Excellence – NICE, established in 1999, provides guidance to the NHS on the use of pharmaceuticals and medical devices based on an HTA, and NHS organisations are required to follow NICE guidance and findings. In Portugal, since 2006, a favourable economic evaluation is required for the approval of new pharmaceuticals with exclusive hospital use.

An HTA is usually part of formal process for making national reimbursement decisions, but not in all countries. Countries such as Australia, Belgium, Canada, Finland, the Netherlands, Norway, Portugal and Sweden have formal mechanisms for making national reimbursement decisions based on an HTA, while in others, including Denmark and Switzerland, an HTA is not part of the formal decision making process (Jönsson and Wilking, 2007).

Given the differences in the roles and focus of an HTA, the assessment methods also differ across countries (Paris et al., 2010; Sorenson et al., 2007). HTA studies may include an analysis of the budget impact and/or indirect costs and benefits, and different outcome measures may also be used. In addition, a sensitivity analysis for uncertainty is not always carried out. Partly due to these differences, findings are not always consistent across studies. For instance, analyses in Canada, European countries and the United States came to both favourable and unfavourable conclusions on the cost-effectiveness of Herceptin (trastuzumab) (Foster et al., 2011; Blank et al., 2010; Ferrusi et al., 2009), leading to different supply decisions. Likewise, the initial findings were different for medical devices such as Positron Emission Tomography (PET) scanners across countries (OECD, 2005) although in recent years, a number of HTAs conducted in various countries have found that PET scanners in the diagnosis and staging of cancer may be cost-effective.

There are ongoing European and international efforts both to reduce redundancy in the HTA activities conducted across countries and to seek synergies through co-ordination (Velasco Garriodo et al., 2008). At the European level, for example, collaboration has been taking place through the European network for Health Technology Assessment (EUnetHTA).

medicines have to be set against the rapid introduction of new pharmaceuticals without consideration for the financial consequences.

Some countries have changed *reimbursement mechanisms to control the overuse of pharmaceuticals,* as the uptake of innovative cancer drugs has been increasing rapidly and putting upward pressure on cancer care costs. In France, innovative cancer drugs such as Herceptin, Avastin, Erbitux, Eloxatin and Camptosar are registered on the "liste en sus" to

facilitate patient access, while other pharmaceuticals are included in the GHS (French Diagnosis-Related Groups, DRG). All the products that are on the "liste en sus" have to respect good practice guidelines, and they also need to be prescribed according to the indications of the marketing authorisation or the PTT (temporary therapeutic protocol). In order to ensure that they are used in a disciplined way, non-binding financial incentives are set so that hospitals follow the protocols. In Korea, since 2006, reimbursement for cancer drugs has been made available only if guidelines for use are respected. If the treatment was given in greater volumes or for a longer time than the limits set in the guidelines, reimbursement is not allowed or is only partial so as to control overuse. Hungary also changed reimbursement policies, and incentives have been embedded in the DRG system used in hospitals to control the use of certain cancer drugs.

To promote the rational, evidence-based use of pharmaceuticals, other countries such as Australia, Canada, Italy, Poland and the United Kingdom use *risk-sharing payment arrangements with close monitoring of the effectiveness of the pharmaceuticals*. For example, in Italy, a risk-sharing arrangement is specified during the reimbursement negotiations for certain pharmaceuticals, and the availability of these products depends on their performance on specific patients (Garattini and Casadei, 2011). The use of these medications is monitored more intensely than usual, and access is managed by an online registry run by Agenzia Italiana del Farmaco (AIFA), the Italian drug agency. Hospital doctors are required to provide patient data and indications for pharmaceutical use and dosage online, and the pharmaceutical validated by the system is released at the hospital pharmacy. If the patient is considered as a "non-responder" based on disease progression, progression-related death, or an excessively high toxicity level for continuing treatment, the manufacturers are expected to bear a certain proportion of the pharmaceutical costs. For example, during the initial six weeks of treatment with Avastin, half the cost is born by the pharmaceutical company, and the other half by the NHS. After this period, all the cost is born by the NHS if the pharmaceutical is found effective, but for doses administered above a certain threshold, the pharmaceutical company has to reimburse the entire cost. The risk-sharing arrangements for the same pharmaceutical are sometimes different depending on the indication. In addition, for some pharmaceuticals, a price ceiling is also set; for the use of Avastin in colon cancer, this is EUR 25 491 per patient (Adamski et al., 2010). These measures allow monitoring and regulating the use of costly medicines while ensuring patient access to new medication (Pugatch et al., 2010).

However, risk-sharing arrangements require additional administrative work. In Poland, the use of chemotherapy drugs is decided based on the treatment decision made for individual patients, and may be provided free, with payment exemption continued only if the treatment is found effective over three months. However, these approval processes involve a heavy administrative burden, so practice does not always follow formal procedures.

Nonetheless, these financing incentives requiring effective pharmaceutical use are also intended to standardise and enforce evidence-based use of pharmaceuticals. These developments are in line with cross-national trends for promoting the delivery of evidence-based cancer care, as described further in Chapter 3, ("Cancer care practice").

Many countries have taken measures to improve the availability of pharmaceuticals…

In order to shorten drug lags and promote access to new pharmaceuticals, some countries have made efforts to expedite the authorisation process through *between-country collaboration,* trying to improve joint evaluation among the national agencies that deal with drug authorisation. At the European level, national assessment processes used to differ across countries, but since 1995 the European Medicines Evaluation Agency (EMEA) has been in charge of approvals for cancer drugs to all European countries. Once approved at the European level, the marketing authorisation becomes valid in all member states, facilitating the authorisation process in the region. Similar developments have been observed elsewhere too. Australia and New Zealand agreed to regulate therapeutic goods, including medicines, through a joint scheme in 2011, with a view to administering the regulation by the Australia New Zealand Therapeutic Products Authority in coming years. These efforts are intended to reduce the regulatory costs for industries as well as gain efficiency for both governments.

Within-country collaboration has also been taking place. In Canada, even though pharmaceuticals are authorised nationally, decisions for inclusion on the positive drug list are made at the provincial level, and a drug formulary is maintained separately by each province and territory and private insurance company. As a result, reimbursement policies vary nationwide, leading to the unequal availability of pharmaceuticals across regions. In this context, in February 2007, all the provinces except Quebec announced a pilot project to jointly review evidence for innovative cancer drugs. This initiative, called the Pan-Canadian Oncology Drug Review, is developing a more integrated approach to the review of cancer drugs, with the aim of promoting equal access to new medications.

To resolve delays, *an accelerated authorisation process* was made available for pharmaceuticals used for serious life-threatening diseases in EU countries as well as in the United States, Australia, Canada and Japan (Jönsson and Wilking, 2007). For instance, in Austria, Finland, the Netherlands and Sweden, even though time lags exist for other pharmaceuticals, cancer drugs become available in hospitals as soon as a market authorisation is granted (Wilking et al., 2009). In Malta, for innovative cancer drugs that are not yet in the formulary, patients can still receive the treatment if the Special Board approves their use based on an individual evaluation. Similarly, in Portugal, when immediate attention is needed, the formal process of a cost-effectiveness evaluation is sometimes bypassed and an individual evaluation is made instead. The rules and criteria on individual evaluation depend on the type of cancer and pharmaceutical; in the case of breast cancer, for instance, there is no upper limit on the number of individual evaluations undertaken in public hospitals.

Some countries developed *separate financing arrangements for innovative pharmaceuticals* in order to ensure easier and more secure access. Reimbursement policies are not sometimes flexible enough to respond to the latest development in pharmaceuticals, hindering the uptake of new pharmaceuticals at the provider level. For drugs administered in hospitals, some countries have rigid hospital budgets that require several years of advance planning in order to accommodate new treatment alternatives. In other countries, hospital-administered drugs are funded based on a bundle payment, such as a per diem basis or DRG system. Without the flexibility to change the per diem or DRG payment, these reimbursement mechanisms hinder the uptake of new drug therapies. Therefore, several countries, including Australia, France and Germany, have established either a separate

listing for innovative drugs or separate funding for certain cancer drugs. For example, in Australia, separate funding became available for Herceptin, and a similar arrangement is available in France. In Germany, cancer drugs are paid on a DRG basis or through "specific additional payments" (*Zusatzentgelte*). DRG and additional payment levels are updated every year by the National Institute for Payment in Hospitals (Paris and Docteur, 2008).

Some countries *have moved to block purchasing* to ensure equal access to new medications. In the Netherlands, the pharmacy units in hospitals were previously responsible for pharmaceutical purchases, and hospitals with a pharmacy unit that managed to purchase innovative drugs at lower prices were able to use these drugs more than other hospitals, leading to cross-hospital variations in the availability of expensive pharmaceuticals. But due to pressure from patient groups, in 2002/03 the Ministry of Health became responsible for 80% of the costs related to the purchase of expensive pharmaceuticals to insurance companies, with the rest paid by the hospitals and pharmacy.

Patients' financial access to cancer care and innovative cancer drugs vary across countries (Box 2.3), but recently *financial access has been improved* in some countries, including Chile, Korea and Turkey, all countries with high economic growth. In Turkey, cancer patients previously needed to pay a copayment for diagnosis and treatment, like other patients, and the copayment was generally about 10% of the total cost. Furthermore, patients were allowed to seek care and purchase pharmaceuticals only at the health facilities affiliated with their social security scheme. But nowadays, cancer patients are exempted from any payment for their care, and under the universal health insurance system established in 2002/03, patients can seek care in any health facilities with the doctor of their choice and can purchase medicines at any pharmacy. Furthermore, since 2006, all treatment costs for cancer patients including those related to innovative cancer drugs have been covered fully by the government.

Box 2.3. **Financial access to care for cancer patients across countries**

For cancer patients, financial access to care is different across countries. About one-fourth of countries ensure free access to cancer care (see table below); these include the Czech Republic, England, France, Greece, Israel, Italy, the Netherlands, Scotland, the Slovak Republic, Slovenia (for the chronically ill), Spain and Turkey. But here, too, the extent of free services and treatment options differ across countries. For example, in the Slovak Republic and Spain, patients need to pay certain innovative pharmaceuticals which are provided free in the other countries.

In another group of countries (e.g. Canada, Denmark, Hungary, Malta, Poland, Portugal and Sweden), free financial access is ensured for most, but not all, services for cancer patients, and in most of these countries, even though diagnosis and treatment are provided free, cancer patients still need to pay for certain pharmaceuticals and/or treatments. In Canada, patients are required to pay for the pharmaceuticals used for treating diseases/conditions other than cancer (for cancer patients below age 65), those used outside of hospitals in Denmark and Sweden, and those used in the private sector in Portugal. In Denmark and Sweden, there are also maximum payment limits (in the former, for chronically ill patients with permanent or high use of pharmaceuticals), beyond which pharmaceuticals are provided for free. In Malta, patients need to pay for medicines not in the government formulary (i.e. many innovative drugs).

Box 2.3. **Financial access to care for cancer patients across countries** *(cont.)*

Table 2.1. **Financial access to cancer care, 2010**

Completely free	Free access with some restrictions	More financial access for cancer patients			Same financial access as other patients
		Support for pharmaceuticals and other costs	Support for pharmaceuticals	Support for other costs	
Czech Republic, England, France, Greece, Israel, Italy, Netherlands, Scotland, Slovak Republic, Slovenia, Spain and Turkey	Canada, Denmark, Hungary, Malta, Poland, Portugal and Sweden	Korea	Belgium, Finland, Iceland and Norway	Chile and Latvia	Australia, Cyprus[1,2], Germany, Ireland, Japan, Luxembourg, Singapore, Switzerland and the United States
	More financial access for patients with high medical costs				
	Australia, Belgium, Chile, Denmark, Finland, Germany, Iceland, Ireland, Japan, Korea, Latvia, Norway and Switzerland				
	More financial access for patients with low incomes				
	Australia, Belgium, Chile, Cyprus, Hungary, Ireland, Italy, Japan, Korea, Latvia, Portugal, and Singapore				
Financial support for care-related travel costs					
Australia, Belgium, Finland, Hungary, Ireland, Latvia, Luxembourg and Norway					

1. Footnote by Turkey: The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey shall preserve its position concerning the "Cyprus issue".
2. Footnote by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Source: OECD HCQI Questionnaire on Systems of Cancer Care.

There is another group of countries in which cancer patients make out-of-pocket payments but the amount of payment is reduced in order to relieve their financial burden. In Korea, cost-sharing for care including pharmaceuticals is reduced for cancer patients. In Belgium, Finland, Iceland and Norway, payment exemptions are available for certain pharmaceutical goods for patients. The extent of exemption varies across these countries, and includes cancer drugs dispensed in a pharmacy in Belgium, cancer drugs used in hospitals but copayment for pharmacy drugs in Finland, cancer drugs used in hospitals in Iceland, intravenous drugs and several pain-reducing drugs in Norway. It should be noted that the availability of medications, for instance in hospitals, varies across countries due to the authorisation status and insurance coverage decisions. A couple of other countries such as Chile and Latvia also provide some exemptions for cancer patients. Chile provides all services at primary care free of charge, including cancer control programmes such as Pap smears, mammograms, palliative care and many routine blood tests. But patients need to pay a copayment (based on income level) for other services and procedures. A maximum payment limit is available for care, including pharmaceutical goods for breast and cervical cancer patients, through the Explicit Health Guarantee Regime, but not to patients with other cancers. In Latvia, cancer patients need to pay half of the patient deposit, a daily fee set for outpatient care (LVL 1.5, about EUR 2) and inpatient care (LVL 2.5 per day, about EUR 3.5), and a fixed payment specific to each intervention, up to a maximum payment limit set for outpatient and inpatient care together.

Box 2.3. **Financial access to care for cancer patients across countries** *(cont.)*

In other countries (i.e. Australia, Germany, Ireland, Japan, Singapore, Switzerland and the United States), there is no financial rule specifically set for cancer patients, and the same out-of-pocket payment rules are applied to all health care users, including cancer patients. In Germany and Luxembourg, even though payment rules applied to cancer patients are the same as those for other patients, additional support for the chronically ill is available for certain cancer patients. In the former, a copayment is required for the chronically ill, including some cancer patients, but the maximum payment limit for health care is 1% of the patient's gross annual income, instead of the 2% applied for others. In addition, insured persons under age 18 are fully exempted from out-of-pocket payments. As for costs of pharmaceuticals, cost-sharing for the chronically ill is 10%, with a minimum copayment of EUR 5 and a maximum of EUR 10. In Luxembourg, as part of the extended coverage for severe/chronically ill people, cancer drugs are provided free, and patients are also exempted from paying for inpatient care and cancer therapies, including pain management. However, a copayment is required for outpatient care, and cost-sharing of 5-20% is also required by patients for care not directly related to the chronic diseases.

In a number of countries financial support for the vulnerable, including those with high health care spending and low incomes is common. In addition, many countries provide financial support for travel to receive health care.

England, Finland and Japan have also expanded financial access. As the cost of medicine had been increasing for patients, Finland introduced an annual maximum ceiling for the purchase of pharmaceutical goods at pharmacies. In England, financial access to medications for cancer patients has been increased through the abolition of prescription charges in 2009 and the introduction of the Cancer Drugs Fund in 2010. Japan introduced a maximum total payment limit for medical and long-term care since 2008, although separate limits were available previously. The new payment limit has improved the financial support for patients with expensive care needs, including cancer patients.

... but some countries have policies to control the use of pharmaceuticals...

Some countries have *quotas for using certain innovative drugs*, with use restricted to only a certain number of people meeting inclusion criteria. In Chile, for exceptionally high cost treatment, the Central Commission, composed of oncologists in Santiago, evaluates each case. For example, inclusion criteria are examined for the use of Herceptin, and approximately 120 to 140 patients with breast cancer are allowed to receive the treatment for free every year. The number of eligible women is expected to be raised to 200 in coming years. Ineligible patients, however, are required to pay the entire cost of Herceptin. In Latvia, in 2010, even though Glivec (imatinib), Hycamptin (topotecan), Temodal (temozolomid) and Velcade (bortezomib) were included in the positive list, they were made available only to certain numbers of patients who meet precisely defined inclusion criteria. Patients not meeting the criteria need to bear the entire cost for the treatment. Hungary and Poland also allow a limited number of people who meet inclusion criteria to access certain innovative cancer drugs such as Herceptin, but according to national experts, the administrative process is cumbersome.

In the Czech Republic and Portugal, patients did not usually need to make any out-of-pocket payment for cancer care, including pharmaceuticals, but financial resources are

becoming limited, reducing the size of the quota. In the former, in September or October every year, the Czech Oncology Society negotiates with insurance companies on the number of patients who will be allowed targeted treatments, which involve the use of newly approved pharmaceuticals, in the following year. In past negotiations, the number proposed by the Oncology Society was accepted by insurance companies, and all the cancer patients were able to receive treatment. However, due to the recent economic situation, it is likely that the negotiations will become more difficult in coming years, with access becoming more limited.

... and several countries are also seeking to raise revenues

Under the pressure of financial considerations, several countries have sought to raise revenues by introducing copayments for pharmaceuticals, but the revenues raised have been relatively limited. For instance, in the early 2000s, cancer patients in Hungary did not need to pay for care, including pharmaceuticals. These days a visit fee, which was introduced for everybody seeking care, is exempted following a diagnosis of cancer, but cancer patients need to pay EUR 1 per package of medicines (cancer drugs and others), regardless of the number of tablets in a package. In Latvia, cancer patients used to pay only a patient deposit, but a copayment was introduced, and both were increased in February 2010.

Medical devices are increasing in number, but often without concern for rational use

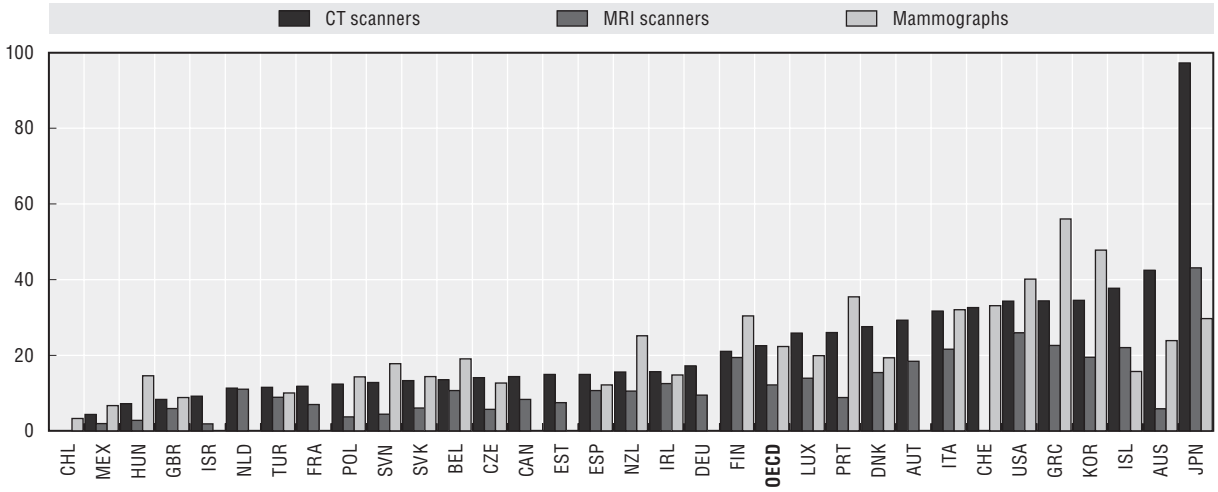
The number of devices relevant to cancer care has increased across countries in recent years. But availability of diagnostic equipment still varies widely, and countries with a high density in one diagnostic equipment also tend to have a high density for other diagnostic equipment. The availability of radiotherapy equipment also varies across countries. However, countries with a high density of diagnostic equipment do not always have a large number of radiotherapy devices, but tend to provide more diagnostic exams even though they are not necessarily associated with better health outcomes. A great number of medical devices may be related to a less stringent authorisation process, and in order to achieve a rational distribution, some countries apply a cost-effectiveness principle through a Health Technology Assessment.

The availability of diagnostic equipment is increasing, but varies widely across countries

The diffusion of new technologies has been observed across countries in recent years, and the density of diagnostic equipment has been increasing. In Denmark, for example, the lack of diagnostic capacity was a severe problem for cancer care in the early 2000s. Along with a low density in CT scanners, only ten mammographs were available per million population in 2005. This led to comprehensive efforts to boost availability. The Slovak Republic also financed the purchase of diagnostic technology, such as positron emission tomography, CT and magnetic resonance scanners.

However, the availability of diagnostic equipment still varies widely across countries. Japan stands out with the highest rate of CT and MRI scanners per million population (97.3 and 43.1, respectively). The density is about 15 times greater than that of Hungary, which has the lowest density of CT (7.2) and MRI scanners (2.8), as can be seen in Figure 2.2. As for mammography equipment, Greece has the highest density at 56.0, over twice as high as the OECD average of 22.3.

Figure 2.2. **Medical technology resources per million population, 2010 (or nearest year available)**



Note: Data on medical technologies outside of hospital are not available for Belgium, Germany and Spain, leading to underreporting. Data for Portugal refer to 2007 and data for Japan refer to 2008, while those for Australia, Belgium, Chile, the Czech Republic, Estonia, Germany, Hungary, Italy, Mexico, the Netherlands, Poland, the Slovak Republic and Turkey refer to 2009. MRI data for Denmark and Slovenia refer to 2009, while for the United States, CT and MRI scanners refer to 2007 and mammographs refer to 2008.
Source: OECD Health Data 2012, www.oecd.org/health/healthdata.

StatLink http://dx.doi.org/10.1787/888932866545

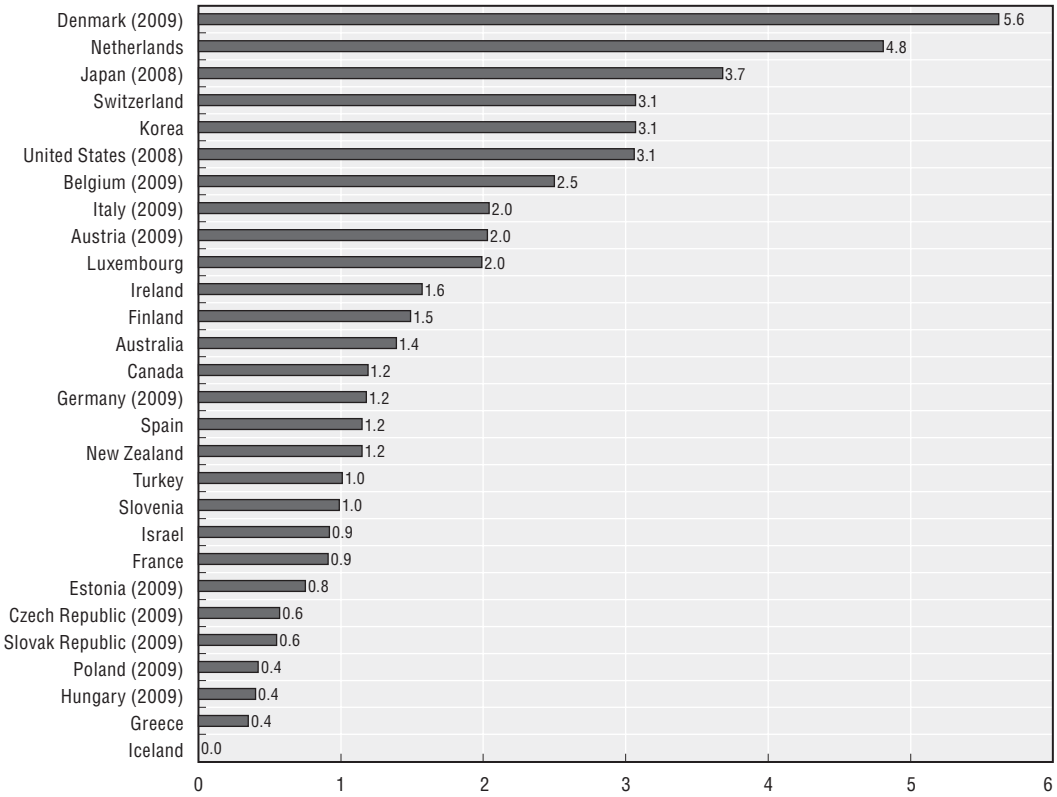
The density of relatively novel and more expensive diagnostic medical technology, such as PET scanners, is much smaller (Figure 2.3), e.g. none in Iceland and 0.4 per million in Greece, Hungary and Poland. The highest density of PET scanners is 5.6 per million populationin Denmark, followed by the Netherlands (4.8) and Japan (3.7).

... and countries have similar density patterns across different diagnostic equipment

Countries generally have a similar density pattern across different types of diagnostic medical technology resources (i.e. CT and MRI scanners, mammographs and PET scanners). Italy, Japan, Korea and the United States have above-average densities for all these devices. In addition, Greece has high densities of diagnostic equipment except for PET scanners, and Switzerland also has a relatively large volume of diagnostic equipment, although data are not available for MRI scanners. On the other hand, the central and eastern European countries (i.e. the Czech Republic, Hungary, Poland, the Slovak Republic and Slovenia) and Turkey have low densities of diagnostic equipment. Data are not available for all four devices, but the densities are generally also low in Chile, France, Israel, Mexico and the United Kingdom. The densities are also below the OECD average in Belgium, Canada, Estonia, and Spain. In Turkey, Mexico and Chile, low densities may be partly related to the low cancer incidence compared with other OECD countries. But across other countries, there is no obvious relation between the density of diagnostic equipment and cancer incidence.

Despite the improved availability in recent years, some countries, particularly those in the low density group, still face shortages across regions or in certain regions due to an unequal distribution of equipment. For example, in Poland the availability of CT and MRI scanners is still suboptimal, and as the number of patients has increased in recent years, the waiting list for diagnostic services involving these devices has lengthened. In Italy, despite relatively high equipment densities, the availability of some modern equipment

Figure 2.3. **Positron emission tomography scanners, per million population, 2010 (or nearest year available)**



Note: Data on PET scanners outside of hospital are not available for Belgium, Germany and Spain, leading to underreporting.
Source: *OECD Health Data 2012, www.oecd.org/health/healthdata.*

StatLink http://dx.doi.org/10.1787/888932866564

including PET scanners differs across regions, and access is low, particularly in the southern regions.

Radiotherapy equipment is also becoming increasingly available, but this varies cross-nationally

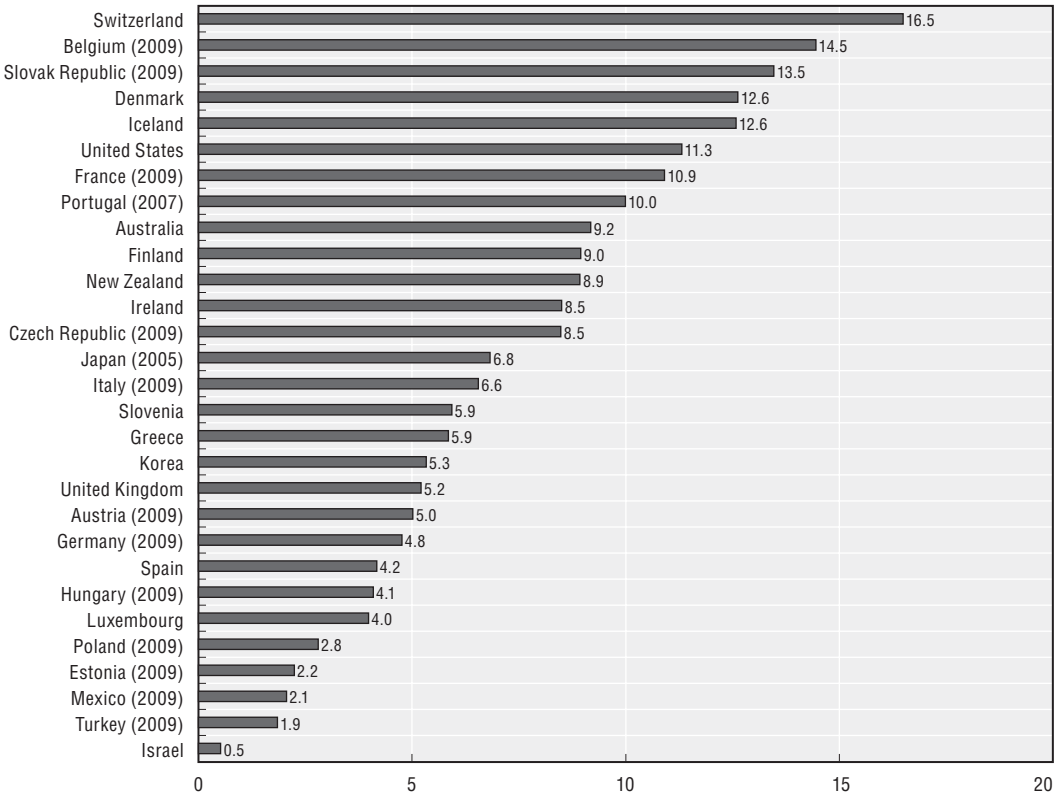
In a number of countries, the amount of radiotherapy equipment has increased since the early 2000s. For instance, the Slovak Republic has invested in expensive radiotherapy equipment and linear accelerators for state-owned cancer care institutions and university hospitals, and Poland has also invested in therapeutic equipment.

Nevertheless, as with diagnostic equipment, the density of radiotherapy equipment also varies widely cross-nationally. The highest density is in Switzerland, with 16.5 radiotherapy devices per million population, over thirty times higher than the lowest density country, Israel (0.5), as is shown in Figure 2.4. Switzerland is followed by Belgium (14.5) and the Slovak Republic (13.5), while Israel is preceded by Turkey (1.9), Estonia (2.2) and Poland (2.8).

A shortage of radiotherapy equipment, along with unequal distribution, has been reported in some countries, including the Czech Republic, Hungary, Ireland, Italy, Portugal and Turkey. For instance, in the Czech Republic, EU funds improved access to radiotherapy

a few years ago, but more equipment is probably needed according to the national expert. In Italy, financial resources were devoted to boost innovation in radiotherapy, especially in the southern regions in 2007, but the inequality in availability of medical technologies has not been fully resolved.

Figure 2.4. **Radiotherapy equipment per million population, 2010 (or nearest year available)**



Note: Data on radiotherapy equipment outside of hospital are not available for Belgium, France, Germany and Spain, leading to underreporting.

Source: OECD Health Data 2012, www.oecd.org/health/healthdata.

StatLink http://dx.doi.org/10.1787/888932866583

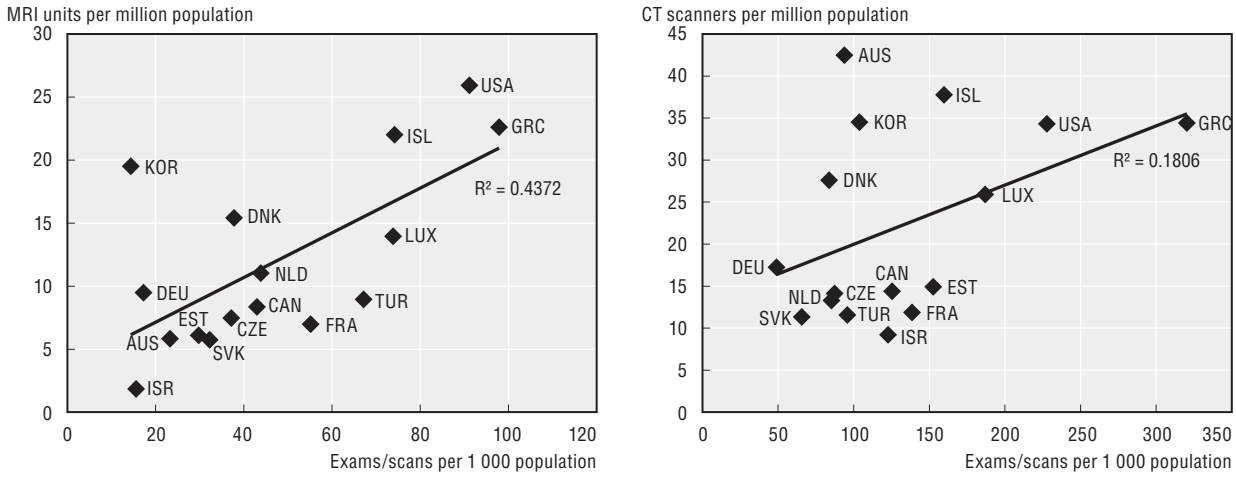
Countries with a high density of diagnostic equipment do not always have a large amount of radiotherapy equipment…

The density pattern for therapeutic devices is not always the same as that for diagnostic devices (Figures 2.2-2.4). The density is above-average for both diagnostic and treatment devices in the United States and Switzerland and below-average for all medical devices in Estonia, Hungary, Israel, Poland, Slovenia, Spain, Turkey and the United Kingdom. Greece, Italy, Japan and Korea have high densities of diagnostic equipment but below-average densities for radiotherapy equipment, and the Czech Republic, France and the Slovak Republic, with below-average densities of diagnostic equipment, have high densities of therapeutic equipment.

... but tend to provide more diagnostic exams

Countries with higher densities of diagnostic devices, however, tend to provide more diagnostic exams relative to the population than others, as shown in the positive relationships for CT and MRI scans in Figure 2.5. For example, the United States, with the highest MRI density, provides 91.2 exams per 1 000 population, and Greece, with a relatively high density of CT and MRI devices, also has high numbers of exams. On the other hand, the Czech Republic and the Slovak Republic, with relatively low densities of these diagnostic devices, have fewer scans.

Figure 2.5. **Use and density of medical technologies, 2010 (or nearest year available)**



Note: See notes for Figure 2.2 for reference years for medical technologies. As for the use of medical technologies, data refer to 2009 for the Czech Republic, Estonia, Germany, the Netherlands, the Slovak Republic and Turkey and 2007 for the United States. MRI data for Denmark refer to 2009. Data for Germany refer to hospitals only.
Source: *OECD Health Data 2012, www.oecd.org/health/healthdata.*

StatLink http://dx.doi.org/10.1787/888932866602

However, the higher use of medical technologies is not necessarily associated with better health outcomes. Many studies have attempted to assess the tangible medical benefits of a substantial increase in CT and MRI examinations in a country but found no conclusive evidence of such benefits (Smith-Bindman, 2008; Baker et al., 2008).

Greater numbers of medical devices may be related to a less stringent authorisation process and inappropriate incentives

The authorisation process for medical devices is less stringent than that of new pharmaceutical goods in some countries, possibly contributing to a greater availability of medical devices. For example, the US Food and Drug Administration (FDA) approves new medical devices, including imaging technologies, and these devices are classified into three groups; Class I for low-risk devices, Class II for moderate-risk devices, and Class III for novel and high-risk devices. For devices classified as Classes I and II, manufacturers usually need to seek clearance from the FDA based on a market notification application, but the requirements are generally less strict than those for drug authorisations (Feldman et al., 2007). For Class III devices, manufacturers need to go through a pre-market approval process that is similar to that for pharmaceuticals, providing evidence on the safety and effectiveness of the devices based on randomised clinical trials. But out of over 8 000 new

devices marketed every year, only a few dozen new devices are classified in Class III (Hogan and Simmons, 2008). For instance, based on the approval of CT scanners, a Class III device, CT colonography scanners were not required additional randomised clinical trial data before marketing and clinical use (Banerjee and Van Dam, 2006).

Apart from the relatively simple authorisation process, high profit margin and payment incentives for providers may also contribute to a high density of medical devices, particularly diagnostic equipment and their frequent use (Dinan et al., 2010). There may be also patient preferences for frequent diagnostic exams in some countries.

… but to encourage rational resource allocation, some countries apply HTA

Health Technology Assessments (HTAs) have been conducted to assess efficacy and cost-effectiveness of medical devices to inform reimbursement and coverage decisions in some countries. For example, NICE in England evaluates both pharmaceutical products and medical devices based on a protocol in terms of clinical- and cost-effectiveness (Feldman et al., 2007). In France, the total cost burden is considered in the assessment of medical technology (OECD, 2005), and the Commission in the Haute Autorité de Santé (HAS) evaluates the clinical relevance of new medical devices for reimbursement purposes (Bernard and Vicaut, 2008). Cost-effectiveness is also evaluated for medical devices such as PET scanners in other countries, including Australia, Canada (Quebec), Germany, Ireland and Norway (OECD, 2005).

Institutions and professionals are becoming specialised for delivering quality cancer care

With regards to institutional and human resources, several countries are challenged by inadequate access to institutions that treat cancer, and many countries face a shortage and inadequate distribution of health professionals who practice cancer care. To meet increasing demand, a number of countries are pursuing centralised cancer care delivery by concentrating resources and expertises at specialised institutions while trying to ensure patients' access geographically. Countries have also developed specialised training and certification systems to seek efficiency gains through specialised cancer care delivery.

The types and numbers of institutions and health professionals providing cancer care vary across countries.

The organisation of cancer care delivery is varied across countries; care is provided in different inpatient and outpatient institutions that vary with the type of cancer or the treatment option. In countries such as Sweden, cancer patients are treated at specialised institutions with both inpatient and outpatient facilities, often called comprehensive cancer centres, in which radiotherapy, chemotherapy and surgery are provided. These centres often facilitate the delivery of integrated care provided by diverse specialists to cancer patients and engage in extended research activities. Germany, Ireland, Latvia, Norway and Slovenia also provide cancer care at comprehensive cancer centres and also at specialised institutions that provide treatment for specific cancers. Other countries, such as Canada, Chile, England, France, Hungary, Israel, the Netherlands, Poland, Portugal, Singapore and Turkey have institutions that specialise in certain treatments, such as radiotherapy, chemotherapy or surgery. Countries such as Australia, Belgium, the Czech Republic, Denmark, Finland, Iceland, Israel, Japan, Korea, Luxembourg, Malta, Singapore, the Slovak Republic, Spain, Switzerland and the United States provide cancer care not only

in specialist cancer institutions but also in general hospitals, in which health professionals provide care for both cancer patients and patients with other diseases. Given the varied organisational structures, the number of institutions providing cancer care differs widely across countries.

Cancer care is provided by different specialists cross-nationally. Many countries have established specific medical specialties in cancer care along with corresponding licensing and certification schemes (see the discussion later in the section and in Chapter 4, "Governance of cancer care systems"), but countries have different specialty categorisations. A number of countries also rely on existing specialists. These specialists often acquire knowledge and skills to provide up-to-date cancer care through continuing training, but in a few countries such training is not necessarily needed for practicing specialists who provide oncology care. In addition, practice patterns in oncology differ across countries. In some countries, specialist oncologists treat cancer patients, while in others physicians provide care not only to cancer patients but also to patients with other diseases, suggesting a large number of doctors working at least partly in cancer care in these countries.

Given these differences, it is difficult to compare the number of medical professionals engaging in cancer care across countries. But the data collected show a wide cross-national variation in the number of professionals such as certified oncologists, radiotherapists and pathologists, as shown in Box 2.4. There are also a number of other professionals such as pulmonologists, gastroenterologists and registered nurses certified in oncology who provide cancer care across countries, and their numbers also vary cross-nationally.

Access to institutions and professionals providing cancer care is reported as inadequate in several countries

In some countries, including the Czech Republic, Israel, Portugal and Scotland, national experts consider that the access to institutions providing cancer care is adequate for the population. For example, in Scotland, there are cancer units in District General Hospitals throughout the country, and the five main cancer centres are geographically placed to facilitate ease of travel. Patients in island communities can also link with clinical staff in cancer centres, and clinicians from the centres visit and provide services to island communities. In Israel, the travel time is one hour maximum to any specialised cancer centre from anywhere in the country.

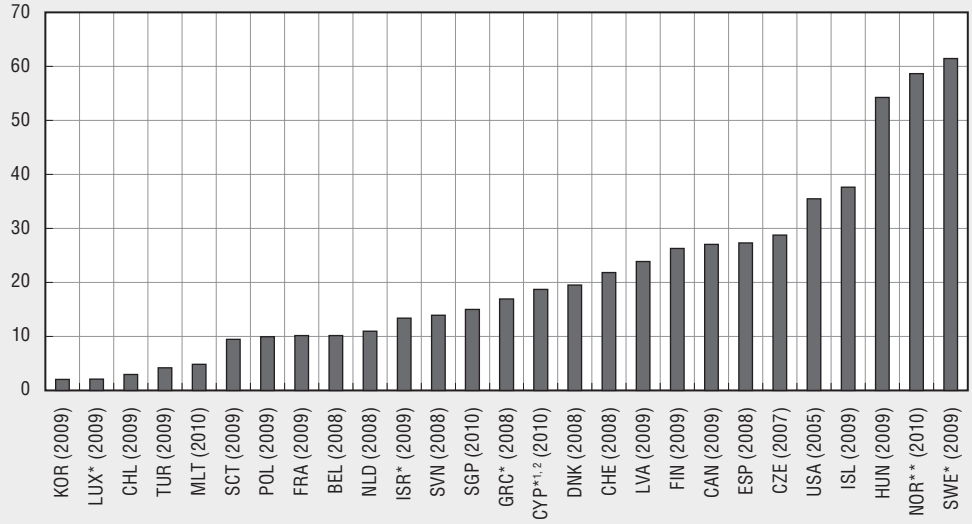
However, according to national experts, the regional distribution of cancer care institutions is not adequate in other countries, and difficulties in geographic access exist in countries including Australia, Canada, Chile, Denmark, Greece, Ireland, Italy, Norway, Poland, Portugal (for radiotherapy facilities), Slovenia, Sweden, Turkey and the United States.

Some of these countries have a limited number of institutions providing cancer care. In Italy, there is still a wide difference in the number of facilities and access to specialised care across the 20 regions. In Greece, oncology institutions are available only in large urban areas, and an imbalanced geographic distribution contributes to unequal access to care. Furthermore, according to national experts, in Poland, there is only one breast cancer unit, and the numbers of cancer care centres and radiotherapy facilities are limited, while Chile, Ireland and Portugal need more radiotherapy facilities. In Chile, there are only five radiotherapy centres in the public sector, located either in the north or the south, and, due

Box 2.4. **Variations in the number of medical specialists providing cancer care across countries**

According to the data collected through the OECD HCQI Questionnaire on Systems of Cancer Care, the number of certified oncologists varies significantly across countries (see figure below). The number of certified oncologist per capita is highest in Sweden with over 60 per million population and lowest in Korea, Luxembourg and Chile with under three per million. The data need to be interpreted with care as the data coverage and also cancer incidence are different across countries besides variation in practice patterns in oncology. But the data are generally comparable to Eurostat data, which ranges between zero in Luxembourg in 2003 and 50 per million population in the Slovak Republic in 2006. One exception is Sweden, as the data provided through the OECD questionnaire is much higher than those available from Eurostat (at 33 per million population).

Figure 2.6. **Certified oncologists per million population, 2010**



Note: Polish and Turkish data refer only to medical oncologists, while Danish data relate to all employed doctors. Data are estimates for Israel, Korea and the Netherlands. Countries with an * refer to those that do not have licensing and accreditation for doctors specialised in providing cancer care, based on the OECD Questionnaire on Systems of Cancer Care. Norwegian data include 111 doctors in specialist education in the hospitals.

1. Footnote by Turkey: The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey shall preserve its position concerning the "Cyprus issue".
2. Footnote by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Source: OECD Health Data 2011, www.oecd.org/health/healthdata, for population in the OECD countries, Eurostat for population in Malta and Slovenia, and the Office for National Statistics for the English and Scottish population, and OECD HCQI Questionnaires on Systems of Cancer Care.

StatLink http://dx.doi.org/10.1787/888932866621

As for radiotherapists, the United States, Canada and England have higher densities, with more than 40 radiotherapists per million persons, while the figure ranges from 2 to 20 in the other countries. A large difference in the density of pathologists was also found, ranging from the lowest of slightly over 3 per million population in Poland to the highest of almost 80 per million population in England.

Given the differences in incidence across countries, care needs to be taken to interpret the data cross-nationally.

to a lack of resources, geographic access is not ensured for care not covered by the Explicit Health Guarantee Regime, such as care for colorectal and lung cancers.

Countries with a large geographic area and small population face a challenge in ensuring equitable access to cancer care. In Norway, for instance, mobile teams are available to provide specialised care, often through a multidisciplinary team, at home or in institutions (Johnsen, 2006). However, the country still faces a challenge in ensuring access to cancer care across regions. In Sweden, according to the national expert, care for breast and lung cancer is not equally distributed across regions, and people in isolated areas are disadvantaged in terms of access to high-quality care, particularly for the diagnosis of lung cancer. Countries such as Australia, Canada and the United States also face distributional challenges across regions, particularly in rural or isolated areas. For example, across Canada, many of the 37 specialised cancer treatment centres provide chemotherapy via satellite clinics, but there is still geographic inequality in access. In the United States, national experts indicated that, even with specialists travelling to clinics, access in the west and mid-west regions is still challenging due to long distances and travel times.

Turning to health professionals, the numbers are appropriate for cancer care needs in some countries. Based on the cancer expert's responses to the OECD HCQI Questionnaire on Systems of Cancer Care, in Germany, for example, the number of internal medicine and other oncology specialists and radiologists is reported to be sufficient across regions, and there were only five vacant positions for radiologists in 2010.

There is, however, a perceived shortage of specialists engaging in cancer care in many other countries, and more specialists for cancer diagnosis are needed in many of them. For instance, in Korea, according to the national expert, there has been a persisting shortage of pathologists since the late 1990s, and on average, only between 30% and 50% of residency positions in pathology in training hospitals have been filled in the past ten years. Canada reports that the lack of pathologists is serious, as their average age is increasing and sometimes no replacement is available for retiring pathologists. In addition, based on the projected needs, training positions for radiologists were cut back in the early 2000s, but by the late 2000s an increase in diagnostic imaging activities and technological sophistication has led to an increase in demand. In Ireland, following the launch of a colorectal cancer screening programme in 2011, more skilled diagnostic specialists are needed to assist with programme implementation.

According to the questionnaire responses, a number of countries also need more specialists for cancer treatment. In Portugal, even though training posts have been increased for medical oncologists and radiologists in the past few years, there is still a shortage. Among the central and eastern European countries, Hungary is estimated to need an additional 20 radiologists, and Poland also faces a shortage of radiologists due to the brain drain of the 1990s. In addition to oncologists and radiologists, there is also a need for thoracic surgeons in Chile and Hungary, for colorectal surgeons in Norway and for surgeons in general in Sweden. Israel also needs more radiologists and radiotherapists. Moreover, some small countries also face difficulty in keeping specialists from going abroad. Maltese doctors trained abroad do not usually return home to practice, and due to the shortage, particularly for breast cancer, general surgeons usually provide cancer diagnosis and treatment. In addition, Luxembourg reports a need for more trained and skilled radiotherapists and more oncologists and other specialists trained in cancer treatments. One way of resolving a shortage is to increase the training opportunities and

vacancies, but countries have also followed alternative approaches in meeting demand for cancer diagnosis and treatments, as will be described later in this chapter.

Looking into the future, a shortage of health professionals engaging in cancer care is foreseen at least in some countries. For example, in the Netherlands, since the number of cancer survivors is increasing, demand for follow-up care, particularly in outpatient settings, is expected to grow. As a result, the current number of doctors in this area may not be sufficient, and a shortage may become more apparent in the near future. In Malta, too, it is anticipated that the numbers of health professionals in imaging and radiotherapy will become insufficient. Shortages are also expected in some other countries due to population ageing. Even though there is no perceived shortage of radiologists at this point in Singapore, a shortage may emerge due to a changing demographic structure. Norway also faces this same challenge; as population ageing continues, cancer incidence and the demand for cancer care is expected to grow.

Besides shortages, medical specialists engaging in cancer care are not always adequately distributed within a country. For example, while the network of gynaecologists is very well established and distributed all over Chile, the network of thoracic surgeons is limited, and surgeons who can treat colorectal and lung cancer patients appropriately are concentrated in only a few big cities. In Canada, according to the national expert, the number of radiologists varies by region. Australia, Greece, Hungary, Italy, Latvia, Poland, Turkey and the United States also face distributional problems, particularly with regard to rural or isolated areas. Challenges are pronounced for colorectal and lung cancer patients in Australia, in the northeast region in Hungary and in the southern regions of Italy.

Many countries are concentrating cancer care delivery into fewer centres

Over time, a number of countries, including Australia, Canada, Chile, the Czech Republic, Denmark, Finland, Hungary, Ireland, Japan, Korea, Latvia, Luxembourg, the Netherlands, Norway, Singapore, the Slovak Republic and Turkey, have centralised cancer care delivery by concentrating resources and expertise at specialised institutions in order to ensure high-quality care delivery and increase efficiency. Many of these countries have also reorganised cancer care delivery in order to strengthen care co-ordination between specialised and community-based care providers.

A few countries *have developed comprehensive cancer centres* to provide specialised care in a more centralised manner. In Norway, there was a shortage of thoracic surgeons in the past for lung cancer patients, and a study on rectal and lung cancers showed differences in surgical treatments provided across regions. These findings led to a policy shift towards more centralised cancer care delivery. Care delivery has been reorganised and centralised at cancer centres, and the better allocation of resources resolved the problem. To improve both access to specialised cancer care across regions and the organisation of cancer care delivery, Japan introduced a designated cancer hospital system in 2002. Previously cancer care was provided at numerous hospitals with varied capacities, now designated hospitals are required to be equipped with a certain level of expertise and resources for delivering high-quality cancer care. Furthermore, Ireland is in the process of transferring and reorganising all cancer diagnostic and surgical services to eight cancer centres. Across countries, these centres are often accredited to provide specialised cancer care; the development of accreditation systems is discussed further in Chapter 4.

Some countries *have strengthened comprehensive cancer care* institutions in recent years. For example, Korea had a limited number of cancer centres in the early 2000s but built a National Cancer Center, nine designated regional cancer centres (designated hospitals for cancer care established in province levels) and 23 private cancer hospitals in recent years to overcome limited capacity and also to reduce regional disparities in delivering high-quality cancer care. In Canada, in the early 2000s most provinces had one cancer centre, but now all provinces have at least one centre. Furthermore, in Hungary, the number of cancer care institutions, including private hospitals, has been increasing throughout the 2000s, and in Chile the number of public cancer care centres increased from 19 in 2002 to 21 in 2010, at the same time as they were equipped to provide care for patients with different types of cancer.

Several countries also *increased the number or capacity of institutions providing specific cancer treatment*. Australia established the National Centre for Gynaecological Cancers in 2007, in addition to Integrated Cancer Centres for all cancer treatment, in order to improve treatment outcomes for women with gynaecological cancers and to raise the awareness and improve the education of medical and allied health professionals. In Luxembourg, in order to overcome the shortage of radiotherapy units, in 2000 the government built radiotherapy facilities (free-standing specialised units not affiliated with hospitals). Denmark and Norway also increased their radiotherapy capacity, and the Slovak Republic built specialised cancer care facilities/centres for the surgical treatment of cervical and colorectal cancers.

Concentrating resources for the delivery of cancer care may affect geographic access to care, hence countries have undertaken different strategies to ensure adequate access. In a number of countries, the *locations of cancer care institutions* have been selected carefully to ensure patients' geographic access. For instance, in Portugal, the locations of hospitals providing cancer diagnosis and treatment were chosen to ensure equal access to care, and cancer hospitals are located in Porto, Coimbra and Lisbon, major cities in the north, the centre and the south of the country. The Czech Republic reduced the number of comprehensive cancer centres from 18 in 2002 to 13 in 2008, intended to optimise the population coverage of each centre and to allocate experienced professionals and sufficient investment at each centre. The current cancer care delivery model is considered well organised and distributed adequately around the country, and, partly due to the more equal access, there is only a small variation in survival across regions. Cancer care delivery is *centralised for some cancers* in some countries. In Finland, for example, the planning and delivery of cancer treatments for rare and most serious cancers is centralised, while the treatment of most other cancers is carried out close to the patient's home. Furthermore, several countries, including those with large areas and small populations, provide *financial support for travelling*. The countries providing such support include Australia, Belgium, Finland, Hungary, Ireland, Latvia, Luxembourg and Norway. Last, policies to ensure the timely delivery of cancer care are also relevant here. These strategies are discussed in Chapter 3.

Countries are also promoting the specialisation of health professionals and increased human resource capacity

In order not only to resolve the shortage of cancer care but also to ensure its quality and seek gains in efficiency, most countries studied *have developed unified licensing and certification systems* to train medical professionals with specialised expertise and skills in

cancer care. These countries include Australia, Belgium, Canada, Chile, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Latvia, Malta, the Netherlands, New Zealand, Portugal, Singapore, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States (see Chapter 4 for more information). For example, in Belgium, until the beginning of the 2000s, physicians with training in internal medicine provided care to patients including cancer patients, but since the introduction of licensing in oncology care, specialists provide care to cancer patients.

In addition, to improve the quality of cancer care, many countries *have strengthened continuing training in cancer care* for practicing doctors, including in Canada, Denmark, Hungary, Japan, the Netherlands, Switzerland and Turkey. In Switzerland, for example, most cantons provide oncology training, and a regular recertification process is available, so oncologists are trained with up-to-date knowledge and skills. In the Slovak Republic and Turkey, opportunities for continuing training have been developed and in recent years have been increasing.

In order to tackle the shortage of medical professionals engaging in cancer care, countries also *increased training positions and recruitment*. For instance, Portugal had an insufficient number of oncologists in the early 2000s, but the shortage is expected to be resolved over the next five years or so through recruitment. The number of oncologists has also been increased in France and Korea. In Norway, due to the growing demand for cancer care, the number of radiotherapists has been increasing in the past five years, and the number of training positions at hospitals has been also boosted for oncologists and pathologists. Similarly, to cope with an expected shortage, in Singapore more radiologists have been trained in recent years, and the numbers of other medical specialists, including medical surgical oncologists, have also increased since the early 2000s.

... but as training takes time, some other strategies have been pursued simultaneously

Countries need to react quickly to changing demand and to other developments and challenges related to medical technologies and medical practices, but training medical specialists takes time, so several countries *have promoted the use of different health professionals in oncology*. For example, Canada developed a certification programme in oncology for registered nurses, and the Netherlands also utilises nurse practitioners in oncology. Hungary is trying to use its professionals more efficiently, and primary care personnel (i.e. nurses and midwives) are now doing smear-taking, which was traditionally done by gynaecologists. This is undertaken not only to tackle the shortage of doctors in cancer care but also to reduce costs related to cancer care delivery.

To strengthen the co-ordination of cancer care, some countries *have enhanced the role of GPs*, as they are particularly important for the follow-up of cancer patients and palliative care for advanced cancer. In Hungary, for example, the role of primary care physicians is important for care co-ordination, and an information system and training for primary care physicians has been organised to ensure good care co-ordination and referral between primary care and regional cancer centres. In a few countries, GPs have been given financial incentives in order to encourage care co-ordination for cancer patients. For instance, in Australia, in an effort to improve co-ordination for chronic medical conditions, including cancer, new items were introduced in the Medicare Benefit Schedule in 2004, and GPs are given extra payments for managing care through a multidisciplinary approach with

dieticians and specialists in mental health, aboriginal health and others. Similarly, in Scotland, additional remuneration is provided to GP practices if they register cancer patients, undertake regular reviews and assessments of support needs, deliver palliative care and ensure co-ordination with specialist care.

Countries are also seeking other measures to resolve pressing shortages. The Netherlands is trying to *enhance the use of IT*. A system has been set up so that GPs can find knowledge on follow-up care from specialists via the Internet. Such enhanced information sharing is also important for care co-ordination among different providers. According to the Portuguese expert, the country needs to *improve care organisation* to better utilise the pathologists available for cancer care. Malta is aiming to *improve the working conditions* of specialists in oncology, as there is a need to increase their retention by making their pay and working conditions more attractive compared with other countries.

Conclusion

Due to the increasing cost of pharmaceuticals, delivering state-of-the-art treatment has far-reaching financial consequences. As observed, many countries have been undertaking HTAs to promote the rational use of medicine and evidence-based cancer care. But to reduce the burdens associated with undertaking HTAs, further cross-country collaboration would be beneficial. Regional collaboration is taking place at the European level, and similar efforts could also be undertaken in other parts of the world.

Countries also monitor the evidence-based, effective use of pharmaceuticals and undertake an individual evaluation for certain pharmaceutical treatments, but these involve additional administrative procedures. In some countries, the administrative burdens associated with these processes sometimes hinder the effective use of cancer drugs, and so need to be minimised, where possible.

Despite the increased availability of medical devices in recent years, some countries are still challenged by both shortages and unequal distribution, which sometimes contributes to the untimely delivery of cancer care, as described in Chapter 3. Nevertheless, some other countries appear to have an excessive supply of some diagnostic equipment and to overuse diagnostic services.

There have been few policy responses to the increase in diagnostic equipment and services. The authorisation process for medical devices, reimbursement for their use, and the planning and monitoring of their supply and distribution may need to be reviewed in order to ensure that the volume of diagnostic devices and their usage do not become excessive.

With regards to institutions and professionals, countries are tending to centralise the delivery of cancer care. Concentrating resources and expertise at specialised centres and centralising cancer care delivery while promoting integrated care seem to have contributed to higher quality cancer care and improved evidence-based care delivery. As cancer care is not provided only at specialised centres, care co-ordination needs to be promoted among different providers particularly with those in the community where patients live and their support system exists. A number of countries still face challenges related to assuring access, particularly access to professionals providing cancer care.

The development of institutional and professional capacity takes time, so strategic planning needs to be forward-looking. Planning for institutional and human resources needs to follow a comprehensive approach, examining changes in the demand and supply

of cancer care. Institutional and professional capacity also needs to be evaluated regularly based on changes in demand and supply in order to ensure the continued delivery of high-quality cancer care. If unforeseen challenges such as shortages and inadequate access emerge, timely and flexible policy options need to be sought to resolve them.

Notes

1. Australia, Belgium, Canada, Chile, Cyprus, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Luxembourg, Malta, the Netherlands, New Zealand, Norway, Poland, Portugal, Singapore, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and the United States. United Kingdom provided some information specific to England, Northern Ireland, Scotland and Wales and where possible, the country-specific data and information are included in this publication but otherwise data and information for the United Kingdom as a whole are used. The publication uses three-letter country codes defined by the International Organization for Standardization (ISO); GBR refers to the United Kingdom and CHE refers to Switzerland; for England, ENG is used.
2. Nine selected drugs refer to Herceptin (trastuzumab), Avastin (bevacizumab), Aromasin (exemestane), Femara (letrozole), Arimidex (anastrozole), Evista (raloxifene), Eloxatin (oxaliplatin), Camptosar (irinotecan) and Xeloda (capecitabine). For breast cancer, cancer drugs refer to Herceptin, used for late stage, to Trastuzumab for early stage, and also to Exemestane, Letrozole, Anastrazole and Capecitabine (also reimbursed for colorectal cancer), and for colorectal cancer to Bevacizumab, Oxaliplatin and Irinotecan.
3. Available data are not disaggregated up to the same level in the System of Health Accounts framework, making it difficult to compare figures across countries.
4. Based on a literature review, these ten drugs were selected to assess years in which innovative cancer drugs are generally authorised and used clinically.
5. Avastin, Eloxatin, Camptosar and Xeloda in Belgium, Avastin, Evista and Erbitux in Chile, Femara and Eloxatin in Italy, Avastin and Evista in Latvia, Avastin and Aromasin in Malta, Avastin and Erbitux in Poland, Herceptin, Avastin, Erbitux, Eloxatin and Camptosar in Spain, and Evista, Erbitux, Eloxatin and Camptosar in Turkey.
6. United Kingdom provided some information specific to England, Northern Ireland, Scotland and Wales and where possible, the country-specific data and information are included in this publication but otherwise data and information for the United Kingdom as a whole are used. The publication sometimes refers countries by three-letter country codes defined by the International Organization for Standardization (ISO); GBR refers to the United Kingdom for England, ENG is used.
7. Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Switzerland, Sweden and the United Kingdom.

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Chapter 3

Cancer care practice

Besides providing an adequate level of cancer care resources and ensuring their adequate allocation, as discussed in Chapter 2, countries also aim to ensure that high-quality care is delivered throughout the various stages of the disease pathway. This chapter illustrates cross-country differences in cancer care practice, such as smoking reduction, screening, medical practices and waiting times. It also considers the various policy measures that countries have adopted, in addition to simply increasing resources, in their efforts to improve cancer care practice.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Introduction

This chapter illustrates cross-country differences in cancer care practice, such as smoking reduction, screening, medical practices and waiting times, and also describes policy trends to improve practice. Countries have been giving increasing emphasis to the prevention of cancer and its early diagnosis. Many have introduced prevention policies to avoid and delay the onset of cancer, along with nationwide population-based screening programmes, particularly for breast cancer, to improve early diagnosis. Various policy measures have also been adopted to improve the quality and timeliness of cancer care treatment.

Chapter 3 mainly uses 2010 information collected through the OECD HCQI Questionnaire on Systems of Cancer Care, together with subsequent interviews and data submitted in response to requests made to 35 countries.[1] The experts who provided inputs are listed in Annex A.

Anti-smoking steps have been taken but additional prevention measures are needed

Smoking rates vary across countries, even though smoke-free environments and anti-smoking policies have been introduced for the prevention of lung cancer in the past decade in the majority of countries studied. These anti-smoking policy measures have contributed to a downward trend in smoking rates and a reduction in cross-country variations. Other prevention efforts that aim to improve life styles and reduce cancer incidence such as health promotion and counselling have also been undertaken cross-nationally.

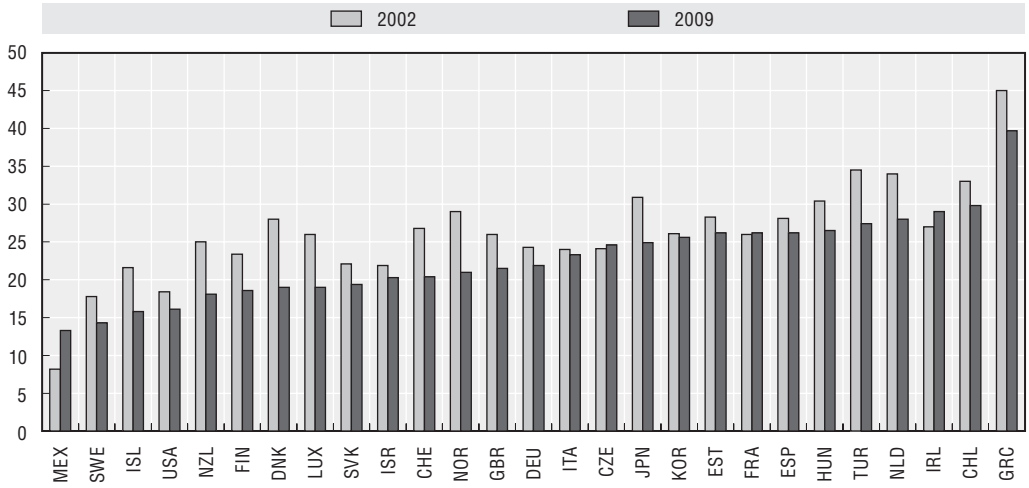
Smoking rates vary across countries

Smoking rates vary by about two-and-a-half times across countries (Figure 3.1). The lowest rate is in Mexico, where 13.3% of the population aged 15 and over are daily smokers, followed by Sweden at 14.0% and Iceland at 14.3%, while it is as high as 31.9% in Greece, followed by 29.8% in Chile and 29.0% in Ireland. The smoking prevalence is higher for men in all OECD countries except Norway and Sweden. Several studies provide strong evidence of socio-economic differences in smoking and mortality (Mackenbach et al., 2008). In general, people in lower social groups have a greater prevalence and intensity of smoking, a higher all-cause mortality rate and lower rates of cancer survival (Woods et al., 2006).

Smoke-free and anti-smoking policies have been introduced across countries

An increasing number of countries have implemented smoke-free and anti-smoking policies for the prevention of lung cancer in recent years according to the responses to the OECD HCQI Questionnaire on Systems of Cancer Care. Many of them, including Australia, Belgium, Chile, Denmark, England,[2] Finland, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Malta, the Netherlands, Slovenia, the Slovak Republic, Spain and Turkey, have introduced a nationwide smoking ban in public places. Smoke-free

Figure 3.1. **Percentage of population aged 15+ who are daily smokers, 2002 and 2010**



Note: 2002 data for Greece and Hungary refer to 2000, those for Australia, Belgium, Canada, Korea and Poland refer to 2001 and those for Chile, Germany, Mexico, the Slovak Republic, Spain and Turkey refer to 2003. 2010 data for Mexico refer to 2006, those for Ireland, New Zealand and Switzerland refer to 2007, those for Belgium and the Czech Republic refer to 2008, and those for Chile, Germany, Greece, Hungary, Poland, the Slovak Republic, Spain and the United Kingdom refer to 2009. Population aged 12 and over for Canada, those 13 and over for Denmark, those aged 14 and over for Australia, those aged between 15 and 64 for Finland, those aged between 16 and 64 for Estonia, those aged between 16 and 74 for Norway, those aged 16 and 84 for Sweden, those aged 16 and over for the Netherlands, Spain and the United Kingdom, those aged 18 and over for France, Greece, Hungary,Ireland and the United States, those aged 20 and over for Japan, Korea and Mexico, and those aged 21 and over for Israel.
Source: OECD Health Data 2012, www.oecd.org/health/healthdata.

StatLink http://dx.doi.org/10.1787/888932866640

policies have been extended to restaurants and work places in some of these countries and in many parts of Switzerland and the United States. To reduce smoking, public awareness campaigns have also been undertaken in many of the countries (i.e. Australia, Belgium, Chile, Denmark, England, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Japan, Korea, Latvia, Luxembourg, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland and Turkey).

Additional strategies have been followed in some countries. In order to promote awareness on the harm caused by smoking, graphic health warnings are printed on cigarette packages in countries, including Australia and France. In addition, tobacco sales to minors are banned in countries such as Australia, Belgium, Chile, Germany, Japan, Korea, the Netherlands and Turkey. Chile also banned the sale of tobacco near schools, and Korea and Turkey introduced restrictions on vending machine installation. Tobacco advertising is also restricted in countries including Australia and Iceland, and a ban on smoking in broadcasting was introduced in Korea and Turkey. Furthermore, a tobacco tax has been introduced in many countries including Australia, France, Germany, Korea, the Netherlands, Spain, Turkey and the United States and has been increased in countries such as France, Hungary and Korea.

Some countries have also introduced *smoking cessation programmes*. For example, Malta started a programme in 1998, and Tobacco Dependence Support Classes have been offered free of charge to smokers who apply for the programme. In addition, free "quit line" phone services are available to all smokers. In Luxembourg, a smoking cessation programme involving primary care physicians was launched in 2008. Ireland has also started smoke

cessation services, as have Australia, Belgium, Canada, Korea, the Netherlands, Portugal, Turkey, Wales and the United States. Among these countries, Korea launched a nationwide quitline and smoking cessation clinics at 250 public health centres in 2005, while in Portugal, smoke cessation programmes and consultations have been available since 2007 in many hospitals, although not yet in the rest of the health system. In the United States, national telephone and internet-based cessation resources are available.

A few countries also provide financial incentives to health care professionals to promote smoke cession counselling. Primary care physicians in Belgium, England, Luxembourg, Scotland, Turkey and the United States can obtain pay-for-performance for preventive care episodes relevant to lung cancer. In Luxembourg, a fee for smoking cessation counselling was introduced in primary physician practices in 2008. Turkey also passed legislation that reimburses family physicians who provide anti-smoking programmes to patients. In the United States, depending on a patient's insurance scheme, primary care physicians can obtain a payment bonus for preventive care that includes smoking cessation counselling.

Smoking rates have been reduced across countries

Although large disparities still remain, smoking rates have shown a marked decline across countries, except in Mexico, the Czech Republic, and Ireland (Figure 3.1). The OECD average decreased from 26.8% in 2000 to 19.5% in 2010, with a slightly higher decline amongst men than women.

Government anti-smoking policies appear to have some positive impact on reducing smoking rates across OECD countries. For example, in recent years Australia has introduced tobacco control measures, national quit tobacco campaigns, and a scheme that subsidises medicines for smoking cessation treatment, including nicotine patches. Concurrently, smoking rates declined; in the early 2000s, 19.8% of the population aged 14 and over were daily smokers, and the rate fell to 15.1% by 2010 (OECD, 2012) and is as low as 10% in some areas. In addition, since 1994, Canada has implemented major tobacco control strategies, including the Federal Tobacco Control Strategy (FTCS) of 2001, which is built on the tenets of prevention, protection, cessation and product regulation. Federal/provincial/territorial legislation and polices, including taxation and restrictions on tobacco access to youth, have helped reduce smoking to the lowest levels ever recorded (16.3% of population over age 12 smoking regularly) (OECD, 2012). These days, fewer Canadians are trying smoking and becoming smokers than ever before. Furthermore, in France a 40% price increase on manufactured cigarettes due to a tax hike in 2003 led to a drop in sales by 33% two years afterwards, and the prevalence of declared smokers has decreased in the country since 2000 due to the varied interventions against smoking. The proportion of those who declare smoking "even from time to time" decreased from 33.1% in 2000 to 29.9% in the 12-75 age group (INPES, 2000 and 2005).

Prevention policies have been introduced in many countries

Other prevention efforts that aim to improve life styles and reduce cancer incidence have been undertaken across countries. Various efforts including health education and promotion, regulation and fiscal measures, and counselling in primary care have been pursued across countries in order to promote physical activity and healthy diets. For example, to counter increasing trends of cancer incidence due to population ageing, Australia is trying to reduce alcohol consumption and obesity and to promote physical

activity through community campaigns run at the state level with federal support. Germany has also been making considerable progress in primary prevention, through campaigns addressing known risk factors for cancer other than tobacco, such as alcohol, ultraviolet radiation, poor diet and lack of physical activity. Latvia has used booklets and the mass media to promote healthy life-styles, healthy diet and physical activities. Similarly, on 4 February 2010 Malta launched a general campaign on cancer prevention "World Cancer Day" and published a leaflet on a healthy anti-cancer diet. Finally, Denmark has introduced general health prevention policies not only for cancer but also for other diseases, and the Spanish strategy for nutrition, physical activity and prevention of obesity and strategies for chronic diseases are also relevant to cancer prevention.

The impact of these prevention interventions varies. According to an OECD study (Sassi, 2010), among different interventions (mass media campaigns, school-based interventions, worksite interventions, fiscal measures, regulations on food advertising to children, compulsory food labelling and physician-dietician counselling), physician-dietician counselling appears to contribute the most to reducing health care costs over time, but the cost of the intervention outweighs the health care savings. Nonetheless, given the significant health benefits obtained, physician counselling can be considered an efficient investment, comparable to many other therapeutic interventions routinely provided by health systems. Fiscal measures such as taxes, tax exemptions and subsidies are also considered cost-saving policy options for health systems.

Early diagnosis has also been promoted, but maintaining high screening levels is a challenge

Besides prevention measures, early diagnosis is also important to reduce mortality and improve survival particularly of breast, cervical and colorectal cancers. A number of studies advocate the benefit of screening programmes in detecting cancer at an early stage and reducing preventable deaths, particularly for breast, cervical and colorectal cancers (Hakama and Hristova, 1997; Kadiyala and Strumpf, 2011). Some studies (Brown and Fintor, 1993; De Koning, 2000; Giordano et al., 2012) have concluded that the benefit is substantial for breast cancer in terms of mortality reduction and cost-effectiveness. The incidence and mortality rates of cervical cancer have also found to be decreasing since the introduction of screening programmes across countries (Devesa et al., 1989; Coleman et al., 1993; IARC, 2005). But screening also has potential harms such as over-diagnosis and false-positive results (Puliti et al., 2003; Hofvind et al., 2012), so screening should be offered only if it is proven to reduce mortality, cost-effectiveness is acceptable, high quality is assured and the public is informed of its benefits and potential harms (European Union, 2003).

Even though a number of countries have introduced nationwide screening programmes to improve the early diagnosis of cancer, screening coverage still varies cross-nationally. It is also challenging to maintain high coverage levels over time, even with financial incentives for providers. Recently, many countries have also introduced other early diagnosis and prevention measures, such as BRCA1/2 genetic screening and HPV vaccinations.

Cancer screening varies across countries in terms of spending and coverage

A number of countries have designed and introduced cancer screening programmes, but the amount of spending on cancer screening varies across countries. Based on the limited data collected through the OECD HCQI Questionnaire on Systems of Cancer Care

and the Disease Expenditure Study, France spends the smallest proportions of total cancer care expenditure on screening, at 0.8% (for breast and cervical cancer), followed by 1.2% in the Czech Republic, 3.4% in Korea, 5.1% (for breast cancer) in Denmark, 5.9% in England and 8.4% in Australia.

Screening rates are supposed to capture the actual access to early diagnosis of cancer, but Box 3.1 summarises how differences in data sources and other factors make cross-country comparisons difficult. Screening programmes are classified for the rest of this section and the definitions are provided in Box 3.2.

Box 3.1. **Data comparability issues related to screening rates**

Cross-country comparison of screening rates is difficult due to differences in data sources and specifications. Some countries rely on data collected through surveys, which may be influenced by recall bias and also include women who received screening outside of the population-based programme, while data collected through the screening programme itself often refer to the screening rates of those who were invited to the population-based mammography screening. Screening rates based on survey data are often higher than those based on programme data, but this is not true for all countries.

Screening rates are generally calculated by dividing the number of those screened in the target age by the number in the target age population, but data specifications are different across countries.

Denominator specifications are often different. For example, the denominator of Dutch data refer to the target age population who are invited, excluding individuals who declared that they did not want to participate in the screening (regardless of their refusal reasons) and cancer patients, as they are not invited. On the other hand, for France and Luxembourg, the denominator of breast cancer screening rates refers to the entire population in the target age groups including those who do not want or do not need to be invited to screening due to their history of cancer, even though the data sources are cancer screening programmes. Hence, due to these inclusions and exclusions in the denominator, data are not exactly comparable.

Different reference periods also complicate cross-national comparisons. Across countries, screening data refer to either one or two-year periods for breast cancer. The reference period of the screening rates usually matches with the intervals recommended in the screening programmes, but there are exceptions. For example, the Greek data refer to breast cancer screening in the last three years for the target population, while the population-based screening programme is offered every two years, overstating the rate compared with those of other countries reporting the coverage during the programme's interval periods. On the other hand, Turkey data refer to breast cancer screening over a year while population-based screening is offered every other year, understating the rate when comparing cross-nationally. As for cervical screening, Finland and Turkey offer cervical cancer screening every five years, and Japan offers it every two years, but they all report screening rates for a specific reporting year. On the other hand, Greece with a yearly screening programme and Iceland with a biennial screening programme both report the screening rates of target women over three years. Hence, the international comparison of screening rates is not straightforward.

Source: OECD Health Data 2012, www.oecd.org/health/healthdata.

Box 3.2. **Classification of cancer screening programmes**

To classify cancer screening policies across countries, the terms and definitions used are from *Cancer Screening in the European Union: Report on the Implementation of the Council Recommendation on Cancer Screening* (von Karsa et al., 2008) and *IARC Handbook on Cancer Prevention: Breast Cancer Screening* (IARC, 2002). These definitions are explained below.

To qualify as a *screening programme*, there should be a public screening policy documented in a law, or an official regulation, decision, directive or recommendation. The policy should define, at a minimum, the screening test, the examination intervals and the group of persons eligible to be screened; and the screening examinations should be financed by public sources (apart from a possible copayment).

Population-based screening means that in each round of screening the persons in the eligible target population in the area served by a programme are individually identified and personally invited to attend screening. Population-based screening programmes generally require a high degree of organisation in order to assure that the invitational activities are performed reliably and effectively and are adequately co-ordinated with the subsequent steps in the screening process. Population-based programme also has the following characteristics: a management team responsible for implementation, a health care team for decisions and care, a quality assurance structure and a method of identifying cancer occurrence in the target population. Population-based screening may be available nationwide (national rollout completed) or only in certain regions or in different stages of implementation: planning phase, pilot phase, or rollout ongoing. On the other hand, *non-population-based/opportunistic* screening refers to direct referral to screening by doctors outside of population-based screening programmes.

Nationwide rollout is considered completed if at least ca. 90% of the eligible target population in the respective region or country should have received at least one personal invitation to attend the screening programme, and all elements of the screening services should be fully functional in order to assure that every eligible person has an equal opportunity to participate in screening. In some cases, the implementation status may be mixed because the country is in a phase of transition from one type of programme to another (i.e. from non-population-based to population-based programmes) or because both types of programmes exist in various regions.

Differences in the specifics of the screening programmes need to be taken into account when comparing cross-national data. Breast cancer screening generally targets women aged between 50 and 69, covering 20 years, and is provided every two years across countries, but there are cross-country variations in the target age and screening intervals, which partly reflects differences in underlying incidence and stage distribution, as described in Box 3.3.

Despite these challenges in data comparability, some general observations can be made about screening rates. The cross-country variation in mammography rates is wide, with an almost seven-fold variation cross-nationally (Figure 3.2), which is similar to the level for cervical cancer screening coverage (Figure 3.3). Countries tend to have a similar coverage pattern between both cancer screenings; countries successfully covering the target population for one cancer screening also do well for the other cancer. This suggests that the infrastructure has been set up for effectively reaching the target population in

Box 3.3. **Differences in the target age and interval of breast cancer screening across countries**

The target age and screening intervals are different for breast, cervical and colorectal cancers across countries. This box focuses on the differences for breast cancer screening programmes, but these differences exist for other cancer screening programmes as well.

Breast cancer screening generally targets women aged 50 to 69, a 20-year span, across countries, but cross-country variation does exist, as is shown in the table below. For instance, the programme's target population includes women below 50 in several countries, including the Czech Republic, Greece, Hungary, Iceland, Japan, Korea, New Zealand, Portugal, the Slovak Republic and Sweden. In the United States, most insurance companies cover screening from age 40 and above, but routine screening is recommended at age 50 and above. Between 40 and 49, women are encouraged to make an individual choice about screening after discussion with their physician. This is in line with findings by some studies (Fletcher, 1997; National Institute of Health, 1997; IARC, 2002), showing the effectiveness of screening women below 50 despite the lower incidence and poorer performance of screening younger women.

As for the upper age limit of the target age, many countries use 69, but there is no agreement on the specific age threshold even though the benefits of screening are known to decrease with age (IARC, 2002). In countries like Chile, Malta and Ireland, the upper age limits are set rather low at 54, 59 and 64, respectively. But some countries offer screening to populations with a wider age range, including older ages. The upper age limit is 70 in the United Kingdom, 74 in France, Israel and Sweden, and 75 in the Netherlands, while the upper age limit is not particularly set and screening is available with no upper age limit in the Czech Republic, Greece, Japan, Korea and the United States.

Target age in breast cancer screening programmes, 2010

Nationwide population-based		Population-based but not nationwide	Non-population-based	
Wider age range (20 years+)	Narrower age range	Wider age range (20 years+)	Wider age range (20 years+)	Narrower age range
Australia (50-69), Belgium (50-69), Cyprus[1,2] (50-69), England (50-70), Finland (50-69), France (50-74), Germany (50-69), Hungary (45-65), Iceland (40-69), Israel (50-74), Italy (50-69), Korea (40+), Latvia (50-69), Luxembourg (50-69), Netherlands (50-75), New Zealand (45-69), Northern Ireland (50-70), Norway (50-69), Poland (50-69), Portugal (45-69), Scotland (50-70), Singapore (50-69), Spain (50-69), Sweden (40-74) and Wales (50-70)	Ireland (50-64) and Malta (50-59)	Canada (50-69), Denmark (50-69), Japan (40+), Slovenia (50-69), Switzerland (50-70) and Turkey (50-69)	Czech Republic (45+), Greece (40+), Slovak Republic (40-69) and United States (50+)	Chile (50-54)

Note: Data in parenthesis refers to the target age group for breast cancer screening in then respective country.

1. Footnote by Turkey: The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey shall preserve its position concerning the "Cyprus issue".
2. Footnote by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Source: OECD HCQI Questionnaire on Systems of Cancer Care.

Box 3.3. **Differences in the target age and interval of breast cancer screening across countries** *(cont.)*

Breast cancer screening is generally provided every two years, so regular access to screening is ensured across countries (table below). But there are some exceptions, including Malta and the United Kingdom, with a three-year interval. In the latter, a study (Boer et al., 1998) found that the marginal cost per life-year gained was lower for a three-year screening interval than the two-year interval. The interval was kept to three years, but the upper age limit was extended from 65 to 70 instead. In the United States, Preventive Services Task Force recommends screening every two years, but in practice it is done more frequently.

Recommendations on frequencies of breast cancer screening, 2010

Nationwide population-based		Population-based but not nationwide	Non-population-based
Frequent access (every two years)	Less frequent access (every three years)	Frequent access (every two years)	Frequent access (every two years)
Australia, Belgium, Cyprus,[1] Finland, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Korea, Latvia, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Singapore, Spain and Sweden	England, Malta, Northern Ireland,Scotland and Wales	Canada, Denmark, Japan, Slovenia, Switzerland and Turkey	Chile, Czech Republic, Greece, Slovak Republic and United States

1. See notes 1 and 2 in preceding table.
Source: OECD HCQI Questionnaire on Systems of Cancer Care.

A number of countries have expanded the target populations for breast cancer screening programmes in recent years. The Netherlands extended the upper age limit over ten years ago, but most other countries including Chile, the Czech Republic, England, Finland, France, Luxembourg, Malta, New Zealand, Northern Ireland, Scotland and Wales widened the target age in the past ten years. There is, however, an exception,as the age group was narrowed in Belgium from 50-70 to 50-69 in 2003.

Source: OECD HCQI Questionnaire on Systems of Cancer Care.

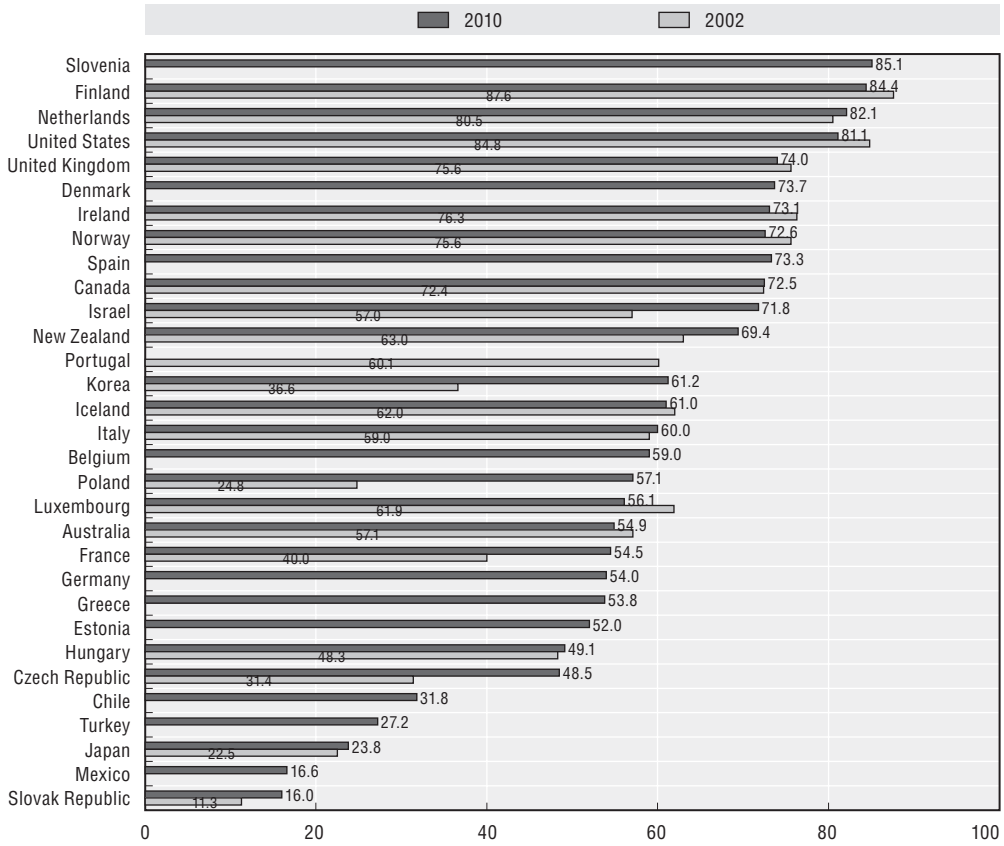
these countries. In fact, these countries tend to have nationwide population-based screening programmes for both cancers.

Many countries have introduced nationwide population-based breast cancer screening programmes

Recent studies suggest that some of the differences in cancer survival could be due to variations in the implementation of screening programmes (Rosso et al., 2010). Some evidence suggests that opportunistic screening often leads to a varied cancer screening coverage by socio-economic group and may have implication for different cancer treatment and outcomes, but population-based screening does not have such an obvious coverage variation (Walsh et al., 2011) and better reaches the disadvantaged.

To improve early diagnosis, many countries introduced population-based breast cancer screening programmes, as shown in Box 3.3 and Table 3.1. In 25 out of 35 countries, population-based screening (see Box 3.2 for definitions) is available nationwide. There is also a group of countries, such as Canada, Denmark, Slovenia, Switzerland and Turkey, in which screening is population-based but not available in all regions. In Canada, for example, most

Figure 3.2. **Mammography screening, percentage of women aged 50-69 screened, 2002 and 2010 (or nearest year available)**

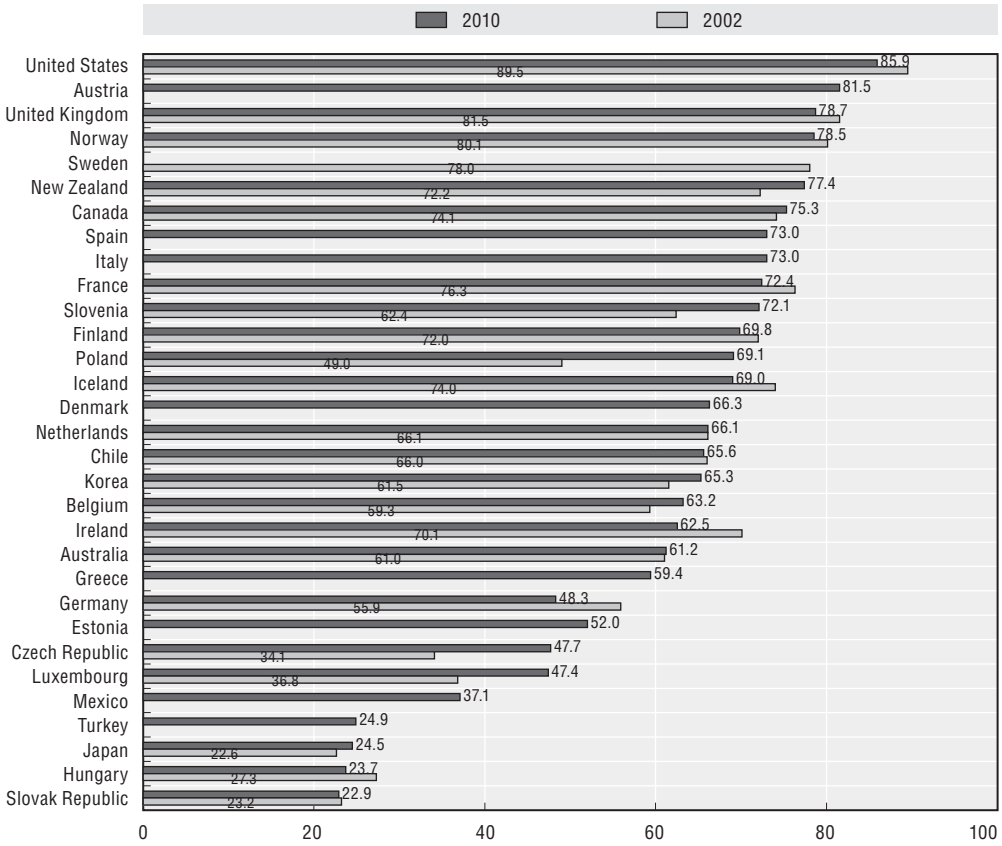


Note: Survey data for Canada, Greece, Japan, Korea, New Zealand, Poland, Spain and the United States and programme data for other countries. 2002 data refer to 2001 for Japan, 2003 for Canada and the United States and 2004 for Korea and Poland, while 2010 data refer to 2007 for Japan, 2008 for Canada, Greece and the United States and 2009 for Korea and Poland. The age group of the data refers to 50-69 for most countries except for Chile (50-54), Estonia (50-65), France (50-74), Hungary (45-65), Iceland (40-69), Ireland (50-64), Israel (50-74), Turkey (40-69) and the United Kingdom (50-64). Target age for Finland for 2002 is 50-59. The US data come from the Behavioral Risk Factor Surveillance System (BRFSS) but not from National Health Interview Survey.
Source: OECD Health Data 2012, www.oecd.org/health/healthdata.

StatLink *http://dx.doi.org/10.1787/888932866659*

but not all provinces and territories have at least some of the elements of population-based screening programmes, such as population-based information systems, networks of supporting laboratories, quality assurance programmes and systems of monitoring and evaluation. Furthermore, there is another group of countries in which population-based breast cancer screening is not available, including Chile, the Czech Republic, Greece, the Slovak Republic and the United States. In the Czech Republic and the Slovak Republic, it is available nationwide to a non-population base as women are referred to undertake mammographs by their GPs or gynaecologists as part of regular medical check-ups. In the United States, population-based screening is available but only to low income women and through some health care systems, but it is expected to expand with the implementation of the Affordable Care Act in 2014. Countries in this group except for the United States have relatively lower breast cancer incidence rates, although some of the other low-incidence countries such as Turkey, Korea and Japan have introduced population-based screening programmes.

Figure 3.3. **Cervical cancer screening, percentage of women screened aged 20-69, 2002 and 2010 (or nearest year available)**



Note: Data for Austria, Canada, France, Greece, Italy, Japan, Korea, Mexico, Poland, Spain and the United States come from surveys while data for other countries come from programmes. Cervical cancer screening coverage usually refers to women aged 20-69 except for Chile (ages 25-64), Belgium (25-64), Denmark (23-65), Estonia (30-60), Finland (30-60), Germany (20-49 for 2002 and 20+ for 2010), Greece (21-69), Hungary (25-65), Ireland (25-60), Italy (25-64), Korea (30-69), Netherlands (30, 35, 40, 45, 50, 55, 60), Norway (25-69), Poland (25-59), Portugal (25-64), Slovenia (ages 20-64), Sweden (23-49), Turkey (ages 35-65) and United Kingdom (25-64 in England and Northern Ireland, 20-64 in Wales and 20-60 in Scotland). 2002 data for Ireland refer to Midwestern region but 2009 data is the national screening rate. 2002 data refer to 2001 for Japan, 2003 for Canada, France, Ireland and the United States and 2004 for Korea, Poland and Slovenia. 2010 data refer to 2006 for Austria and Mexico, 2007 for Finland, Ireland and Japan. 2008 for Australia, Belgium, Canada, Chile, France, Netherlands and the United States and 2009 for the Czech Republic, Denmark, Estonia, Hungary, Iceland, Italy, Korea, New Zealand, Norway, Poland, Spain, the Slovak Republic, Turkey and the United Kingdom. Japan and Turkey report screening rates for target women for the specific year referred while their recommendations on screening intervals being every two years and five years respectively. The US data come from the Behavioral Risk Factor Surveillance System (BRFSS) but not from the National Health Interview Survey.

Source: OECD Health Data 2012, www.oecd.org/health/healthdata.

StatLink *http://dx.doi.org/10.1787/888932866678*

Countries with non-population-based breast cancer screening programmes (i.e. Chile, the Czech Republic, Greece, the Slovak Republic and the United States) tend to have low screening rates, with the notable exception of the United States (Figure 3.2). This is not surprising, as opportunistic screening does not usually ensure a wide uptake, hence in order to promote early diagnosis across the target population, countries started to introduce population-based screening programmes. The relatively high screening coverage in the United States may have been achieved by the health system's characteristics, including its fee-for-service reimbursement, medical malpractice liability system (which compensates patients for injuries caused by the negligence of health professionals), the

Table 3.1. **Breast cancer screening programmes and financial access, 2010**

Nationwide population-based		Population-based but not nationwide		Non-population-based	
Free access	Access with fee	Free access	Access with fee	Free access	Access with fee
Australia, Belgium, England, Finland, France, Germany, Ireland, Italy, Japan, Korea, Latvia, Luxembourg, Malta, Netherlands, New Zealand, Northern Ireland, Norway, Scotland, Portugal, Spain, Sweden and Wales	Cyprus,[1] Hungary, Iceland, Israel, Poland and Singapore	Denmark, Switzerland and Turkey	Canada and Slovenia	Chile, Czech Republic, Greece and Slovak Republic	United States

1. See notes 1 and 2 of first table in Box 3.3.
Source: OECD HCQI Questionnaire on Systems of Cancer Care andSchopper, D. and C. De Wolf (2009), "How Effective Are Breast Cancer Screening Programmes by Mammography? Review of the Current Evidence", *European Journal of Cancer*, Vol. 45, pp. 1916-1923.

insurer's quality monitoring and pay-for-performance (Howard et al., 2009). In addition, national guidelines, resources and effort put into disseminating those guidelines to health care providers, and mass media and tested promotion programmes (Meissner et al., 2004) are also considered to explain high screening rates in the country. Another observation about cross-national trends is that countries that achieved national rollout before the early 1990s (e.g. Australia, Finland, Iceland, Luxembourg, the Netherlands and the United Kingdom, see Table 3.2) have attained relatively high screening rates as well.

Table 3.2. **Rollout years of breast cancer screening programmes, 2010**

Nationwide population-based		Population-based but not nationwide	Non-population-based
Nationwide rollout since the 1990s or earlier	Nationwide rollout since the 2000s	No nationwide rollout	
Australia (1991), England (circa 1995), Finland (1987), Iceland (1988), Luxembourg (1992), Netherlands (1990), Northern Ireland (1980), Scotland (1991), Sweden (1997) and Wales (1989)	Belgium, Cyprus[1] (2009), France (2004), Germany (2009), Hungary (2004), Israel (2000), Ireland (2009), Italy (2008), Korea (2005), Latvia (2009), Malta (2009), New Zealand, Norway (2004), Poland (2007), Portugal (2009), Singapore (2002) and Spain	Canada, Denmark, Japan, Slovenia, Switzerland and Turkey	Chile, Czech Republic, Greece, Slovak Republic and United States

1. See notes 1 and 2 of first table in Box 3.3.
Source: OECD HCQI Questionnaire on Systems of Cancer Care.

Cervical cancer screening is less often population-based

Countries follow different policies with regards to the prevention and early diagnosis of cervical cancer. Unlike breast cancer screening, only slightly over half of the countries studied have cervical cancer screening organised through population-based programmes, and a number of countries retain opportunistic screening, as is shown in Table 3.3. For example, in the Slovak Republic, cervical screening is not a population-based programme but is provided as part of a preventive gynaecological examination recommended for women every three years. In France, however, both population-based and non-population-based programmes exist, and non-population-based screening is available nationally while a regional pilot is population-based. The majority of countries provide screening every three years to women in their 20s up to their 60s, covering 40 years and more. The starting age varies across countries because it needs to be identified based on the age-specific profile of HPV prevalence and cervical cancer incidence for each country (IARC, 2005). The

Table 3.3. **Rollout years of cervical cancer screening programmes, as of 2010**

Nationwide population-based		Non-population-based but nationwide		Population-based but not nationwide	Non-population-based
Nationwide rollout since the 1990s or earlier	Nationwide rollout since the 2000s	Nationwide rollout since the 1990s or earlier	Nationwide rollout since the 2000s	No nationwide rollout	
Australia (1991), England (1988), Finland (1968), Iceland (1964), Netherlands (1988), New Zealand (1990), Northern Ireland (1989), Norway, Sweden (1970), Scotland (1988) and Wales (1988)	Denmark (2007), Estonia, Germany (2013), Hungary (2005), Ireland (2008), Korea (2005), Latvia (2009), Poland (2007), Singapore (2004) and Slovenia (2003)	Chile (1994), Germany (1971) and Switzerland	Czech Republic (2008), France, Greece, Israel, Slovak Republic and Spain	Canada, France, Italy, Japan, Portugal and Turkey	Belgium, Luxembourg and United States

Source: OECD HCQI Questionnaire on Systems of Cancer Care; Anttila, A. et al. (2004), "Cervical cancer screening programmes and policies in 18 European countries", *British Journal of Cancer*, Vol. 91, pp. 935-941; Anttila, A. et al. (2009), "Cervical cancer screening policies and coverage in Europe", *European Journal of Cancer*, Vol. 45, pp. 2649-2658.

availability of HPV vaccinations may also contribute to the relatively diverse nature of cervical cancer screening across countries, a subject that is discussed later in the section.

Some countries with low cervical cancer incidence do not have a population-based screening programme, so the development of a screening programme may also be related to the incidence of cervical cancer. Due to the low incidence rate in Israel compared with other cancers like breast cancer, there are no plans to introduce a screening programme for cervical cancer, and Switzerland, which also has a relatively low incidence, does not have a population-based cervical cancer screening programme in place nor does it plan to implement one. But in both countries the women in the eligible age group can still have a Pap smear every three years for free. On the other hand, despite higher incidence rates, Chile, the Czech Republic, and the Slovak Republic do not have population-based programmes, although access is promoted through free screening in these countries.

Many of the countries with a nationwide population-based screening programme (Denmark, Finland, Iceland, the Netherlands, New Zealand, Norway, Poland, Slovenia, Sweden and the United Kingdom) have a higher screening rate than countries without such a programme (Figure 3.3). But there are some exceptions, such as Hungary, which have low rates even though screening is provided free of charge. On the other hand, the United States, with a non-population-based programme (population-based programme is available only to the low income women), attains the highest screening rate, but according to the national experts, over-screening is common in the country, suggesting room for efficiency gain.

Some countries have expanded screening coverage, but maintaining high coverage is a challenge

Countries such as the Czech Republic, France, Hungary, Israel, Italy, Japan, Korea, New Zealand, Poland and the Slovak Republic have expanded breast cancer screening coverage in recent years (Figure 3.2). Many of them have introduced breast cancer screening programmes in the 2000s, with nationwide rollout completed by 2010 (Table 3.4). Korea introduced its screening programme in 1999, the Slovak Republic in 2001, the Czech Republic in 2002, Poland in 2007, Slovenia in 2008 and Japan and Latvia in 2009, and national rollout has been achieved in countries such as France, Hungary, Israel, Italy, Korea, New Zealand and Poland recently. In addition, in Estonia, the organisation of the screening programme

has been enhanced since 2007, with target women now being sent individual invitations, contributing to the large increase in the screening rate.

About half of countries have increased cervical cancer screening rates (Figure 3.3), but unlike mammography coverage, this does not always relate to the country's completion of a nationwide rollout of screening by the end of the 2000s (Table 3.3). Screening became nationwide recently in countries such as Denmark, France, Greece, Ireland, Korea, Singapore, Spain and central and eastern European countries including the Czech Republic, Hungary, Latvia, Poland and Slovenia. Among these countries, a faster increase was observed only in the Czech Republic, Korea, Poland and Slovenia. In Poland, nationwide population-based screening was introduced in 2007, and the rate increased by almost 20% between 2004 and 2009, to 69.1%. But screening coverage actually declined in France, Ireland and Hungary despite the nationwide rollout. This decline may be related to the introduction of HPV vaccinations.

Looking at the trend data for both breast and cervical cancers, it appears difficult to increase and maintain screening coverage in countries once the national rollout of population-based screening has been achieved. Among the countries with initially high mammography rates, the Netherlands and Canada increased the rates slightly, but others experienced slight decreases. The rates decreased in the United States, Ireland, Norway and Luxembourg and remained stagnant in the United Kingdom, Iceland and Australia.[3] Similarly, for cervical cancer the rates decreased over the past decade, particularly in countries with initially high screening coverage. Many of these countries had already achieved nationwide population-based screening, so additional measures are needed to recruit the non-covered population for cancer screening.

Countries are trying to increase screening coverage through pay-for-performance and public awareness building

To promote higher screening coverage, *pay-for-performance* has been given to providers in some countries, but this is not always effective in increasing screening coverage in the long run. As for breast cancer screening, pay-for-performance is available in countries including Belgium, France, Latvia, Luxembourg, Scotland and the United States. In France, payment bonuses are made if a certain level of breast screening participation is attained, and screening coverage increased in recent years. But despite the pay-for-performance, screening rates have declined recently in countries such as Luxembourg and the United States. As for cervical cancer screening, countries such as Australia, England, Iceland, Ireland, Latvia, the Netherlands and Slovenia introduced pay-for-performance for primary care physicians and gynaecologists. In England, before the year 2000, screening coverage increased rapidly with the introduction in 1990 of pay-for-performance for GPs providing cervical screening (Patnick, 2000; IARC, 2005), but the rate decreased by 3% between 2002 and 2009. Screening coverage also decreased in Iceland and Ireland, while it increased for Australia and Slovenia during the same period. The varied results may be due to the different designs of pay-for-performance across countries. To illustrate one example, the financial incentives used in Australia are summarised in Box 3.4.

Besides provider incentives, efforts are also being made across countries to *build public awareness* on the benefits and potential risks of screening so that the public can make informed decisions about their participation. For example, in Switzerland, breast cancer awareness campaigns have been conducted regularly by the Swiss Cancer League, and according to the national expert, public awareness is high. In France, since 2005,

Box 3.4. **Financial incentives for promoting early diagnosis of cervical cancer in Australia**

In Australia, the Practice Incentives Programme (PIP) Cervical Screening Incentive, introduced in 2001, aims to improve the early detection of cervical abnormalities, thereby reducing mortality from cervical cancer. The PIP Cervical Screening Incentive aims to encourage GPs to screen women who have not had a cervical smear in the last four years and to increase overall screening rates. The PIP Cervical Screening Incentive has three components:

- a one-off sign-on payment to practices registering for the incentive;
- an outcome payment of around AUD 3 000 per practice for practices where at least 50% of women patients aged between 20-69 years are screened in a 30-month reference period; and
- a payment of AUD 35 to GPs for each Pap smear taken on an under-screened woman. This component aims to encourage GPs to screen women who have not had a Pap smear in the last four years.

The programme allocation was approximately AUD 71.9 million between 2001 and 2004.

Source: OECD HCQI Questionnaire on Systems of Cancer Care.

information campaigns for breast cancer screening and a large national mobilisation, called "Pink October", regularly take place. Likewise, in Korea a pink ribbon campaign, started in 2001, tries to build awareness about breast cancer. As part of the implementation of screening programmes, countries such as Ireland and the Slovak Republic have also undertaken public awareness campaigns. But these efforts are not undertaken sufficiently in some countries; for instance, national experts expressed that there is further room to raise awareness in Chile and Poland.

And many countries have also introduced other means of early diagnosis and prevention measures

Besides mammography screening, a number of countries have also introduced *genetic testing* in recent years to detect a possibility of developing breast cancer. Breast cancer risk evaluation tests (BRCA1/BRCA2) have become available for free in many countries, with exceptions including Finland, Iceland, Korea, Norway, Sweden and the United States. But the target population for free genetic testing differs across countries. For example, in Canada, BRCA is provided free only to patients with specific indications and after counselling. In England and Israel, it is provided free only to those deemed to be high risk and in Turkey it is free to those with certain indications, while in Latvia, it is available free of charge if referred by the GP.

Countries differ over the introduction of *HPV vaccinations*, which prevent infection with certain species of human papillomavirus associated with the development of cervical cancer. Since the late 2000s, about half of the countries studied have introduced a structured vaccination programme targeting girls in their early teens. In most of these countries, the vaccination is provided for free, and in countries such as Norway and Slovenia it is on a voluntary basis. The HPV vaccination, however, is not provided in an organised manner in other countries (e.g. Chile, the Czech Republic, Finland, Iceland, Ireland, Israel, Japan, Korea, Latvia, Malta, the Slovak Republic, Turkey and the United States),

and in Hungary and Poland it is not available at all. Most of these countries, with the exception of Ireland, Israel, Latvia, Norway and Turkey, do not have plans to introduce an organised programme.

Following screening for breast and cervical cancers, *colorectal cancer screening* has become available in the last few years cross-nationally, and an increasing number of countries have introduced population-based screening, targeting people in their 50s and 60s for free in recent years. Partly because cost-effective screening methods are not yet certain (Frazier et al., 2000; Sonnenberg et al., 2000; Pignone et al., 2002), countries are using different methods [i.e. faecal occult blood test (FOBT), colonoscopy (CS) and flexible sigmoidoscopy (FS)], and multiple methods are also available within the screening programme in some countries. In most countries that provide FOBT, screening is available every two years, but screening is less frequent in countries using CS and FS, generally every ten years. Several countries still have limited population coverage, but about half of those studied (Australia, the Czech Republic, France, Germany, Israel, Japan, Korea, Latvia, Netherlands, Slovenia, the United Kingdom) have already completed nationwide rollout. There are plans to introduce nationwide population-based screening in coming years in a number of countries including Belgium, Denmark, Germany, Greece, Ireland, New Zealand, Poland, Portugal, the Slovak Republic, Sweden and Switzerland.

Medical practice varies, but delivery of evidence-based cancer care has been enhanced

Delivery of standardised evidence-based cancer care is important in order to ensure a high quality of care to all patients, but medical practice in cancer care and the level of compliance with evidence-based cancer care differ across countries, and also within some countries, leading to different cancer outcomes. In order to promote evidence-based cancer care, countries use different policies: these include developing clinical guidelines, following multidisciplinary care delivery, strengthening the monitoring and evaluation of cancer care, and introducing reimbursement mechanisms linked with evidence-based care delivery.

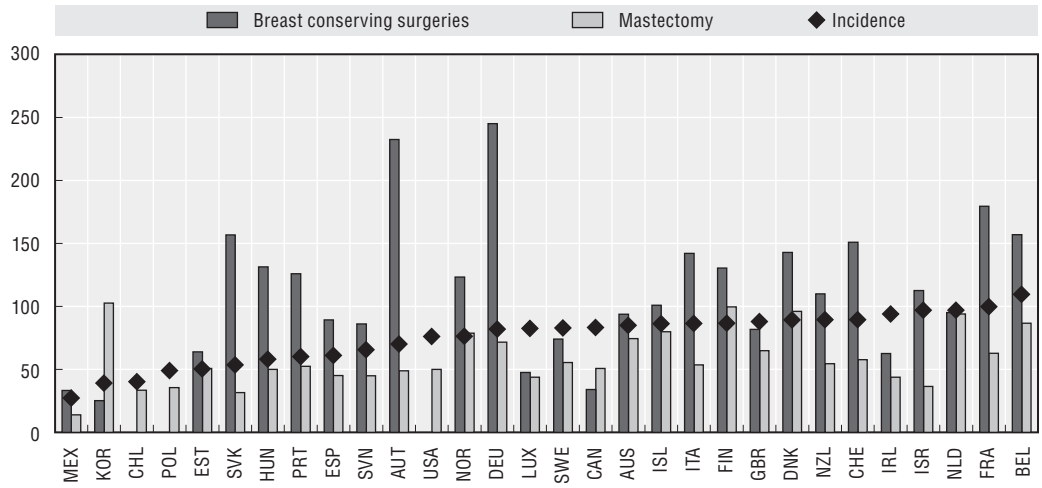
Medical practice in cancer care varies across countries

Variation across countries in the clinical management of particular cancers has long been known (Gatta et al., 1996), and recent evidence collected through the OECD HCQI Questionnaire on System of Cancer Care also points to variation across countries. Some studies have pointed to a high risk of overuse of CT and MRI examinations in the United States, for instance (Smith-Bindman, 2008; Baker et al., 2008). Turning to cancer treatment, according to the Japan Radiology Society, without taking account of cancer stages and types, 25% of all cancer patients receive radiotherapy during their illness, compared with about 60% in the United States (Nakagawa, 2011). This can be explained partly by differences in cancer types (stomach cancer is one of the major cancers in Japan), but it also appears that Japan has room to provide optimal treatment to more patients.

There is cross-country variation in treatment methods for breast cancer, suggesting differences in evidence-based cancer care delivery. Data need to be interpreted with care, as patients' cancer stages, comorbidity and performance status may vary across countries, but Figure 3.4 illustrates that a more aggressive treatment option, mastectomy, is more prevalent in countries such as Korea. Similarly, in Poland the national expert indicated that

radical mastectomy was carried out for the majority of patients with breast cancer. But such surgery is undertaken for a minority of cases in many other countries, and breast conserving surgeries are used more often in many other countries. The proportion of breast conserving surgeries is particularly high in countries including Austria, the Slovak Republic and Germany.

Figure 3.4. **Breast cancer treatment methods and incidence, 2009, per 100 000 women**



Note: Treatment data for Australia, Canada, Chile, the Netherlands, Norway and the United States refer to 2008 and the data for Belgium refer to 2007. In the Netherlands, breast conserving surgeries are often done in day care but procedures performed during day-care admissions are excluded.
Source: *OECD Health Data 2011, www.oecd.org/health/healthdata.*

StatLink http://dx.doi.org/10.1787/888932866697

The level of compliance with national clinical guidelines is one way of assessing evidence-based cancer care delivery, and even though cross-country comparability is challenging, there are variations. According to a study conducted in France, compliance with chemotherapy guidelines was as high as 94% for breast cancer in 2003, but for lung cancer the compliance with guidelines for Stages II and III was 48.8%, and 59.1% for compliance with Stage IV guidelines (Vernay et al., 2007). The rate of compliance with recommended follow-up care also varies by cancer type in the United States, where it is 86% for breast and colorectal cancers (Malin et al., 2006) but 60% for cervical cancer (Singhal et al., 2008). In the Netherlands, according to the cancer registries, 85% of patients received optimal combined treatment (combined surgery, chemotherapy and radiotherapy) for breast cancer in the years between 2005 and 2007, and 70-90% for colorectal cancer and 70% for lung cancer in the years between 2003 and 2008. Compliance levels were also high in the Czech Republic and Poland. On the other hand, level of compliance is lower in other countries, but it should be noted that this may be due to differences in measurements and clinical guidelines. Nonetheless, for instance, according to the *2007 Peer Review Report*, in England 21% of medical teams achieved over 90% compliance, while in Israel 50-60% of patients received optimal treatment for breast cancer and 20% for colorectal cancer in 2009. According to national experts, level of compliance with guidelines is also low in Malta and Latvia.

Variations in medical practice also exist within countries

Optimal treatment is not equally available across regions within some countries. In Canada, in general, the level of compliance with evidence-based cancer care is very high, but some studies found variations in the delivery of radiotherapy treatment within the country. Likewise, in Poland, according to the national expert there is a large gap in clinical practice in radiotherapy treatment between cancer centres and other health facilities. Based on the national experts' view, in Sweden, despite the high compliance level, there are some variations in the types of treatment provided to patients diagnosed at an early stage, and in Slovenia the quality of cancer care differs between regional hospitals and cancer centres for breast and colorectal cancers, which is related to the small number of cancer cases at the hospitals not specialised in cancer care and their insufficient use of guidelines. In Turkey, the national expert indicated that clinical practice varied not only across facilities but also among professionals.

In addition, optimal treatment may not be available for certain groups of patients in some countries. In Australia, data on the compliance level with guidelines are available at the state level, and a number of states, including New South Wales, provide optimal treatments by following best practice guidelines and emphasising the importance of early referral and treatment. It is expected that compliance to guidelines on referral pathways is high and that the referral to specialists for medical oncology and plastic surgery is done appropriately, as the Cancer Service Networks National Demonstration Programme (CanNET) ensures the optimal cancer pathway to university teaching hospitals throughout the country. But as for non-referral cases, particularly for patients with co-morbidity, compliance may not be as good as for the others.

Varied practices have led to different cancer outcomes in some countries

Variations in medical practice are found to have led to differences in cancer outcomes at least in some countries. In Italy, due to decentralisation, the regional authorities administer the health system, and unequal access to care and varied clinical practices exist across regions. The national expert reported that in the south of the country a more aggressive approach was taken for breast cancer treatment than in the north. One study sheds light on the differences in clinical practices and in survival across regions, and found that regional differences in cancer survival were related to the delivery of care. The study also found that the outcome of breast cancer was strictly related to the availability of screening programmes, early detection, and appropriate medical and surgical treatments. Some Japanese studies also found that not only socio-economic inequalities but also differences in regional medical practices as well as in the governance of cancer control seem to contribute to survival differences in the country (Ito et al., 2009; Ajiki et al., 2009). In the Netherlands, according to the national expert the Ministry of Health has been trying to improve the quality of care through encouraging competition between hospitals. In reality, many hospitals in the same region do not collaborate with each other to obtain funding, and according to the national expert this has led to a gap in the quality of care but not to an improvement in quality across providers. It was found that survival for rectal cancers differ between 5-10% across hospitals (although there is no difference for breast cancer), and it is a challenge to decrease such gaps. In Ireland, studies that examined the variation in treatment and survival across regions found that radiotherapy and chemotherapy take-ups differ across regions, and access to radiotherapy for rectal cancers

was found to be low in some regions. Furthermore, in Hungary, compliance with optimal and comprehensive cancer care is generally high due to the compulsory multidisciplinary approach for providing cancer care, but the national expert indicated that the provision of evidence-based cancer care was sometimes difficult in surgical oncology. This is because surgeons often operate on patients even if the guidelines recommend otherwise due to the system of informal payment for surgery, which often accounts for a large part of a doctor's income. Consequently, survival is found to differ across cancer centres.

Countries are increasingly promoting standardised and evidence-based delivery of cancer care

To improve the evidence-based delivery of cancer care, a number of countries have developed *clinical guidelines*. In Norway, optimal treatment has been provided to almost all cancer patients over the years, and due to the Health Directorate's efforts to develop and update clinical guidelines, the level of compliance with the guidelines has been improving in recent years. The national expert, however, considered that the treatment provided for lung cancer patients and treatment at small hospitals can be improved further. In Chile, many of the guidelines have been written and/or approved by medical associations of specialists in recent years, and professionals have become more conscious about the importance and utility of clinical guidelines, at least for breast and cervical cancers covered by the Explicit Health Guarantee Schemes. However, the national expert suggested that there was still a margin for improvement. Guideline development is important to ensure the uniform delivery of evidence-based cancer care throughout a country, a topic that is discussed further in Chapter 4.

Many countries *take a multidisciplinary approach* in providing cancer care and improving the delivery of evidence-based high-quality care, including the Czech Republic, Denmark, Germany, Hungary, Iceland, Ireland, Japan, Latvia, the Netherlands, Norway, Singapore, Slovenia, Spain, Switzerland and the United States. In the Netherlands, for major cancers, large hospitals have an outpatient unit with a multidisciplinary team that provides advice on cancer care, and these days there are also multi-disciplinary outpatient clinics. In Switzerland, a tumour board is a general feature of university and large cantonal hospitals, where a multidisciplinary team composed of different professionals (oncologists, surgeons, radiotherapists, radiologists, pathologists) provides management recommendations (diagnosis, treatment, monitoring) for most patients. In Latvia, multidisciplinary teams exist at the hospital care level, and in Singapore, a Multidisciplinary Tumour Board is also available at hospitals and cancer centres, where surgeons, oncologists and radiologists jointly decide the individualised care for each patient. In Iceland, all incident patients are discussed at a weekly multidisciplinary tumour board meeting to ensure timely and high-quality treatment, while in Israel, too, multidisciplinary teams make decisions on treatment plans for each cancer patient. Thus a number of countries have been using multidisciplinary teams to ensure the delivery of high-quality cancer care.

In order to promote multidisciplinary care delivery, some countries provide incentives to providers. In Australia, two new Medicare items were introduced on 1 November 2006 to cover treating doctors (specialists and General Practitioners) participating in or leading multidisciplinary case conferences for cancer patients. These payment items support an integrated team-based approach to the diagnosis and management of cancer and the

development of treatment and care plans. Similarly, in Belgium multidisciplinary oncology consultation is given additional compensation.

A number of countries have enhanced the *monitoring of cancer care delivery,* and better monitoring has contributed to improvements in evidence-based cancer care delivery in some countries. For example, due to the establishment of clinical registries in the Czech Republic, it became possible to follow the diagnosis, treatment and follow-up provided for each patient, and the country improved the compliance level of the care provided to those diagnosed at an early stage from around 60% in the beginning of the 2000s to around 80% in 2010. In Sweden, based on the information collected through the clinical quality registries, each oncology centre publishes a yearly report on cancer care, and the National Board of Health and Welfare undertakes a regular evaluation of the care provided for lung, breast, colorectal and prostate cancers and publishes an annual public performance report, comparing health care quality and the efficiency of providers across counties.

Several countries have also introduced *reimbursement mechanisms linked with evidence-based care delivery*. In Hungary, for instance, chemotherapy treatments need to meet detailed medication combination requirements for the reimbursement, and even though compliance with guidelines for comprehensive cancer care is still suboptimal, these requirements are usually followed by providers as they would not be reimbursed otherwise. In Chile, for breast and cervical cancer care, which are included in the Explicit Health Guarantee Regime, insurance finances only those treatments and procedures that are part of the guidelines. Since the implementation of the new health care reform, reimbursement is linked with evidence-based care delivery, and physicians are reimbursed only if their services comply with the guidelines. Consequently, the compliance level of breast and cervical cancer care has been improving (and is now close to 100%). In addition, as mentioned in Chapter 2 ("Resources for cancer care"), in some other countries, such as Australia, Canada, Italy, Poland and the United Kingdom, risk-sharing payment arrangements have also been used for expensive pharmaceuticals which require evidence-based, effective use.

Timely delivery of cancer care is not always ensured, but efforts have been made

The timely delivery of cancer care, which is critical for high-quality cancer care, is not always ensured across countries, and referral and waiting times vary cross-nationally. A number of countries have reduced waiting times through establishing waiting time targets and setting up fast-track pathways. Countries are also seeking to increase efficiency gains through enhancing care co-ordination and streamlining the cancer care delivery systems, and a number of countries have also increased the capacity of care delivery. Through these efforts, many countries have reduced waiting times, but there are some exceptions.

Variations in waiting time are wide across countries

Long waiting times usually lead to poor cancer survival, but referral and waiting times vary across countries. As Table 3.4 shows, the referral time between a GP and a specialist visit ranges from as little as a few days in Denmark to up to a month in Israel and Norway.

As for waiting time between diagnosis and treatment, the cross-country variation is wider than for the referral time (Table 3.5), but waiting time is short in some countries. For example, patients wait less than three days on average in Luxembourg and less than

Table 3.4. **Average referral time between GP and specialist visit, 2010**

	Breast cancer	Cervical cancer	Colorectal cancer	Lung cancer	All cancers
Canada	22 days (median)	9 days (median) (all gynaecological cancers)	16 days (median) (all gastrointestinal cancer)	13 days (median)	14 days (median)
Cyprus[1]	6 days	7 days	5 days	6 days	6 days
Czech Republic*	1-2 weeks	1-2 weeks	1-2 weeks	1-2 weeks	1-2 weeks
Denmark	2 days	2 days (all gynaecological cancers)	4 days	1 day	–
Hungary	7 days	7 days	7 days	7 days	7 days
Israel*	2-4 weeks	2-4 weeks	2-4 weeks	2-4 weeks	2-4 weeks
Latvia	10 days	10 days	10 days	10 days	10 days
Malta*	Weeks not months	Weeks not months	Weeks not months	Weeks not months	Weeks not months
Netherlands	5 days	10 days	5-10 days	5-10 days	5-10 days
Norway*	2-4 weeks	2-4 weeks	2-4 weeks	2-4 weeks	2-4 weeks
Singapore*	≤ 14 days	≤ 14 days	–	–	–
Sweden*	Weeks not months	Weeks not months	Weeks not months	Weeks not months	Weeks not months
Switzerland*	Weeks not months	Weeks not months	Weeks not months	Weeks not months	Weeks not months
Turkey*	≤ 14 days	≤ 14 days	≤ 14 days	≤ 14 days	≤ 14 days

Note: Data for Australia and the Netherlands refer to 2008 and for Canada, Denmark, Israel, Korea and Latvia to 2009. For Germany, data for cervical cancer refer to 2010, while data for other cancers refer to 2009. Countries with an * refer to those in which experts provided estimated referral times. Data for Canada are the estimates for the waiting time between consultation to treat and the date of the radiation therapy procedure.

1. See notes 1 and 2 of first table in Box 3.3.

Source: OECD HCQI Questionnaire on Systems of Cancer Care.

seven days in Iceland. In the former, doctors can refer to any specialist of their choice and patients have free access to the service, and the national expert believed that referral and waiting times were short. In addition, cancer patients in particular receive immediate attention and are usually seen by specialists within 72 hours after diagnosis. There is, however, a report that some patients might delay treatment by one or two months, so waiting times may differ due to the willingness of patients to undergo treatment. According to the national expert, access to specialist care is also guaranteed in Switzerland. The expert indicated that waiting time between diagnosis and treatment was not a problem so long as patients were referred, but some GPs might not refer patients on time.

On the other hand, waiting time for initial treatment is long in other countries. Waiting time can be longer than a month, e.g. for radiotherapy treatment in Israel, and is up to a few months in Poland. In Slovenia, patient experiences and anecdotal information suggest that there are problems in the public awareness of cancer care and also with access to certain specialist care (while referral from GPs to specialists works well).

Long waiting times are also reported in other countries. In Ireland, there are waiting lists for access to diagnostics for colorectal cancer, in particular colonoscopy, even though a triage of referrals takes place. In Switzerland, the waiting time for some specific specialists (e.g. orthopaedic surgeons and psychiatrists) may be long in some regions. In a few countries, such as Chile and Poland, the timely delivery of cancer care is not guaranteed in the public sector, and several countries including Korea face problems with their referral systems, which do not guarantee shorter referral and waiting times.

Many countries introduced maximum waiting time guarantees and laid out fast-track pathways

With a view to minimising waiting times, a number of countries have introduced *maximum waiting time guarantees*. For example, the Canadian Association of Radiation

Table 3.5. **Average waiting time between cancer diagnosis and initial treatment (surgery, radiotherapy and/or chemotherapy), 2010**

	Breast cancer	Cervical cancer	Colorectal cancer	Lung cancer	All cancers
Canada	30 days (median)	20 days (median)	21 days (median)	29 days (median)	25 days (median)
Cyprus[1]	17 days	11 days	8 days	10 days	11 days
Czech Republic*	Weeks not months	Weeks not months	Weeks not months	Weeks not months	Weeks not months
France	21 days	–	–	38 days	–
Hungary*	14-21 days	14-21 days	14-21 days	14-21 days	14-21 days
Iceland*	≤ 7 days	≤ 7 days	≤ 7 days	≤ 7 days	≤ 7 days
Israel*	Radiotherapy: 15-45 days	Radiotherapy: 15-45 days	Radiotherapy: 15-45 days	Radiotherapy: 15-45 days	Radiotherapy: 15-45 days
Japan*	Same day-weeks	Same day-weeks	Same day-weeks	Same day-weeks	Same day-weeks
Latvia	30 days (median)	30 days	30 days	30 days	30 days
Luxembourg*	≤ 3 days	≤ 3 days	≤ 3 days	≤ 3 days	≤ 3 days
Malta*	Weeks not months	Weeks not months	Weeks not months	Weeks not months	Weeks not months
Netherlands	25 days	15 days	10-50 days (up to 1st treatment for rectum or coloncancers)	21 days	approx. 40 days
Norway*	2-4 weeks	–	–	–	–
Poland*	3-12 weeks	3-6 weeks	4-8 weeks	4-6 weeks	4-6 weeks
Scotland	24 days	–	23 days	25 days	–
Slovak Republic*	7-21 days	7-21 days	7-21 days	7-21 days	7-21 days
Slovenia*	≤ 1 month	≤ 1 month	≤ 1 month	≤ 1 month	–
Sweden	19 days	Weeks not months	Weeks not months	Weeks not months	Weeks not months
Turkey*	Weeks not months	Weeks not months	Weeks not months	Weeks not months	Weeks not months

Note: Data for the Netherlands, Scotland and Sweden refer to 2008 and for Canada, Israel, Korea, Latvia and Poland to 2009. For Germany, data for cervical cancer refer to 2010 while data for other cancers refer to 2009. For French data, waiting time for breast cancer refers to 2007 while that for lung cancer refer to 2003. Countries with * refer to those in which experts provided estimated waiting times. Cancer diagnosis refers to the first day of cancer diagnosis in Korea.

1. See notes 1 and 2 of first table in Box 3.3.

Source: OECD HCQI Questionnaire on Systems of Cancer Care.

Oncologists developed a guideline in 2000 specifying that the interval between the date of the initial referral to radiation oncology and the date of the radiation oncology consultation should not exceed ten working days or 14 calendar days. In 2004, national waiting time targets were set for access to cancer treatment, and subsequently, each province developed its own waiting time strategy to meet the national targets, as individual provinces are responsible for the delivery of health care services. Furthermore, the country also set targets for "Ready to Treat to Treatment" for radiation therapy for all disease sites. Slovenia also introduced a national waiting list for all procedures in 2010 in an effort to shorten waiting times for all patients, including those with cancers, and the adopted by-law defines the maximum waiting time as one month for cancer. Box 3.5 summarises the waiting time targets set across countries.

These countries generally undertake systematic measurements of waiting times and monitor changes, and there is some evidence that waiting times have shortened since the targets were set. Since the introduction of waiting time targets across provinces and territories in Canada, reports have identified improvements in many provinces and territories and for many interventions. In Scotland, a number of cancer access targets were set for different cancers that have been monitored regularly. For example, two new waiting time targets were introduced a few years ago: 62 days from urgent referral (and screening) to treatment and 31 days from decision-to-treat to treatment for all cancers irrespective of route of referral. These targets have been monitored closely; the former target was first met in 2008 and has continued to be met since, with at least 95% compliance with the 62-day

Box 3.5. **Maximum waiting time guarantees for cancer care vary cross-nationally**

Waiting time targets vary across countries, as shown in the table below. The guaranteed time between primary care physician and specialist visit is usually a maximum of two weeks, and the time between diagnosis and initial treatment is generally within one month. But there are some variations. The maximum waiting time guarantee between primary care and specialist visit is as long as 30 days for breast and cervical cancer patients in Chile. As for the waiting time between cancer diagnosis and initial treatment, England and Scotland have long targets.

Maximum waiting time guarantees, 2010

	Targets
Canada	Initial referral to radiation oncology – within 14 days Ready-to-treat to treatment – within 4 weeks for 90% of patients
Chile	Between primary care physician and specialist visit – 30 days for breast and cervical cancer Between cancer diagnosis and initial treatment – 30 days for breast cancer Between cancer diagnosis and initial treatment – 20 days for cervical cancer
Cyprus[1]	Between primary care physician and specialist visit– 3 days for cervical cancer Between primary care physician and specialist visit – 7 days for colorectal and lung cancers Between primary care physician and specialist visit – 5 days for breast cancer and other cancers Between cancer diagnosis and initial treatment – 28 days for all cancers
Czech Republic	Referral from primary care to specialist – 2 weeks for cervical cancer Between cancer diagnosis and initial treatment – usually 4 weeks for all cancers
Denmark	Between primary care physician and specialist visit – 3 days for breast, cervical and lung cancers Between primary care physician and specialist visit – 6 days for colorectal cancer Between cancer diagnosis and initial treatment – 9 days for breast cancer Between cancer diagnosis and initial treatment – 6 (surgery), 11 (radiation), 8 (chemo) days for cervical cancer Between cancer diagnosis and initial treatment – 7 (surgery), 11 (chemo and radiation) days for colorectal cancer Between cancer diagnosis and initial treatment – 10 (surgery), 11 (radiation), 8 (chemo) days for lung cancer
England	Between primary care physician and specialist visit – 14 days for all cancers Between cancer diagnosis and initial treatment – 31 days for all cancers To see a specialist with breast symptoms where cancer was not initially suspected – 2 weeks Between urgent GP referral for suspected cancer and first definitive treatment – 2 months (62 days) For first definitive treatment following referral from an NHS cancer screening service – 62 days For first definitive treatment following a consultants decision to upgrade the priority of the patient – 62 days For second or subsequent treatment where that treatment is surgery – 31 days For second or subsequent treatment where that treatment is an anti-cancer drug regimen – 31 days For second or subsequent treatment where that treatment is a course of radiotherapy – 31 days
Finland	Between diagnosis and primary care – within 3 days Between referral and specialist care – within 1 week Between diagnosis and specialist care – within 3 weeks
Ireland	Between primary care physician and specialist visit – 14 days for breast cancer
Israel	Between primary care physician and specialist visit – 3-7 days for breast and cervical cancers Between primary care physician and specialist visit – 7-14 days for colorectal and lung cancers Between cancer diagnosis and initial treatment – 7-14 days (excl. radiotherapy) for all cancers
Netherlands	Between primary care physician and specialist visit – 5 days for breast cancer Between primary care physician and specialist visit – 21 days for cervical, colorectal and lung cancers Between diagnosis and treatment – within 28 days for 80% of patients (set in 2003/04), for all cancers Between diagnosis and hospital admission for breast cancer – within 1 week
Portugal	Between primary care physician and specialist visit – 7-30 days for all cancers Between cancer diagnosis and initial treatment – 3-60 days for all cancers
Scotland	Between diagnosis and treatment – within 1 month for breast cancer Between urgent referral (and screening) and treatment – within 62 days for all cancers Between decision-to-treat and treatment – within 31 days for all cancers
Slovenia	Between cancer diagnosis and initial treatment – 1 month for all cancers
Turkey	Referral from primary care to specialists – 2 weeks for cervical cancer Between cancer diagnosis and initial treatment – usually 2 weeks for all cancers

1. See notes 1 and 2 of first table in Box 3.3.

Source: OECD HCQI Questionnaire on Systems of Cancer Care.

The maximum waiting time targets are specified sometimes in national cancer control programmes and often in clinical guidelines, as mentioned earlier. There is further discussion of national cancer control programmes and clinical guideline developments in Chapter 4.

target for breast, colorectal and lung cancer. Some other countries including Chile, Germany, Ireland, Israel (except for radiotherapy) and the Netherlands have also shortened waiting times since the introduction of targets.

Waiting time targets are considered to work more effectively when associated with sanctions (Siciliani et al., 2013). In some countries, providers are held accountable if targets are not met. In Chile, for instance, the Health Explicit Guarantee Regime has legally set maximum waiting times for breast and cervical cancers since 2005. The major problem related to waiting time is in the public system, and if public providers cannot meet the maximum waiting time targets, they are compelled to purchase the service in the private sector.

To minimise waiting times, several countries also try to ensure immediate attention to cancer patients through *fast track pathways*. Denmark introduced National Integrated Pathways in 2007 to reduce systemic and doctor delays, and implemented them for all cancer diagnosis in 2008. It is considered that referral and waiting times ranging between three and four weeks in the early 2000s, are shorter now (for example, a few days for referral). In England, standard fast track pathways were introduced for most types of tumour, and in Spain, rapid access programmes were introduced for lung and colon cancer patients in several regions (e.g. Catalonia, Valencia) in 2005. Cancer patients are also given priority in the Singaporean health system, and those diagnosed with suspected cancers through screening programmes are given fast-track access to specialised care and referred to specialists within 14 days. Moreover, in Turkey, under the quality criteria set for hospital managements, treatment procedures have to start immediately after a patient is diagnosed with cancer, and to ensure fast access to cancer treatment, financial incentives are given to government hospitals to treat any patients including cancer patients within 15 days. Fast track access is also available for cancer patients in other countries, including Canada and Malta.

Countries have also pursued policies to increase efficiency gains

Some countries have enhanced *care co-ordination* in order to minimise waiting times. In the Netherlands, waiting time targets were set in 2003/04 for treating people diagnosed with cancer, and referral between hospitals has been also enhanced. As a result, waiting time between diagnosis and treatment became shorter, particularly for breast and cervical cancers. In Slovenia, the links between professionals were strengthened with the introduction of a breast cancer screening programme and immediate access has been pursued for patients diagnosed through the programme, leading to a reduction of referral time to between a couple of weeks to one month. The colorectal cancer screening programme also aims to shorten waiting times to a matter of weeks between screening and diagnostic colonoscopy and between colonoscopy and first treatment. In Italy, in some regions, particularly in the north, a disease management programme is functioning well with a scheduled follow-up, providing timely cancer care through organised care co-ordination. However, the programme does not perform very well in the southern regions, and cancer patients often need to wait up to two or three months to get diagnostic procedures. Beside poor care co-ordination, the delay in the southern regions is also caused by shortages of medical equipment and of professionals for providing mammography, colonoscopy, endoscopy and radiotherapy. Even though integrated care delivery is important, a number of countries are still challenged by poor care co-ordination, as discussed in Chapter 4, possibly meaning there is room for reducing waiting times.

Several countries have sought efficiency gains through reorganising cancer care delivery. As mentioned in Chapter 2, a number of countries are pursuing more centralised cancer care delivery, and a few of them such as Greece, Japan and Korea are thought to have improved waiting times by *streamlining the organisation of cancer care delivery*. For example, Korea established a number of regional cancer centres and large hospitals designated for cancer care, and the reorganisation of health care delivery took place not only in hospitals but also in primary care settings. These developments are thought to have had some positive impact on improving waiting times in the country. Furthermore, in the Netherlands, in order to improve referral between secondary hospitals and tertiary hospitals and to strengthen co-ordination, capacity and expertise, the number of regional cancer centres has been decreased from nine in the early 2000s to four in 2011, with the reorganisation of health care delivery taking place across the regions. Further streamlining will take place and in 2013, there will be one national cancer centre. In Switzerland where many GPs had a solo practice and referral was sub-optimal, referral has been improved through training and *group practices*.

Some countries have also increased resources

Referral times and waiting times became shorter through *increased capacity* in several countries. In the Slovak Republic, both the number of gastroenterologists delivering colonoscopy examinations and the amount of colonoscopy and video-colonoscopy equipment have increased since 2003. In addition, the quality of diagnostic equipment such as CT scanners and nuclear magnetic resonance (NMR) spectroscopy as well as access to appropriate diagnostic and treatment options have improved since the mid-2000s, thus shortening the waiting time for diagnosis and treatment for colorectal cancer. Turkey used to be challenged by a shortage of resources, including treatment centres and radiotherapy facilities, and access to chemotherapy was also limited. Over the past decade, the country improved the availability of resources and the capacity for providing cancer care, contributing to improved access to cancer care across regions. In Australia, access to radiotherapy depends on the availability of equipment and trained staff, and the variation in access to care and waiting times across states and between rural and urban areas has been addressed regularly through additional investment to deal with insufficient resources. For instance, in New South Wales, quality improvements were made with additional inputs in 2006/07. In addition, geographic inequality in access to care has been considered to be improving since the early 2000s. Other countries have also increased resources, as described in Chapter 2, possibly leading to reductions in waiting times.

But waiting times are becoming longer in a few countries

As described above, many countries have reduced waiting times over recent years, but in some waiting times are reported to have lengthened, including in Finland, Latvia and Poland. Some countries managed to reduce waiting times for some services, but not to all, such as radiotherapy in Israel, colorectal cancer treatment in the Netherlands, and colonoscopy in Portugal. In addition, regional differences in waiting times still exist in a few countries, including Chile (for colorectal and lung cancer patients in small cities and rural areas), Hungary (in the central and north-eastern regions) and Sweden (particularly for surgery for lung cancer patients). Hence, further efforts are needed.

Conclusion

In the area of prevention, many countries have successfully reduced smoking rates over the past decades through anti-smoking measures, and lung cancer incidence has been declining recently. But additional efforts can be made to implement further prevention measures to reduce risk factors for cancers and cancer incidence.

With respect to early diagnosis, countries have been promoting the implementation of nationwide population-based screening, particularly for breast cancer in the past decades and colorectal cancer in recent years, and these efforts have led to high screening coverage in some countries. But several countries have not yet attained high coverage, and some countries, particularly those with high screening coverage already, are having difficulties in increasing or even maintaining population coverage in recent years. Pay-for-performance for providers does not always appear effective in continuously increasing screening coverage in the long run. But provider assessment and stronger quality assurance mechanisms seem to have led to improved early diagnosis, as will be discussed in Chapter 4 ("Governance of cancer care systems"). Furthermore, additional efforts may be needed to inform the public about the benefit and harm of continuous screening and to encourage target populations to undergo screening on the basis of informed decision making.

With regards to the delivery of care, countries have promoted evidence-based and standardised cancer care through different means, including clinical guideline development, multidisciplinary care delivery, better monitoring and financial incentives. Clinical guidelines promote evidence-based care delivery even if they are not binding, and multidisciplinary care delivery ensures high-quality care based on the expertise and knowledge of different kinds of specialists. Centralised cancer care delivery, which is discussed in Chapter 2, has also led to improvements in the quality of cancer care.

Even though many countries already monitor cancer care performance at the provider levels to promote evidence-based care delivery, further efforts can be made to publicly report provider performance. Furthermore, feedback mechanisms for providers also seem to help improve care quality, and the monitoring and reporting of the effectiveness of cancer care interventions and benchmarking with international clinical standards are also important to promote high-quality cancer care.

Long waiting times are caused by a shortage of resources, their unequal distribution and inefficient referral systems. One easy way to resolve waiting times may be to increase investment in resources such as medical devices and medical professionals. Many countries have not necessarily followed this policy option, however, but instead pursued other ways to improve waiting times and have actually managed to reduce them. Countries with prolonged waiting times may nevertheless need to evaluate the pros and cons of different policy options, including enhancing care co-ordination, streamlining care delivery and also increasing resources, such as medical devices, professionals and institutions for cancer care. The systematic measurement of waiting time is important, as it has led to reducing waiting times, and international benchmarking in this area may be useful.

Notes

1. Australia, Belgium, Canada, Chile, Cyprus, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Luxembourg, Malta, the Netherlands, New Zealand, Norway, Poland, Portugal, Singapore, the Slovak Republic, Slovenia,

Spain, Sweden, Switzerland, Turkey, United Kingdom and the United States. United Kingdom provided some information specific to England, Northern Ireland, Scotland and Wales and where possible, the country-specific data and information are included in this publication but otherwise data and information for the United Kingdom as a whole are used. The publication uses three-letter country codes defined by the International Organization for Standardization (ISO); GBR refers to the United Kingdom and CHE refers to Switzerland; for England, ENG is used.

2. United Kingdom provided some information specific to England, Northern Ireland, Scotland and Wales and where possible, the country-specific data and information are included in this publication but otherwise data and information for the United Kingdom as a whole are used. The publication sometimes refers countries by three-letter country codes defined by the International Organization for Standardization (ISO); GBR refers to the United Kingdom.

3. For Finland, the decline was due to changes in data definitions. In 2002, 87.6% of women aged 50-59 were screened, but in 2009, two years after the changes in the screening target age, the country attained 84.4% among women aged 50-69.

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Chapter 4

Governance of cancer care systems

Over recent decades, countries have strengthened the governance of cancer care systems by introducing national cancer control programmes, and developing monitoring and quality assurance mechanisms. This chapter addresses the cross-country variation and trends related to governance surrounding cancer care.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Introduction

Governance refers to how a system of care is steered and managed at a macro level, particularly with respect to improving its quality and outcomes. Governance seeks continuous improvement in what a system delivers and in how it delivers. Over recent decades, countries have strengthened the governance of cancer care systems by introducing national cancer control programmes with specific targets and clinical guidelines, which often involves identifying a lead person or organisation that is held accountable for delivering the outcomes. Some countries instead address cancer control through region-specific policies, within broader national health policies or through policies targeting specific aspects of cancer control, such as screening and establishing a registry.

Countries have also strengthened monitoring mechanisms, expanding the focus from assuring activity to assuring quality such as the effectiveness of cancer care and the patient's experience, and have introduced quality assurance schemes (particularly around the accreditation of institutions and the licensing of professionals) to enable action to be taken where standards are not met. But some countries are lagging in these areas.

Chapter 4 mainly uses 2010 information collected through the OECD HCQI Questionnaire on Systems of Cancer Care and subsequent interviews and data submitted in response to requests made to 35 countries.[1] The experts who provided inputs are listed in Annex A.

National policies are often set out to steer cancer control efforts

National cancer control plans (NCCP) set out a country's broad ambitions in the face of cancer: they seek to reduce the number of cancer cases and cancer deaths and to improve the quality of life of cancer patients by systematically and equitably applying best practice in key areas such as cancer prevention, early detection, diagnosis, treatment and palliative care. The terms used by individual countries to refer to their national plans inevitably differ, but wherever a national plan or strategy adheres to the general features above, we refer to it as an NCCP.

In recent years, based on the responses collected through the OECD HCQI Questionnaire on Systems of Cancer Care, NCCPs have become increasingly prominent across countries, and they have now matured with clear lines of responsibility and dedicated funds. Some countries, however, have not introduced NCCPs and instead address cancer control through region-specific policies, within broader national health policies or through policies targeting specific aspects of cancer control, such as screening and establishing registries.

Comprehensive, co-ordinated national cancer control plans have become increasingly prominent

As Table 4.1 below shows, there has been a clear and decisive trend in recent years towards the introduction of NCCPs, overarching and comprehensive cancer control

policies, across OECD countries. A few countries introduced a number of specific cancer policies, such as screening policies, which are set at the national level but do not have a comprehensive nature in the governance of cancer care as a whole, whilst other countries introduced comprehensive health policies that cover cancer alongside other diseases.

Table 4.1. **Introduction of national cancer control programmes or national health policies or strategies with a focus on cancer care, 1996-2010**

National cancer control plans/strategies	Specific cancer policies (screening, registry, research, etc.)	National health policies or national strategies that cover cancer
Australia (1996), Belgium (2002, 2008), Canada (2007), Chile (1987), Czech Republic (2004), Denmark (2000, 2005, 2007), England (2000, 2007), France (2003, 2009), Germany (1979, 2008), Hungary (2005), Ireland (2000, 2007), Italy (2006), Japan (2004), Korea (1996, 2006), Latvia (2009), Malta (2010), Netherlands (2004), New Zealand (2003), Norway (1998, 2006), Poland (2005, 2007), Portugal (2001, 2007), Scotland (2008), Slovenia (2010), Spain (2006, 2009), Sweden (2009), Turkey (2009)	Israel (1996, 2005), Japan (1984, 1994), Korea (1996, 2006), Latvia (1997), Luxembourg (1982, 1992, 2000), Slovak Republic (2001, 2003), United States (1974)	Australia (2001, 2007), Chile (2000, 2005), Hungary (2003), Iceland (2001, 2007), Portugal (2004), Slovenia (2000), United States (1979, 2000, 2010)

Source: OECD HCQI Questionnaire on Systems of Cancer Care.

An early example of an NCCP is in Germany. In 1979, the country initiated a programme on cancer control which focused on four priority areas for action: prevention, delivery of care (cancer centres, palliative care), research and training. Activities as part of the cancer control programme were being implemented until the late 1990s. Australia, Chile and Norway also introduced cancer control strategies relatively early, between the 1980s and 1990s, but earlier policies often did not take a comprehensive and overarching approach.

A typical pattern, which is seen in countries such as Belgium, the Czech Republic, Italy, the Netherlands and Sweden, was to move from a background of various discrete cancer policies towards the introduction of a comprehensive national plan. In the Czech Republic, for example, cancer policy in the early 2000s was piecemeal and focused on screening programmes for breast and cervical cancers; later in the decade, in 2005, a more comprehensive effort, the National Cancer Control Programme, was introduced to improve the quality of care and cancer survival more broadly.

A few countries without national cancer control plans have recently started the process of introducing them. Malta began developmental work in 2007 by introducing the country's first set of cancer-specific targets, and Singapore is currently engaged in a similar process.

Two particularly evolved examples of a comprehensive approach to cancer control come from England[2] and France. In England, the NHS Cancer Plan was introduced in 2000, and outlined the government's comprehensive national programme for investment in and reform of cancer services. Building on the progress made since the NHS Cancer Plan, in 2007 the Cancer Reform Strategy was introduced to set a direction for cancer services over the next five years. It focused on preventing cancer, diagnosing cancer earlier, ensuring better treatment, living with and beyond cancer, reducing cancer inequalities and delivering the care in the appropriate settings through the better use of information and

stronger commissioning and funding. In France, the first Cancer Plan with a comprehensive approach was implemented between 2003 and 2006, and was followed in 2009 by a New Cancer Plan that deals with emerging challenges and is effective up to 2013. The plan focuses on research, monitoring, prevention, screening, patient care and life during and after cancer.

Cancer control is actually implemented at regional levels in a number of countries, so the involvement of regional authorities is important for the success of NCCPs. The cancer care strategy in Spanish National Health System, first introduced in 2006 and updated in 2009 with new policies and strategic goals, was designed through close collaboration with all stakeholders including civil society. It is a co-ordinated effort between the Minister of Health and the regional governments and is implemented by health authorities in regions. In Italy, regional governments participated extensively in the development of the first National Cancer Control Plan in 2006, which has been adopted and implemented much more consistently at the local level than earlier initiatives were. Regional authorities have been key players in cancer control in a few other countries such as Canada and Sweden,which developed regional plans first and then NCCPs. Moreover, countries such as Australia and Korea developed regional plans outlining the implementation strategies for local stakeholders, based on the NCCPs.

National cancer control plans have matured, clarifying lines of responsibility...

Identifying a lead organisation responsible for delivering the NCCP's objectives is a means to increase the prominence of an NCCP, helping ensure that it does not get lost in the sea of competing priorities that characterise health systems. Often, this responsibility falls to the Ministry of Health, as in Australia, Belgium, Germany, Japan, Latvia, the Netherlands, Poland, Portugal, the Slovak Republic, Slovenia and Turkey. In other countries, other organisations have been given responsibility for overseeing cancer control. For example, in Hungary, the National Institute of Oncology, a comprehensive public cancer research centre that provides cancer care and training in oncology, oversees the implementation of the NCCP. Canada, Denmark, France and Turkey have established an independent body to oversee the overall implementation of cancer control. In Denmark, a task force composed of representatives from the Ministry of Health and the National Board of Health, established in 2007, has taken charge of the assessment and follow-up of implementation and ensures the flow of cancer care delivery. The Ministry of Health shares responsibility with the Cancer Strategy Promotion Committee in Japan, and with four separate organisations in the Netherlands (Dutch Cancer Society, Dutch Federation of Cancer Patient Organisations, Association of Comprehensive Cancer Centres and Association of health care Insurers). In Ireland, Italy, Luxembourg, Norway and Portugal, a specific lead person has been assigned.

To ensure implementation of the NCCP, in many countries an organisation or individual is held accountable for meeting the targets it sets. Again, accountability often falls on the Ministry of Health, but there are some exceptions. In Korea, for example, the National Cancer Control Expert Committee and its board members have been held accountable for meeting cancer-related targets, while in Iceland, the government, the ministry and health specialists and hospitals are deemed accountable for achieving the targets of cancer control programmes. In several countries, however, such as Japan and Portugal, no organisation is formally held accountable. The risk here is that, in the absence of clear leadership accountable for driving through necessary changes, good policy may fail.

... and receiving dedicated additional funds

Most countries have backed the introduction of an NCCP with additional funding. This is sometimes extensive, reflecting the high importance countries place on reducing the burden of cancer in their population. In 2010, the total budget for implementing cancer strategies under Japan's current third ten-year Cancer Control Plan was JPY 55.9 billion (USD PPP 502 million) at the national level, up from JPY 53.9 billion (USD PPP 470 million) in 2009. Most of the budget was spent for designated cancer hospitals, radiotherapy equipment and screening. Australia committed AUD 2 billion (USD PPP 1.3 billion), of which AUD 1.3 billion (USD PPP 0.9 billion) was allocated in 2010 over six years to improve Australia's cancer infrastructure, and more than AUD 600 million (USD PPP 400 million) was allocated over five years for cancer care, research and medicines in 2009.

In countries in which NCCPs are implemented at the regional levels, the central budget is sometimes allocated to regions. In Spain, a total budget for health strategies including cancer strategies is proportionality distributed by population to all autonomous regions.

Given the drive towards more cost-effective spending, additional funds have often been directed toward prevention, screening and early diagnosis. In Singapore, for example, breast and cervical cancer screening programmes were prioritised with additional funding, although more recently lab and clinical research have also received additional financial support. In the Slovak Republic, the early detection of cancer has been a particular priority, and a national programme for the prevention of colorectal cancer was implemented in 2003, although radiotherapy equipment has also received significant additional investment. Under Poland's National Cancer Programme in 2007/08, the budget, though reportedly not large, was allocated for public awareness-building and anti-tobacco measures.

Novel policy directions include widening the revenue base for cancer care and investing in new institutional arrangements for centralised cancer care delivery. Countries including Australia, France, Germany, Korea, the Netherlands, Spain, Turkey and the United States raised additional revenue for cancer prevention by increasing taxation on cigarettes. Australia is investing in Integrated Cancer Centres to combine state-of-the-art cancer treatment with clinical and laboratory research, linking these with a network of regional cancer centres and the digitalisation of cancer screening programmes, in an attempt to narrow geographic inequalities in cancer outcomes. The Turkish Government also allocated financial resources to establish 29 comprehensive cancer centres under the Oncological Vision Programme, and each centre is required to fulfil the criteria set for health professionals and medical equipment. More information on centralised cancer care delivery is provided in Chapter 2, ("Resources for cancer care").

Some countries have not introduced comprehensive national cancer control plans

Not all countries have chosen to introduce an NCCP. In some cases, this is due to simple governance arrangements. In Switzerland, for example, the political structure means that health policy at the federal level tends to be restricted to communicable diseases, whilst the cantons are responsible for other health care issues, including cancer. Nevertheless, OncoSwiss (the Swiss Federation Against Cancer) did propose a comprehensive National Cancer Programme in the early 2000s. Not all of its proposals were taken up, but some elements, including a federal policy on palliative care, were agreed and implemented.

Elsewhere, cancer control is integrated into broader national health policies (such as in Finland and Iceland) or is dealt with via particular policies targeted at specific aspects of cancer control. In the absence of a comprehensive national plan, Luxembourg, for example, introduced specific policies to screen for and treat cervical cancer (in the 1970s), set up a cancer registry (in 1982), improve breast cancer screening (in 1992) and invest in radiotherapy centres (in 2000).

Further advances in national policy appear to be needed in countries such as Chile and the Slovak Republic. In the former, even though the National Cancer Programme was introduced in 1987, this did not set up an overarching policy framework for cancer control. In 2005, the Explicit Health Guarantee Regime was introduced to improve access to care for patients with specific illnesses, including breast and cervical cancers. Based on the targeted measures, access to care for these cancers improved, but future policies could focus on care for other cancers. The Slovak Republic introduced a National Cancer Programme with a focus on breast cancer in 2001, and a national programme for the prevention of colorectal cancer in 2003. The development and implementation of National Cancer Control Plan is a stated priority, but has been postponed in recent years.

Countries are setting national targets but the development of national guidelines varies

Targets and clinical guidelines are often prominent features of an NCCP. They can operationalise the Plan by setting out a country's cancer control priorities (via national targets around mortality or screening coverage, for example) and by setting out how to get there (via national clinical guidelines on cancer treatment or screening protocols, for example). Targets are about establishing and publicly highlighting the priorities for a cancer care system. Targets can play an important role in improving health care quality, particularly if they are simple, clear and pertinent to issues that matter to different stakeholders, including providers and patients. Clinical guidelines are developed to help medical professionals and patients make decisions about appropriate care for specific circumstances (Field and Lohr, 1992). Guidelines are likely to improve the quality of care when they provide guidance at key decision points, if they clearly and concisely set out evidence-based best practice whilst also allowing local circumstances to be taken into account, and if they are readily accessible when needed.

These days, many countries set national targets, ensuring the goal-oriented steering of cancer control efforts. Initially the targets focused on prevention and screening, but nowadays they cover a more comprehensive set of areas. Targets need to be selected with care so that they take into account the views of different stakeholders. The use and development of guidelines is also increasing, but this still differs across countries. Guidelines have been used to standardise best practice in cancer care within many countries over the years, but it is more difficult in countries that lack national guidelines and instead have guidelines specific to regions or professional groups.

Increasing numbers of countries set national targets

Many countries did not set targets until recently. For example, in Japan, the first and the second Ten-Year National Cancer Control Strategies, introduced in 1984 and 1994, detailed the country's cancer research agenda but did not set any specific targets in relation to cancer control. Similarly, the 1974 Act in the United States was designed mainly to encourage research, and no specific target was set.

Nowadays, however, most countries (e.g. Australia, Belgium, Canada, Chile, Czech Republic, Denmark, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Israel, Japan, Korea, Latvia, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Turkey, the United Kingdom and the United States) have established some cancer-specific targets or objectives. For example, the current National Cancer Control Strategies in Japan set targets on prevention, cancer treatment, a supportive environment for cancer care, specialist training, palliative care and cancer registration. Germany's focuses include targets such as early detection, the organisational development of the oncology care structure and quality assurance, the provision of efficient oncology care, a patient-centred approach and patient information.

National targets have shifted from a focus on prevention and screening to a more comprehensive set of concerns

Some of the earliest examples of target-setting in cancer control were sometimes restricted to objectives around prevention and screening. Singapore, for instance, where screening coverage still trails behind other developed countries despite good survival outcomes, has tried to enhance efforts in early detection by setting long-term targets of around 70% coverage for breast and cervical screening. The country has also put emphasis on tobacco control since 1970, in line with international recommendations, and set a goal of reducing smoking prevalence to 10%. In the Slovak Republic, one goal of the National Cancer Programme 2001 was to increase the number of mammography exams and to improve the access and quality of the exams for women in the target age group. Similarly, Healthy People 2010, started in 2000 in the United States, focused on prevention goals such as improving breast, cervical and colorectal cancer screening and reducing smoking.

Later targets have been broadened as countries also established priorities around treatment and follow-up. For example, Italy's 2006 NCCP focuses on the reduction of waiting times for early diagnosis, treatment and follow-up, and legislation introduced in 2004 aims at fair access to treatment for breast, cervical and colorectal cancers, in addition to setting a target of 100% coverage for the population-based screening programmes. In the Netherlands, the National Cancer Control Programme, introduced in 2004, covers not only prevention and diagnosis but also treatment and aftercare, as well as education, psychosocial care, continuing professional education and research. NCCPs in many other countries such as Australia, Belgium, Canada, the Czech Republic, England, France, Germany, Hungary, Italy, Japan, Latvia, Malta, Norway, Poland, Portugal, Scotland, the Slovak Republic, Slovenia, Spain, Sweden, and Turkey also emphasise better treatment.

As countries often face the challenge of poor care co-ordination (Box 4.1), another key area for national targets has been integrated care. An increasing number of countries use case management, with the aim of providing a seamless delivery of care to cancer patients who often have multiple and complex care needs. These countries include Australia, Belgium, Chile, Czech Republic, Denmark, England, Finland, France, Germany, Iceland, Ireland, Italy, Latvia, Malta, Netherlands, Poland, Scotland, Slovenia, Spain (for breast cancer), Sweden and Turkey. But in some countries, the use of case management is limited to certain institutions or certain cancers. Countries also aim to improve patient pathways through the use of GPs (as mentioned in Chapter 2, "Resources for cancer care"), multidisciplinary cancer care delivery (as described in Chapter 3, "Cancer care practice") and cancer networks, as summarised in Box 4.2.

Box 4.1. **Cancer care co-ordination across countries**

As different providers are involved in providing cancer care throughout the different stages of cancer care pathways, co-ordination among providers is important for effective care delivery. According to the responses to the OECD HCQI Questionnaire on Systems of Cancer Care, in about half of the countries studied, co-ordination of cancer care is perceived to function well. On the other hand, according to the national experts, care co-ordination is still generally problematic in a number of countries, including Greece, Italy, Latvia, Luxembourg, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Sweden, Switzerland, Turkey and the United States. For example, in the United States, co-ordination problems appear to exist in follow-up care and after care. In some countries, care co-ordination is not working well for specific cancers. For instance, co-ordination reportedly needs to improve for lung cancer patients in Australia and Norway, and for breast cancer patients in Luxembourg and Switzerland.

Some countries face difficulties in co-ordination between primary and specialised care. For example, in Portugal, co-ordination of care is problematic not only for cancer care but also for other illnesses. In general, the primary care and specialised care sectors do not co-ordinate well. In the case of cancer care, the co-ordination between GPs and centralised cancer hospital units does not function well. Similar problems are observed also in Greece, Italy and Slovenia. In Greece, the primary care system reportedly needs to be integrated for more effective prevention, diagnosis, treatment, follow-up and rehabilitation.

Care co-ordination is not optimal between specialised care providers in several countries. In Norway, co-ordination does not function well among specialists in the health system except for those in comprehensive cancer centres. The national expert considered that the health information system needed to be developed further to allow monitoring the continuum of care provided to individual patients in the country, and the distribution of specialists might need to be reorganised to improve care co-ordination. In Luxembourg, the national expert indicated that the co-ordination of care among specialists, particularly gynaecologists, surgeons and oncologists, was not optimal. For example, even though all women diagnosed with cancer through the breast cancer screening programme are followed by the Ministry of Health, about 20% of the patients, diagnosed outside of the screening programmes, are not receiving care in a co-ordinated manner. Furthermore, the expert in Poland reported that co-ordination is challenging between outpatient laboratories, hospital inpatient care and comprehensive cancer centres, and thought that the organisation and co-ordination of service delivery could be improved at cancer treatment centres/hospitals through better collaboration and information-sharing between GPs and specialists, improved referral systems, improved quality control, the introduction of cancer networks and quality assurance. In Ireland, each hospital is left to co-ordinate with others, and there is a need for centralised hospital management to enhance the co-ordination of care across hospitals. Portugal reports a similar problem.

In some countries, including Belgium, Italy and Switzerland, the extent of care co-ordination varies across regions, leading to regional inequalities in care quality. In addition, care co-ordination between regions is not working well in some countries, including Canada, Italy, Slovenia and Sweden. For example, in Sweden, according to the national expert, care co-ordination between municipalities has some problems and palliative care in particular does not function well between counties and municipalities. In Canada, while radio- and chemotherapy are provided in a co-ordinated manner within the province, care co-ordination between central and provincial levels is still limited.

Source: OECD HCQI Questionnaire on Systems of Cancer Care.

Box 4.2. **Cancer networks**

Cancer networks have been established in some countries, including Australia, Canada, Chile (for gynaecologists), the Czech Republic, England, France, Hungary, Japan, the Netherlands, Portugal and Scotland, in order to facilitate co-ordination among professionals engaged in oncology care. An oncology network in Hungary, composed of 25 centres at different levels, including all university centres and most cancer centres, covers the entire country. To facilitate participation in the network, telepathology and online oncology are scheduled to start soon. In the Netherlands, nine comprehensive cancer networks have existed since 1978, providing a framework for performance comparisons and benchmarks across hospitals and regions. Each cancer network is funded by the Ministry of Health and insurance companies, and health professionals and facilities including hospitals, regional centres and home centres take part in the networks. In 2013 the networks will be integrated into one countrywide organisation. Furthermore, in England, there are 34 cancer networks, co-ordinating cancer care pathways across providers, and in Scotland, Managed Clinical Networks and Regional Cancer Advisory Groups were established recently, and cancer networks were developed for each region to improve care for cancer patients.

The impact of cancer networks varies across countries. The network of Czech Comprehensive Cancer Centres was established in 2006, and since then care co-ordination has improved. In Japan, the national expert expects that the co-ordination mechanism has been strengthened following the establishment of Designated Cancer Hospitals and their co-ordination networks in 2002. The National Cancer Network in Portugal established links among different specialisations within the NHS in 2010, which is supposed to collect and manage knowledge and expertise in cancer care. According to the national expert, however, it does not work very well, and the network needs to strengthen its capacity to effectively co-ordinate with different hospitals/services (with different levels of specialisations) and to promote quality guidelines/criteria for the different cancer services.

Source: OECD HCQI Questionnaire on Systems of Cancer Care.

In several countries, cancer targets also cover other areas, such as palliative care, patient-centred care and monitoring. In Korea, the second term of the Cancer Control Programme, started in 2006 for a period of ten years, aims to improve primary prevention, early detection, diagnosis and treatment and palliative care. The overall goal is to improve the quality of life of cancer patients and reduce the cancer burden at the national level by reducing cancer incidence and mortality and improving survival. In Norway, the comprehensive national cancer control plan, introduced in 2006, has specific focuses, such as ensuring a patient-centred approach, timely delivery of cancer care, resources for appropriate follow-up of cancer patients, and the financing of expensive pharmaceuticals and cancer treatment. Sweden's 2009 NCCP emphasises the importance of treatment and follow-up by setting targets around improving the quality of cancer patient management, prolonging survival and improving the quality of life after a cancer diagnosis, reducing inequalities in morbidity and survival, and reducing risk factors. With regards to monitoring, a topic of the following section, Belgium and Canada are trying to improve their surveillance systems, while Japan, Korea and Turkey are aiming to strengthen their cancer registries.

Targets need to be selected with care

Governance based on targets assumes that priorities can be targeted, the part that is measured can stand for the whole, and what is omitted does not matter (Bevan, 2006). Targets may also break systems into "silos" by focusing attention on isolated parts rather than on the whole (Gubb, 2009).

For countries to advance in cancer control, appropriately targeted and measurable indicators need to be developed for evaluating cancer control performance over time and across providers and regions, reflecting the views of different stakeholders, including professionals, patients and the public. The list of targets needs to be maintained at a manageable level, and administrative burdens for reporting need to be minimised, even though stakeholders inevitably have different objectives. For example, in the Netherlands, an excessive number of stakeholders involved in monitoring, including health insurance companies, the Dutch Cancer Patients Association, professional associations, the Ministry of Health and others, led to a situation where several indicator sets, with 8 to 20 indicators each were reported per cancer patient. As a result, the professionals were overloaded with reporting responsibilities, necessitating a review of target setting. The process of rationalising target setting and streamlining monitoring processes is on-going.

Timeframes are set in an increasing number of countries

Targets become more binding if accompanied by specified timeframes. Nevertheless, the majority of countries did not have any time-bound cancer-related objectives in the early 2000s. Furthermore, even if timeframes were specified, in several countries including Chile and Italy they were not binding. In the former, if targets had not been met within the specified time period, they were usually included in the next set of policy targets. In the latter, objectives were set together with a timeframe, but these national policies were not necessarily respected by the regional governments in charge of actual care delivery.

These days, an increasing number of countries have set timeframes for achieving cancer-related objectives, and many countries set timeframes particularly for screening, early detection and improved treatment. Time-bound objectives are revised regularly in countries including Canada, Germany and Ireland; in Ireland, these are set annually in the National Service Plan of the Health Service Executive.

Some countries, however, still do not set fixed timeframes to achieve objectives or targets, and this may be a rational policy option, given local contexts. For example, in Israel, the national expert indicated that it was considered difficult to identify the time needed to achieve targets, given the pressure of continuously competing health-related issues arising from other domains. Similarly, in Luxembourg, current national cancer policy does not specify timeframes, whereas previous policy did.

The absence of binding timeframes entails certain risks: targets may slip in importance or become subject to unhelpfully frequent revisions. For example, in Hungary, according to the national expert, the cancer control policies have changed with each new government, leading to a lack of consistency and of a longer-term perspective.

Guidelines have long been used in an attempt to standardise best practice in cancer care

As with targets, national clinical guidelines in cancer care are also well established in a number of countries. One early example of these comes from Chile, where the

Central Commission of Experts, now called the Programa Adulto Nacional de Drogas Antineoplásicas – PANDA, was established in 1988 to develop guidelines on chemotherapy for cancer. Other countries with long histories of clinical guidelines in cancer care include Norway, which introduced diagnostic and treatment guidelines for breast and colorectal cancers in the mid-1980s and early 1990s, respectively, and Canada, where guidelines on breast cancer diagnosis and treatment were developed in the mid-1990s. The details included in national guidelines differ across countries, and in some countries, waiting time targets are also specified in guidelines, as described in Chapter 3. Countries with relatively long histories of cancer-related guidelines report regular revision and updates in order to promote best practice in cancer care and to improve the performance of the cancer care systems.

Elsewhere, early guidelines have often focussed on screening. In Hungary, for example, national guidelines for cancer screening were developed for the first time in 1994, and in Latvia, similar national guidelines were developed in the late 1990s. Nowadays, most countries have guidelines for breast and cervical cancer screening.

An increasing number of countries report developing national clinical guidelines for the first time. Singapore, for example, brought out a suite of clinical guidelines for the management of breast, cervical, colorectal and lung cancer in 2003/04. Other examples include the Slovak Republic, which approved new guidelines for the diagnosis and treatment of breast cancer in 2009, and Portugal, where national guidelines for breast and lung cancer were published in 2009/10.

In other countries, national guidelines have a lower profile

As mentioned in Chapter 3, the development of guidelines is important to standardise and promote evidence-based cancer care delivery, which helps with quality improvement across providers, but in some countries, national guidelines on cancer management are much less prominent. In some cases this simply reflects governance structures that are more federal in character, as noted earlier. In Canada, for example, guidelines for cervical, colorectal and lung cancer treatment exist only at the provincial level.

In other cases, however, the absence of national guidelines is not so readily explained. In Japan, guidelines for diagnosis and treatments were developed by professional associations with central government support, but they are reportedly not considered to be national guidelines. They are seen more as reference material, and clinical practice remains dependent on the discretion of the individual practitioner. Similar situations are reported in Korea and Greece.

The recognition and implementation of national guidelines is a matter of degree. Compliance may be encouraged and incentivised, as discussed in Chapter 3, but it is rarely practical to enforce adherence, since clinicians' discretion in particular circumstances must be accommodated, as must patient preferences. In fact, due to these two considerations, carefully developed guidelines often go unused (Feder, 1999). Nevertheless, if national standards of care are perceived as being peripheral to clinical decision making, the risk of unwarranted variations in medical practice arises, which may lead to inefficiencies and inequity (Fisher, 2003, Dartmouth Atlas of Health Care, 2012), as is also described in Chapter 3.

Monitoring of cancer control efforts has been improving, but remains uneven

Monitoring progress towards targets set out as part of a national cancer control system is a vital element of effective system governance. For countries to advance in cancer control, proper infrastructure on health information and cultures of monitoring and utilising data for decision making are important. In order for the public, providers and other stakeholders to have confidence in monitoring arrangements, monitoring responsibilities have been assigned to independent agencies across countries. Monitoring, which reflects target-setting and guidelines, often focuses on outcomes (such as survival) or on processes (such as adherence to guidelines and waiting times). These days, the extent and the depth of monitoring are expanding, but it remains uneven across countries. A more recent focus in monitoring is around quality dimensions such as effectiveness and patient experiences. Despite the progress, there is still room to improve monitoring across countries, and additional efforts in public reporting can make monitoring more effective.

Monitoring responsibilities are assigned

Reviewing cross-national experiences, it is evident that a diverse range of agencies monitor cancer care across countries. In many countries, the Ministry of Health is responsible, while in others, quasi-governmental public bodies (such as the Institute for National Cancer Control in Korea or the Haut Conseil de la Santé Publique in France) take on the role.

It is not unusual for distinct aspects of monitoring to be split off amongst specialist agencies, with survival overseen by a cancer registry, for example, and the quality of care monitored by health insurance funds or the Ministry of Health. In some cases, multiple stakeholders are jointly involved. In Poland, for example, the Association of Polish Oncologists, the Cancer Society, the Patients' Association and the Ministry of Health all observe and report on the implementation of the national cancer programme. Such shared ownership may enhance the credibility and relevance of the monitoring process, particularly given the involvement of a patients' association, which is rarely seen.

Some countries have established agencies responsible for monitoring cancer control in recent years. Canada's Partnership Against Cancer, an independent organisation funded by the federal government, was established in 2007 and works with cancer experts, charitable organisations, provincial and territorial governments, cancer agencies, national health organisations, patients, survivors and others to implement the NCCP. The Partnership reports each year to Health Canada (the federal government), covering indicators throughout the continuum of care and aiming to provide high-level evidence on cancer system performance across provinces and territories.

The extent and depth of monitoring is expanding but remains uneven across countries

Countries generally have a long history of monitoring, but most often around cancer incidence, mortality and survival, comparing providers and regions. For instance, in the United States, the annual Surveillance Epidemiology and End Results (SEER) Cancer Statistics Review (CSR) reports statistics on incidence, mortality, prevalence and survival from 1975. In France, besides incidence and mortality rates, survival by cancer are available so as to compare regional differences for the diagnosis period from 1989 from 15 district registries, and the ongoing cancer control plan aims to report these data regularly at a national and regional level.

Cancer screening programmes are also monitored in many countries, as shown in Figures 3.2 and 3.3 in Chapter 3. Individual-level information, such as taking screening tests, screening results and histology, are also available at the national or regional level in a number of countries, such as Denmark, Estonia, Finland, France, Germany, Ireland, Italy, the Netherlands, Poland, Slovenia and the United Kingdom (Attila et al., 2004 and 2009).

Nevertheless, significant disparities still exist in the extent and depth of monitoring, with some countries having a relatively restricted set of data available. Although Portugal has recently introduced maximum waiting times and clinical guidelines for different cancers, the success of these initiatives are still not monitored. Similarly, the Slovak Republic does not monitor survival for colorectal cancer, and in addition, mature monitoring and feedback systems for the performance of national breast and cervical screening programmes are not yet in place.

Emerging interests are around effectiveness and patient experiences. . .

The trend in recent years, though, has been to move beyond monitoring screening, incidence, mortality and survival and to monitor a richer set of indicators of cancer care. This means an increasing focus on information on the use of appropriate processes, measuring effectiveness and efficiency across providers and/or regions. Ambitious, recent monitoring initiatives include those from the Czech Republic, where the Czech Society for Oncology has started a programme to monitor and evaluate the effectiveness of key treatments. Similar efforts to measure effectiveness have been undertaken in Israel (for breast cancer) and Sweden, and relevant experiences in the United States are summarised in Box 4.3.

Box 4.3. **Health information system measuring the quality of cancer care in the United States**

The health information system has been developed extensively in the United States. The National Cancer Data Base (NCDB), a joint programme of the Commission on Cancer (CoC) and the American Cancer Society (ACS), is a nationwide oncology outcomes database for more than 1 400 Commission-accredited cancer programmes across the United States and Puerto Rico. Some 70% of all newly diagnosed cases of cancer in the country are captured at the institutional level and reported to the NCDB, which now contains approximately 25 million records from hospital cancer registries across the country. Data on all types of cancer are tracked and analysed, and these data are used to explore trends in cancer care, to create regional and state benchmarks for participating hospitals, and to serve as a basis for quality improvement. In addition, *Patterns of Care* studies provide important information on cancer treatments beyond that documented in the hospital record. These studies verify treatments with the patients' physicians. The goals are to evaluate the diffusion of state-of-the-art cancer therapy into community practice, to disseminate findings in scientific journals and through professional meetings, and to work with professional organisations to develop educational opportunities to increase the use of state-of-the-art cancer therapy and quality of care in community practice. Further assessment on care quality is conducted by the insurance companies or health plans offering these services.

Source: OECD HCQI Questionnaire on Systems of Cancer Care.

Other data around patient-centred cancer care delivery, another important dimension of quality of care, such as the extent to which patients felt involved in taking decisions about treatment, are also of increasing interest. Health care needs to be delivered in a client-oriented manner, so it is important to examine whether patients are informed users of health care systems and the extent to which cancer services are configured around the needs of the patients and their carers, rather than around the needs of the service. For instance, some countries collect data on patient knowledge of the illness and treatment options and their outcomes. The Patient-Reported Outcome Measures (PROMs) developed in England is a well-known example. PROMs focus on measuring health and the impact that treatments or adjustments to lifestyle have on quality of life from the patient's point of view. However, the collection of data on the patient's experience is often at a pilot or regional stage in countries, and has not yet become mainstreamed into routine national data collection. Finland, for example, has started efforts to collect comparable data on patients' reported experiences in some areas, and the Netherlands is similarly exploring collecting such data at some hospitals. The Icelandic Tumor Boards have started occasional patient experience surveys, and Japan started collecting patient experience data in 2010, linking it to administrative databases with information on waiting times.

... but public reporting is often not sufficient

There is an increasing trend towards the public reporting of cancer care performance across providers and regions. For example, under the Hospital Evaluation Programme (HEP) introduced in 2004, Korea published hospital-specific health care quality evaluations undertaken in the previous three years. Likewise, in Japan, comparable information on treatment and outcomes is published by the network of Designated Cancer Hospitals. International reporting on the performance of cancer care systems is also available, often comparing cancer mortality, survival and screening, but this is still limited. Countries would benefit from more international benchmarking.

Despite the existence of such public reports, it is not always clear how often they are actually helpful to patients. Several countries report on-going policy initiatives to increase the use and usefulness of hospital performance statistics to patients.

Quality assurance mechanisms have been set up but not in all countries

Quality assurance (QA) programmes seek to ensure that the health care provided meets certain standards of care. A mix of methods is used, such as inspecting sites where health care is delivered, interviewing staff and service users, and verifying a hospital's mechanisms to audit care, to report untoward incidents and to institute performance improvement plans. QA may involve acting on *ad hoc* information from the public and staff with respect to lapsed standards, setting out legal obligations for services to report certain incidents. QA programmes also use quantitative approaches, reviewing routine performance data to identify areas of progress and deficiency and providing feedback to providers.

In the majority of countries, systematic and comprehensive quality assurance mechanisms have also been set up, particularly for screening programmes. Within QA, a formal accreditation process exists to identify institutions where standards are met. In parallel, QA agencies license health care professionals who have met minimum standards around training and demonstrate ongoing professional development. A few countries still lack QA mechanisms for cancer care.

Quality assurance mechanisms have been set up for screening in the majority of countries

Countries' QA initiatives are often first implemented around screening programmes. Singapore, for example, is typical in having set up a quality assurance programme around mammography, where a subset of mammograms undergoes double-reading by two radiologists, and any missed cases prompt a look-back exercise across previous reports issued by the service. Likewise, Luxembourg has introduced a programme of outlier analysis in its cervical cancer screening programme, in which centres review the rate of abnormal cells determined by each pathologist; where rates are found to be outliers, previous reports from that pathologist are reviewed. Israel also has a mature QA system, as summarised in Box 4.4, and providers receive feedback to compare their performances. Evidence shows that provider assessment and feedback mechanisms contribute to increased screening (Sabatino et al., 2008).

Box 4.4. **QA system for cancer screening in Israel**

A comprehensive quality assurance mechanism has been developed in Israel for breast cancer. Every entry to the cancer detection centre is registered in a centralised electronic database, which was established in the mid-1990s. The database contains screening information from all public and private providers, and over 90% of diagnosis test results for individuals who had a mammography. Data including detection rates, recall rates, further examination rates, and staging information, and negative/positive test result rates are provided to all providers every year so that they can compare their performance relative to the national average and to other providers in the country. Using the database, every care pathway is monitored, and providers receive a report in case of an irregular pathway. A similar system exists for colorectal cancer, but there is a need to improve the collection of colonoscopy data.

Source: OECD HCQI Questionnaire on Systems of Cancer Care.

However, a system-level QA mechanism is not often robust and lacks feedback mechanisms and associated correction measures. There are some exceptions and systematic reviews are undertaken in the Netherlands and some health care organisations in the United States. In some cases, the introduction of QA mechanisms is opposed since it may be viewed as interfering with the physician's autonomy and possibly having negative financial consequences for some practitioners. It is therefore sometimes difficult to introduce more vigorous QA mechanisms, and instead minimum requirements are set for facility accreditation and professional licensing, as will be discussed below.

Facilities and services accreditation

Accrediting institutions for cancer care is one means of identifying facilities and services that have met and maintain agreed minimum standards. Countries are increasingly adopting accreditation, but some still lack cancer care-specific accreditation systems. Countries that have recently moved to implement cancer service accreditation include Belgium, which started accreditation in 2003, the Czech Republic, in 2004, and Chile, in 2005. Other countries with cancer accreditation systems as of 2010 include Australia, Canada, Denmark, England, Finland, France, Germany, Hungary, Iceland, Italy, Japan, Latvia, Luxembourg, Netherlands, New Zealand, Poland, Singapore, Scotland,

Slovak Republic, Spain, Turkey and the United States. This trend is in line with the increasing focus on providing cancer care at specialised institutions, as discussed in Chapter 2. The criteria assessed when considering accreditation broadly concern the extent and quality of resources such as buildings and equipment along with the existence of adequate processes for patient safety and quality of care and appropriate policies for recruiting and training the institutional workforce. In some of these countries, there is a movement to attain international accreditation.

Accreditation is mandatory in many but not all of these countries. In Singapore, for example, hospitals must be licensed to provide chemotherapy and other forms of cancer care. In Hungary, oncology care institutions are classified in three levels, each with different minimum requirements, and the Medical Officers Monitoring System evaluates whether the institutions meet certain standards. In other cases, non-accredited institutes may continue to offer cancer care, but lack the profile, additional resources or patient preference that may come with accreditation. In Japan, for example, a system of Designated Cancer Hospitals started in 2002, although other hospitals can continue to provide cancer care. In Denmark, accreditation is obligatory for public hospitals, but voluntary for private hospitals, and indeed most private providers do not participate in the accreditation process. The government has recognised that it may need to play a more active role in managing the quality of care provided by the private sector.

Professional licensing is being developed

As for services accreditation, professional licensing is a means of identifying those physicians who can demonstrate a minimum degree of training in cancer care, and a number of countries have developed licensing mechanisms in cancer care, as is mentioned in Chapter 2.

Licensing is sometimes also linked to a requirement to demonstrate on-going professional development. In Australia, the newly established Medical Board of Australia (MBA) oversees the registration of medical practitioners, the development of professional standards for medicine, the handling of notifications and complaints about medical practitioners, and the assessment of International Medical Graduates who wish to practise in the country. The MBA, in conjunction with the Australian Health Practitioner Regulation Agency, maintains a specialist's register, which records all medical practitioners who are registered as a specialist under the National Law. Thus, the system ensures the competency of specialists, and it is also hoped that patient safety will be improved by having a national register that will clearly identify whether a health practitioner is registered and any conditions that may be imposed on their registration. Several other countries have similar professional register systems, including Ireland.

In some countries, however, it is reported that professional licensing systems specific to cancer care are weak, not unified or absent. For example, in Chile, since 2005 professionals have needed a certification to provide cancer care, but it is reported that the implementation of professional licensing remains incomplete, and consequently the policy is delivering fewer benefits than intended. In Japan, different oncology training and certification schemes exist for specific organs and treatment methods, and consequently, the certification programmes vary across professional associations even for the same specialisation. In addition, countries including Greece, Italy, Poland and Sweden do not have cancer care-specific professional licensing, and in these countries, any licensed doctor can practice oncology, as is discussed in Chapter 2.

Given the complex and highly specialised nature of cancer care (whether medical, nursing or other professional care), the risk of not having a distinct accreditation process for cancer services is that important opportunities to reward excellent practice, to address deficient practice and to improve the skills level of the workforce are missed, as might other benefits such as networking and peer-to-peer support for professionals.

Conclusion

National cancer control plans offer an opportunity to bring stakeholders together and work to improve the quality of cancer care across the patient pathway. Across countries, there is a clear trend towards the adoption and strengthening of NCCPs by committing additional resources and specifying accountable lead organisations. But having NCCPs alone is not sufficient for making progress in cancer control, and some countries without NCCPs also have strong governance mechanisms for cancer control.

Targets and guidelines bring stakeholders and resources together to focus on overcoming specific challenges and on improving cancer care performance and quality. In order to achieve these, different stakeholders need to be involved in developing a national framework for cancer control, its targets and clinical guidelines, to make sure that separate cancer control efforts are in line with a broader agreed framework. The involvement of patient representatives may also be important. Furthermore, as the targets and guidelines mature, they will also need to address rapidly emerging priorities.

Monitoring efforts have been intensified in care delivery, such as on the use of pharmaceuticals and evidence-based and timely cancer care, as discussed in Chapters 2 and 3. These have broadened at the system level to go beyond incidence, mortality and survival and include different quality dimensions, such as effectiveness and patient-centredness. Efforts are thus being made to assess different aspects of the cancer care system's performance. Monitoring could be strengthened by making specific key data publicly available, and countries would also benefit from more international benchmarking.

QA mechanisms have been developed in subsystems, such as the use of cancer drugs and the evidence-based and timely delivery of cancer care, as discussed in Chapters 2 and 3, and for screening, as discussed earlier in this chapter – and these are leading to quality improvements. Minimum requirements have also been set for facility accreditation and professional licensing, but introducing more vigorous system-level QA mechanisms with feedback mechanisms and correction measures appears difficult.

Notes

1. Australia, Belgium, Canada, Chile, Cyprus[3, 4], the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Luxembourg, Malta, the Netherlands, New Zealand, Norway, Poland, Portugal, Singapore, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and the United States. United Kingdom provided some information specific to England, Northern Ireland, Scotland and Wales and where possible, the country-specific data and information are included in this publication but otherwise data and information for the United Kingdom as a whole are used. The publication uses three-letter country codes defined by the International Organization for Standardization (ISO); GBR refers to the United Kingdom and CHE refers to Switzerland; for England, ENG is used.
2. United Kingdom provided some information specific to England, Northern Ireland, Scotland and Wales and where possible, the country-specific data and information are included in this publication but otherwise data and information for the United Kingdom as a whole are used.

3. Note by Turkey: The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey shall preserve its position concerning the "Cyprus issue".
4. Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

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Chapter 5

Exploratory quantitative analysis

This chapter describes the results of an exploratory analysis of the relation between cancer care system characteristics and cancer outcomes. It looks at the differences in cancer outcomes for breast, cervical, colorectal and lung cancer in 31 OECD countries for cancer patients followed-up between 2000 and 2002. The analysis tries to explain these differences through system characteristics related to the resources put into cancer care, the practice of cancer care and the governance of cancer care.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Introduction

This chapter summarises the results of explorative analytical work on the performance of cancer care systems in the early 2000s. The study was undertaken with the aim of examining the relative effect of key characteristics of the system of cancer care, in particular resources, practice and governance, on the survival outcomes of patients with breast, cervical, colorectal and lung cancers. Based on the availability of comparable data, the study covered 31 OECD countries.[1]

This study adds to the preceding analyses done in the area. Previous attempts to analyse the complicated relationships between health system organisation, specific policies and cancer outcomes include Micheli (2003), Quaglia (2005), Lillini (2011) and Coleman (2011). These studies suggest that cancer survival does depend to some extent on macro-economic determinants. Moving beyond these determinants, this study looked at the effects of different organisational structures.

Methods

Data sources

Survival estimates were taken as the main outcome measure for this study. In order to ensure the data comparability across countries, the same calculation methods were used to derive these outcome measures. The EUROCARE-4 study collected the age-standardised five-year period relative survival for breast, cervical, colorectal and lung cancers systematically for 23 countries. Relative survival was calculated by period analysis (Brenner, 1997) based on survival experience of adult patients diagnosed since 1996 with follow-up years 2000-02 (de Angelis, 2009). Period survival estimates were calculated for the following age groups: 15-44, 45-54, 55-64, 65-74 and 75+ years. Expected survival was calculated using Hakulinen's method (Hakulinen, 1982). Data were logarithmically transformed to calculate 95% confidence intervals with a positive lower limit. Age-standardised survival estimates were computed using Corazziari's method (Corazziari, 2004). In-situ and death-certificate-only (DCO) cases were excluded from the dataset.

Survival data from other countries, not participated in the EUROCARE study, were additionally collected with the same calculation methods. The US data were obtained through the US SEER (Surveillance, Epidemiology and End Results) programme and data from other countries (Australia, Canada, Hungary, Israel, Japan, Korea, Latvia, New Zealand, Singapore, and Turkey) were submitted by national experts listed in Annex A. The cancer survival data are presumed to be as broadly representative for each country as possible.

The exploratory analysis undertaken did not use survival data from the OECD Health Data because although they are more up-to-date, the additional data request to national experts ensured better data comparability across countries. Based on this experience, however, OECD seeks to improve the collection of comparable cancer survival across countries.

Independent variables were chosen on the combined basis of the conceptual framework model presented in Chapter 1 and a literature review. Data for independent variables was sourced from the OECD Health Data, national experts through the OECD Health Care Quality Indicators (HCQI) Questionnaire on Systems of Cancer Care and interviews, as well as other sources as cited below. The following variables were chosen:

Resources for cancer care

- Gross domestic product (GDP) in USD per capita adjusted for purchasing power parity (PPP),
- Total national expenditure on health (TNEH),
- Computer tomography (CT) scanner units per million population divided by GDP per capita,
- Positron emission tomography (PET) scanners per million population (Hastings, 2006),
- clinical use of innovative cancer drugs such as trastuzumab (Herceptin), bevacizumab (Avastin), exemestane (Aromasin), letrozole (Femara), anastrozole (Arimidex), raloxifene (Evista), cetuximab (Erbitux), oxaliplatin (Eloxatin), irinotecan (Camptosar) and capecitabine (Xeloda) (Parkin, 2001; Wilking, 2005),
- free access to at least three out of ten cancer drugs mentioned above,
- oncologists per million population, and
- comprehensive treatment centres per million population.

Practice of cancer care

- Characteristics of cancer screening programme (interval, target population, minimum age, coverage, national rollout, and provision free of charge),
- referral time (GP to specialist),
- waiting time (diagnosis to treatment), and
- provision of optimal treatment (combination of surgery, radiotherapy and chemotherapy if patientis diagnosed early at a localised stage).

Governance of cancer care

- Fully implemented national cancer control plan (NCCP),
- cancer-specific targets,
- additional funding made available to achieve these targets,
- lead person or organisation assigned to oversee the implementation,
- quality assurance mechanisms in place for cancer care,
- care co-ordination and networks for service delivery,
- key milestones and timeframes for cancer control,
- monitoring,
- someone made responsible for meeting targets,
- national guidelines (screening, diagnosis, and treatment),
- case management (multidisciplinary teams),
- accreditation of health professionals, and
- licensing of hospitals.

Due to the data availability and comparability, some proxies were used in the analysis. Countries decide on the volume and allocation of resources based on cancer incidence and geographic characteristics to ensure appropriate access to care for cancer patients. However, as described in Chapter 2, cancer care is organised differently across countries, making difficult to compare available resources for cancer care cross-nationally. For example, it is challenging to take account of cross-country variation in professionals providing cancer care at varied facilities, but this analysis simply uses the numbers of oncologists and comprehensive cancer centres per population as proxies for the patient's access to cancer care resources. Given these issues around data comparability, these data were also transformed into binary variables and based on tests assessing the relationships with cancer survival, the threshold was set as ten oncologists and three comprehensive cancer centres per million population for the analysis.

With regards to data on costs, unfortunately, cancer-specific expenditure could not be used in the analysis due to a lack of data availability and issues with comparability, and instead total health expenditure was used. This is, obviously, a major limitation, and illustrates the importance of moving towards the implementation of disease-specific health accounts.

Policies across all phases of cancer care were considered, with the exception of prevention and palliative care. Both phases currently lack robustly comparable, standardised international metrics, limiting the contribution they can make to any quantitative analysis. Furthermore, the primary goal of palliative care is not to improve survival but to prevent and relieve the symptoms of cancer and other illnesses, so it was not included in the analysis. The impact of preventive policies was considered in the context of the OECD work on the *Economics of Prevention* (Sassi, 2010).

Every effort has been made to ensure the independent variables used in the models relate to the same timeframes for the cancer survival data. As cancer survival refers to patients diagnosed since 1996, cancer care resources and practice and system governance before 2000 may be also associated with cancer outcomes, but independent variables were collected for 2000-02 and it is assumed that they also approximately represent the various country situations in the late 1990s. When data are available for different years in the period, 2002 data are used.

Analytical approach

Several analyses were undertaken as part of explorative work. First, the relationships between variables of health system characteristics, cancer care policy, financing, resources and the practice of cancer care on the one side and cancer survival on the other side were investigated by univariate analyses. Countries were divided into two separate groups according to whether GDP was up to or more than USD 20 000 per capita adjusted for purchasing power parity (PPP). This criterion was based on the findings from a previous study (Verdecchia, 2008). The results are shown in the next section.

Then, multivariable fractional polynomials (FP) modelling (Box 5.1 and Annex 5.A3) was performed to investigate the effect of particular characteristics of various domains from the conceptual model on five-year relative survival. The Royston and Altman model-selection algorithm was used (Royston, 1994). The domains were, as presented above, separated into three groups: resources, practice and governance. The five-year relative survival was used as a dependant variable for each of the four cancers of interest. The results are available below in the section "Results of multivariable analysis at the domain level".

Finally, multivariable FP modelling was performed by using selected variables across all three domains in order to identify key factors contributing to higher survivals.

Box 5.1. **Fractional polynomial modelling**

Conventional statistical or econometric analysis of differences across countries works best when there are a large number of countries and substantial variations in the likely explanatory factors (including health system characteristics and other factors pertaining to health policy) over time. This allows variations due to changes in policy to be identified separately from variations due to factors that are not of interest. Unfortunately, no reliable time series data are available across countries for cancer survival, and even less so for different policies. In these circumstances, analysis usually has to resort to simplistic regressions on a very few factors, which are often unconvincing.

Fractional polynomial modelling involves complicated maths, but in essence it is simple. The modeling allows for examining both linear and non-linear relationships between the outcome of interest and explanatory variables, by raising each variable to various powers (to its square, square root, cube, cube root, etc.) and assessing which combination of variables, at which powers, "explain" the differences in outcomes most convincingly. Adjusted coefficient of determination (Adj R^2) shows a proportion of the explained variation in the outcome. This model generates correlations that best fit the data without imposing a structure on the data. It does not, therefore, indicate causal relationships. In no way do any of the relationships identified in this chapter imply causation.

Results of the univariate analyses

These analyses assume that the survival outcome is related to only a single continuous or categorical explanatory variable. The list of variables is described in Annex 5.A2. Confounding variables and more complex relationships are addressed via analyses in the next two sections. The results are available for each cancer for variables with p-value less than 0.35 in Annex 5.A3.

Resources for cancer care

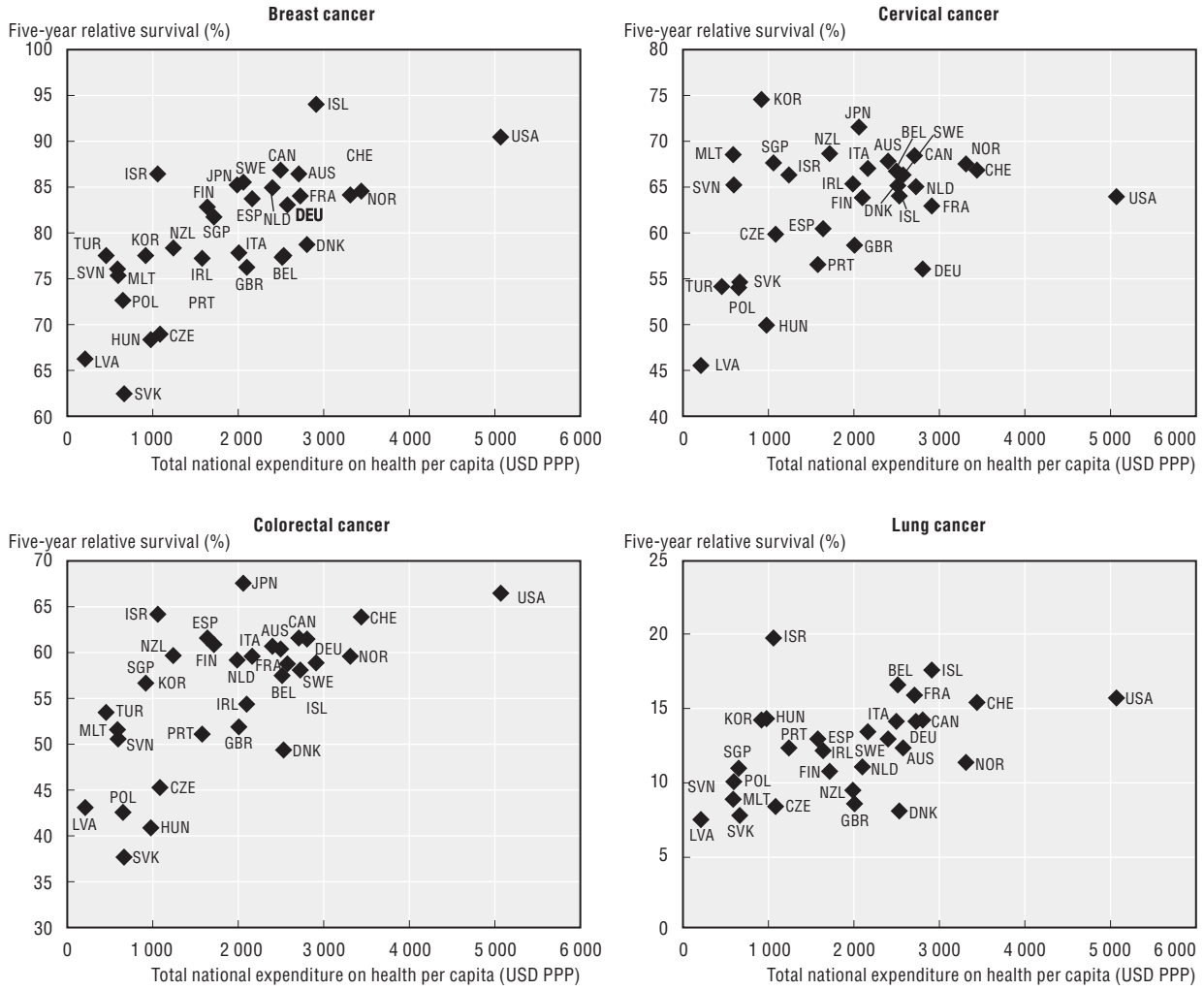
The analysis suggests that there is a significant association between cancer survival and the set of indicators for resources devoted to cancer care such as countries' total national expenditure on health (TNEH), the early introduction of technology, and the available infrastructure.

The results indicate that a considerable part of the differences in variation in cancer survival may be related to countries' total national expenditure on health (TNEH). TNEH is a strong predictor of cancer survival across all cancer sites (the test statistic is significant, with p-value ≤ 0.01), apart from lung cancer (with p-value = 0.07) (Tables 5.A3.1-5.A3.4 in Annex 5.A3).

Figure 5.1 shows the results of fractional polynomial models fitted for all cancers by using the best fitted curve, where the y-axis is survival assessed on the basis of follow up years 2000-02 and the x-axis shows the explanatory variable of interest, i.e. TNEH in 2002. The shaded area shows the 95% confidence interval of the line of best fit.

The results raise the question of whether there is a saturation effect when it comes to getting better cancer outcomes through investing more resources. In other words, once

Figure 5.1. **Relationships between cancer survival and total national expenditure on health with 95% confidence limits, based on fractional polynomial model**



Source: EUROCARE/SEER (survival), *OECD Health Data* (TNEH).

there has been a substantial effort to put more resources into cancer, further investments have a lesser effect and instead attention needs to turn to the other factors affecting cancer outcomes.

Countries with higher cancer survival tend to spend more on health per capita, but there are some exceptions. For example, Japan and Israel have attained high colorectal survival while per capita spending is relatively low compared with the United States, with a similar level of survival. On the other hand, the Slovak Republic, Hungary and Denmark have lower survival than other countries with comparable spending levels. For the same level of spending, Malta and Slovenia have higher survival than the Slovak Republic, while Sweden, the Netherlands and Belgium have higher survival than Denmark. It should be noted that TNEH is a high-level measure of expenditure on health with no account given for what this money is spent on.

Other studies have shown gross domestic product (GDP) also to be a strong predictor of cancer survival. TNEH is closely related to GDP. TNEH is, however, statistically found to be a better predictor in the case of countries with a lower level of GDP per capita (Tables 5.A3.5-5.A3.8 in Annex 5.A3).

In terms of cancer drugs, the results show that survival for all cancers is weakly associated with investment in pharmaceuticals. In the case of breast cancer, the early introduction of certain cancer drugs such as trastuzumab seems to be moderately related ($p = 0.14$). The provision of a range of pharmaceuticals free of charge appears to be a more relevant explanatory variable than the number of available pharmaceuticals in clinical use, but with no significant association with survival outcome. When examining the relationship for lower and higher income countries separately, the correlation between the provision of at least three out of ten pharmaceuticals free of charge and survival is stronger for countries with GDP below USD 20 000 per capita.

Investment in technology (CT scanners divided by GDP, as proposed by Verdecchia et al., 2008) is highly correlated with lung cancer survival ($p \leq 0.01$).The strength of association between investment in technology and cancer survival is more notable in countries with lower income levels for all four cancers (e.g. breast cancer; low GDP countries $p = 0.05$, high GDP countries $p = 0.11$). This matches the findings of a previously published study (Verdecchia, 2008).

The number of comprehensive cancer centres per 1 million population is a proxy measure of cancer facilities and infrastructure (ESMO, 2006). It is also a strong predictor of cancer survival across all cancer sites (breast $p = 0.04$, cervical $p = 0.03$, colorectal $p = 0.02$), apart from lung cancer.

The number of oncologists appears to be less relevant than the number of comprehensive treatment centres (e.g. breast $p = 0.23$). As noted previously in Chapter 2, the comparability of data on density of oncologists is weak, as there are clear differences in the definitions used across countries. The lack of a strong statistical relationship may therefore be misleading.

Practice of cancer care

According to the modelling results, health system characteristics such as timely access and evidence-based execution of cancer care are very important in explaining variations in survival across countries. Furthermore, in the case of breast cancer, certain screening programme characteristics are found important.

In terms of the early detection of cancer, the following screening programme characteristics are used as variables: access to screening tests (screening interval in years), the target population (age range), the lower age eligibility limit, nationwide coverage, national rollout completed five years before the end of time periods used in this analysis, and the provision of screening tests free of charge.

Turning to breast cancer specifically, the results indicate that significant features of an effective breast screening on cancer survival include a population-based programme with the national rollout completed before 1997 (Table 5.A3.1 in Annex 5.A3).

The main descriptors of the cervical screening programme are found to be weak and structural elements of the cervical screening programme appear to be less related to survival in comparison to the breast screening programme. This may be because cervical cancer screening detects pre-cancerous disease.

The average referral time (from primary care physician to specialist) and waiting time (from diagnosis to initial treatment) are used to assess the access to cancer care services. Based on the univariate analysis, both appear to be moderately robust predictors of

survival for breast and colorectal cancers (p = 0.06-0.09), and weak predictors for cervical and lung cancer.

One important policy variable examined is the appropriateness or effectiveness of care. The effectiveness of cancer care is estimated based on the proportion of patients who received optimal treatment (combined surgery, chemotherapy and radiotherapy) if diagnosed at an early/localised stage. This information is seldom published, and hence is based primarily on the qualitative evidence provided by cancer experts. The provision of optimal treatment seems to be strongly associated with the survival outcome, with significant p-values ≤ 0.05 across all cancer sites except lung cancer. This is more notable in the case of countries with a GDP below USD 20 000 per capita.

Without staging data it is also not possible to evaluate early detection initiatives properly and to assess whether improvements in survival are due to early detection rather than to treatment. In addition to improvements in diagnosis and treatment, temporal improvements in patient survival may be the result of "stage migration" due to enhanced diagnostic technologies and the consequent reclassification of patients (Dickman, 2006) or to changing patterns of diagnosis, including the detection of early-stage cancers that would never have become symptomatic (Welch, 2000). There is nevertheless increasingly strong evidence of the importance of stage at diagnosis on international differences in survival for cancers of the breast, colorectum and lung, as well as ovarian cancer (Maringe et al., 2012 and 2013; Walters et al., 2013).

Governance of cancer care

The introduction of National Cancer Control Plans (NCCPs), especially in the period from 2005-10, is a relatively new development within the broader field of health system governance. There has clearly been an increased interest in evaluating the outcomes of cancer control in recent years (Micheli, 2011). These plans are intended to help carry out cancer control effectively by paying appropriate attention to organisation, financing and resource provision. The NCCPs typically aim to decrease the risk of cancer, detect cancer earlier, ensure effective treatment and improve the quality of life for patients, but the objectives and priorities are tailored to the specific context of the country. Although the service delivery dimension is reasonably well articulated in the majority of NCCPs, other elements, in particular financing, resource allocation and governance issues, remain less well defined (Atun, 2008).

As previously stated in Chapter 4, most countries involved in this analysis had not introduced an NCCP before 2002. Instead of using NCCP as a categorical variable in the modelling, this analysis explores whether improved health outcomes could be achieved by incorporating the following characteristics often found in NCCPs: setting up cancer-specific targets and timeframes; making additional funding available to achieve these objectives; assigning a lead person or organisation to oversee implementation; putting quality assurance and control mechanisms in place for cancer care; co-ordinating care and developing networks for service delivery; identifying the key milestones and timeframes; monitoring progress; and making someone responsible for meeting objectives. Other characteristics of governance were also assessed, such as licensing, accreditation and the existence of national cancer guidelines.

The results show a considerable variation in the level of importance of explanatory variables across the four cancer types and over time (Tables 5.A3.1-5.A3.4 in Annex 5.A3).

Based on the models for which the test statistics are statistically significant, the following five characteristics seem to be most commonly associated with an effective cancer care system and good survival outcomes: setting up the key milestones and timeframes, monitoring the progress, developing national guidelines, introducing case management and putting quality assurance mechanisms in place for cancer care. These cancer policy characteristics are positively correlated with survival for all cancer types. The other characteristics appear to be significant for particular types only, such as setting targets for cervical cancer. For lower income countries with GDP per capita below USD 20 000 per capita, the development of national cancer guidelines is found particularly important for higher survival (Tables 5.A3.5-5.A3.8 in Annex 5.A3).

Results of multivariable analysis at the domain level

Multivariable fractional polynomials (FP) modelling (Box 5.1) was performed to investigate the effect of selected variables within each of the three domains (resources, practice and governance) on cancer survival. The five-year relative survival was the chosen metric of outcome and fitted models included a subset of explanatory variables listed in the section at the beginning of the chapter. Only the variables which had p-value less than 0.35 in the univariate analysis were included in the models and then they were further selected based on the backward elimination for each domain and for each cancer.

Resources for cancer care

Based on the analysis within resources for cancer care, the combination of four explanatory variables below were found to explain most of differences in cancer survival:

- Total national expenditure on health (TNEH),
- number of new cancer drugs in clinical use,
- number of CT scanners per million population divided by GDP per capita, and
- number of comprehensive treatment centres per million population.

Table 5.1 shows the results of multivariable analysis for different cancers. Results for fitted fractional polynomials models show statistically significant test statistics (p-value ≤ 0.01), apart from cervical cancer. The adjusted R2 values indicate that just less than half of the differences in cancer survival across countries may be explained by the available resources. More specifically for lung cancer, the model is statistically significant, and the adjusted R2 denotes that the combination of four variables (TNEH, pharmaceuticals in clinical use, CT scanners per million population divided by GDP per capita, comprehensive treatment centres) can explain 40% of the differences in cancer survival. TNEH and CT scanners per GDP appear to be significant explanatory variables. The marginal contribution of different types of resources is shown in Table 5.A4.1 in Annex 5.A4 and the magnitude of contribution by each resource is similar across cancers.

The results show that cancer survival is correlated with the total national expenditure on health, investment in technology, available innovative cancer drugs, and infrastructure. This finding should be considered together with those of several other international studies that assess the relationship between cancer survival and health system characteristics, which found that survival is associated with a country's income (Micheli, 2002 and 2003; Coleman, 2008; Verdecchia, 2008).

Table 5.1. **Multivariable analysis for cancer resources, p-value and adjusted R^2**

	Breast cancer	Cervical cancer	Colorectal cancer	Lung cancer
Model fit statistic(p-value)	0.000***	0.064*	0.0001***	0.003***
Adjusted R^2 (explained variation in %)	57.1	16.4	53.6	40.7
Variables (p-value):				
• Total national expenditure on heath per capita	0.000***	0.110*	0.000***	0.090*
• Cancer drugs in clinical use	n.a.	n.a.	n.a.	0.461
• CT scanners per million population per GDP	0.142*	0.087*	0.017**	0.001***
• Comprehensive treatment centres (three or more) per million population	0.032**	0.195	0.027**	0.350

Note: Level of significance * refers to $p < 0.15$, ** refers to $p < 0.05$ and *** refers to $p < 0.01$; n.a. = not available, variable is not included in the model.
Source: OECD HCQI Questionnaire on Systems of Cancer Care and *OECD Health Data*.
StatLink http://dx.doi.org/10.1787/888932866716

Practice of cancer care

The results of multivariable analysis (Table 5.2) indicate that significant descriptors of an effective breast screening programme, resulting in earlier identification of the disease and increased survival, are:

- Early national rollout (completed at least five years before the end of the time periods used in this analysis, i.e. 1997),
- population-based screening, and to a lesser extent,
- screening interval (every 1-2 years).

Table 5.2. **Multivariable analysis for cancer screening, p-value and adjusted R^2**

	Breast cancer	Cervical cancer
Model fit statistic(p-value)	0.009***	0.349
Adjusted R^2 (explained variation in %)	27.3	0.6
Variables (p-value):		
• Screening interval	0.168	n.a.
• Population-based screening	0.036**	n.a.
• Early national rollout	0.017**	0.396
• Low age limit	n.a.	0.342

Note: Level of significance * refers to $p < 0.15$, ** refers to $p < 0.05$ and *** refers to $p < 0.01$; n.a. = not available, variable is not included in the model.
Source: OECD HCQI Questionnaire on Systems of Cancer Care and *OECD Health Data*, *www.oecd.org/health/healthdata*.
StatLink http://dx.doi.org/10.1787/888932866735

According to the modelling results (Table 5.2), the most strongly associated descriptors of the cervical screening programme are:

- Early national rollout, and
- a low age limit (less than 25 years).

Table 5.3 shows the results of multivariable analysis for the practice of cancer care. For this analysis, composite screening scores for breast and cervical cancers are calculated based on the coefficients from the above models and they are included together with other independent variables identified important for the practice of cancer care in the models.

Certain characteristics of the access to services, including screening, waiting times and the reported optimal treatment, appear to be descriptors of good practices in the execution of cancer care. The adjusted R^2 indicates that the combination of practice of cancer care characteristics can explain around a third of differences in cancer survival on

Table 5.3. **Multivariable analysis for the practice of cancer care, p-value and adjusted R^2**

	Breast cancer	Cervical cancer	Colorectal cancer	Lung cancer
Model fit statistic(p-value)	0.0002***	0.067*	0.001***	0.330
Adjusted R^2 (explained variation in %)	52.5	18.6	42.9	1.2
Variables (p-value):				
• Breast cancer screening composite	0.114*	n.a.	n.a.	n.a.
• Cervical cancer screening composite	n.a.	0.839	n.a.	n.a.
• Referral time	0.149*	0.496	0.216	n.a.
• Waiting time	0.536	0.918	0.388	0.261
• Optimal treatment	0.000***	0.015**	0.001***	0.579

Note: Level of significance * refers to $p < 0.15$, ** refers to $p < 0.05$, *** refers to $p < 0.01$, and n.a. = not applicable or not available (variable is not included in the model).
Source: OECD HCQI Questionnaire on Systems of Cancer Care and *OECD Health Data, www.oecd.org/health/healthdata*.
StatLink http://dx.doi.org/10.1787/888932866754

average for breast, cervical and colorectal cancer. Lung cancer is an exception in that the p-values for these variables indicate a poor model fit.

For example, for breast cancer, the model is statistically significant. The adjusted R^2 indicates a strong predictive ability for the combination of four variables:

- screening composite (based on characteristics of screening programme),
- the referral time (from GP to specialist),
- the waiting time (from diagnosis to initial treatment), and
- optimal treatment.

Across cancers, the provision of optimal treatment is the only significant explanatory variable at the $p \leq 0.05$ level. The marginal contribution of different factors within practice of cancer care is available in Table 5.A4.2 in Annex 5.A4 but the magnitude of contribution by each factor varies across cancers. The availability of optimal treatment at the early stage has a large impact on survival of breast, cervical and colorectal cancers but not lung cancer.

Governance of cancer care

The results of modelling the governance characteristics vary considerably across cancer types (Table 5.4). While fitted models for breast and cervical cancers showed statistically significant test statistics (at the 0.05 level) and a relatively high predictive ability, the results for colorectal and lung cancers were less robust. However, the following five characteristics appear to be the common relevant explanatory variables for all cancers of interest:

- timeframes specified to achieve objectives/targets,
- monitoring of the stated objectives/targets,
- national guidelines,
- case management, and
- quality assurance.

Table 5.4 shows the results of multivariable models for the governance of cancer care for different cancers. For instance, for breast cancer, the model is statistically significant ($p = 0.02$). The adjusted R2 denotes that the combination of the five characteristics can explain around a quarter of differences in cancer survival. The marginal contribution of different factors within governance of cancer care is shown in Table 5.A4.3 in Annex 5.A4 and the magnitude of contribution by each factor is similar across cancers.

Table 5.4. **Multivariable analysis for the governance of cancer care, p-value and adjusted R^2**

	Breast cancer	Cervical cancer	Colorectal cancer	Lung cancer
Model fit statistic (p-value)	0.023**	0.007***	0.085*	0.129*
Adjusted R^2 (explained variation in %)	27.6	29.8	17.4	10.3
Variables (p-value):				
• Timeframe	0.118*	0.034**	0.107*	n.a.
• Monitoring	0.681	0.405	0.591	0.130*
• Guidelines	0.455	n/a	0.772	0.907
• Case management	0.447	0.180	0.593	0.269
• Quality assurance	0.340	n.a.	0.482	n.a.

Note: Level of significance * refers to $p < 0.15$, ** refers to $p < 0.05$ and *** refers to $p < 0.01$; n.a. = not available, variable is not included in the model.
Source: OECD HCQI Questionnaire on Systems of Cancer Care and *OECD Health Data*.

StatLink http://dx.doi.org/10.1787/888932866773

Multivariable analysis across domains

Multivariable FP modelling across domains illustrates that the contribution of each domain differs by cancer (Table 5.5). The independent variables with p-value below 0.35 based on univariate analysis were included in the model and they are further selected by backward elimination. The models perform best for breast and colorectal cancers ($p \leq 0.01$, Adj $R^2 \geq 60$).

Table 5.5. **The predictors resulting from multivariable modelling across domains**

	Coefficients			
	Breast cancer	Cervical cancer	Colorectal cancer	Lung cancer
Model P-value	0.00	0.01	0.00	0.00
Model AdjR^2	68	45	60	56
Variables (coefficients)				
Total national expenditure on heath per capita	0.003**	0.0002	0.002*	0.0002
CT scanners per million population per GDP	0.031**	0.044**	0.040**	0.044***
Comprehensive treatment centres (three or more) per million population	2.311	–	–	1.396
Breast cancer screening composite	0.313	–	–	–
Referral time	–	0.051	1.091	–
Optimal treatment	4.129*	5.020*	6.524**	1.094
Target	–	4.280	–	–
Timeframe	–	0.395	1.976	–1.936
Monitoring	0.440	–	–	2.780*
Case management	2.734*	3.894*	–	–
Cancer networks	–	–	1.617	2.237*

Note: Level of significance * refers to $p < 0.15$, ** refers to $p < 0.05$ and *** refers to $p < 0.01$; n.a. = not available, variable is not included in the model.
Source: OECD HCQI Questionnaire on Systems of Cancer Care and *OECD Health Data*.

StatLink http://dx.doi.org/10.1787/888932866792

Box 5.2 shows the best predictors of the survival outcome across the four cancer types based on the multivariable analysis across domains.

For all cancer types, the variables included in the resources domain explain more of the variation in survival than do the other variables (Table 5.5). The cancer practice variables are particularly important in explaining variations in breast, cervical and colorectal cancer, but have an insignificant effect on lung cancer. The governance variables are most significant in explaining breast, cervical and lung cancers.

Box 5.2. **The best predictors of the survival outcome by domain**

Domain explanatory variables

Resources

- Total national expenditure on health.
- CT scanners per million population divided by GDP per capita.
- Comprehensive cancer centres per million population.

Practice

- Cancer screening characteristics.
- Referral time ≤ 30 days from GP to specialist.
- Waiting time ≤ 30 days between diagnosis and initial treatment.
- Provision of optimal treatment.

Governance

- Targets.
- Timeframe.
- Monitoring.
- Case management.
- Cancer networks.

There are a number of possible reasons for the relatively poor explanatory power for differences in lung cancer survival. One factor is that lung cancer survival data are available only up to the year 2002, limiting the possibility for in-depth analysis. Furthermore, the fact that so few patients survive for more than five years may mean that real differences in the quality of care across countries are not adequately measured by these survival estimates. Clearly, more work is required to understand which explanation is most plausible.

The analytic technique chosen allows differences in cancer survival to be allocated to one of the three broad domains – resources, practice and governance. The results of modelling at the across-domain levels indicate that just under one-half of the differences in cancer survival can be explained by adequate resources and approximately one-third by good practice. Strong governance characteristics account for the remaining variation. The proportion of explained differences in survival is the unweighted average of the four cancer types.

Conclusion

Cancer survival varies substantially across countries. This reflects, among other factors, the performance of the health care system. Policy choices can lead to improved survival, but careful identification of which policies matter is necessary if policy makers are to make optimal choices.

The main contribution of this analysis is to characterise the national policies that are associated with different cancer outcomes. In this analysis, survival is the main outcome measure, and the patient's quality of life is not considered.

By using the available survival outcome data and an appropriate methodological approach, it has been found that a significant proportion of the variation in cancer survival can be "explained" by the three domains of cancer resources, cancer practice and cancer governance. All three broad domain groups appear to be significant, and some elements within these domains seem to be particularly important.

Survival is strongly related to a country's wealth and the level of health investment, especially for lower income countries. The relationship between resources and outcomes is weaker once a reasonable resourcing level has been reached. The better-performing richer countries with better cancer survival outcomes appear to have established cancer policy priorities, implemented key elements of cancer control, introduced integrated care processes and actively worked on the delivery of cancer services.

The analysis suggests which aspects of these domains are particularly important for achieving better outcomes. Even in the absence of an NCCP, the modelling results suggest that some policies prove to be effective if they incorporate specific characteristics of cancer control plans. Countries that reported considerably better survival seem to have more active policies and structures in place with respect to the co-ordination of care and the use of multi-disciplinary teams and case management.

There are a number of weaknesses in the work that could not be avoided, which supports a case for getting better information on cancer outcomes and on relevant cancer policies in the future. This particularly applies to more up-to-date data on cancer survival, staging information, cancer-specific expenditure and the level of compliance with guidelines. Further conclusions and recommendations are presented in Chapter 6.

Some policy conclusions that could be drawn from the analysis presented in this chapter on cancer resources, cancer practice and cancer governance are set out in Box 5.3.

Box 5.3. **Key policy points**

Resources

- Allocate sufficient expenditure for cancer care, detailing the level of funding, the scope of services, entitlements and coverage.
- Make adequate investment in the health infrastructure (such as comprehensive cancer centres).
- Make sufficient investment in diagnostic and treatment technology for cancer.
- Ensure timely authorisation, clinical use and access to innovative cancer drugs.

Practice

- Introduce screening programmes with a national rollout, effective coverage rates and appropriate target groups and intervals.
- Enable timely access to cancer care in terms of referral times and waiting times.
- Put in place mechanisms to ensure a high level of compliance with the evidence-based execution of cancer care.

Box 5.3. **Key policy points** *(cont.)*

Governance

- Ensure that certain characteristics of a cancer control system are incorporated into National Cancer Control Plans and strategies, such as setting up cancer-specific targets and timeframes, assigning a lead person or organisation to oversee implementation, putting quality assurance and control mechanisms in place for cancer care, ensuring adherence to guidelines, co-ordinating care and developing networks for service delivery, and monitoring progress to ensure the objectives are met.
- Create an appropriate regulatory environment to strengthen cancer control as well as mechanisms for performance management across all stages of the cancer care continuum.

Note

1. The following 31 countries participated in the analytical work by supplying complete information: Australia, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Malta, the Netherlands, New Zealand, Norway, Poland, Portugal, Singapore, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.

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ANNEX 5.A1

Methodologies for analysis

Backward elimination combined with an iterative algorithm that selects the best Fractional Polynomial (FP) transformation for each continuous variable was used to select variables with influence on the outcome and to remove redundant predictors (Royston, 1994; Sauerbrei, 1999). This approach also allowed a rigorous process for selecting variables and FP functions.

Simple power transformation of a covariate ($\beta_1 X^p$) is commonly used in data analysis when non-linearity is suspected. The conventional polynomial of degree m with powers $p = (1, \ldots, m)$ takes the form:

$$P(m) = \beta_1 X^1 + \beta_2 X^2 + \ldots + \beta_m X^m$$

Fractional polynomial of degree m with powers $p = (p_1, \ldots, p_m)$ is defined as:

$$P(m) = \beta_1 X^{p1} + \beta_2 X^{p2} + \ldots + \beta_m X^{pm}$$

The powers p are taken from a predefined set S = (-2, -1, -0.5, 0, 0.5, 1, 2, 3), where X^0 denotes log(X). The set includes no transformation ($p = 1$) and the reciprocal, logarithmic, square root and square transformation. The FP1 function models are fitted by using each of the eight values of p.

The FP2 function models with powers (p_1, p_2) are defined as:

$$P(m) = \beta_1 X^{p1} + \beta_2 X^{p2} + \ldots + \beta_m X^{pm}$$

or

$$P(m) = \beta_1 X^p + \beta_2 2X^p * \log(X)$$

The latter is the so-called repeated-powers model if $p_1 = p_2$. A total of 36 FP2 function models were fitted. In practice, higher order functions are rarely needed because 8 FP1 and 36 FP2 models provide a reasonably good fit in the modelling procedure.

The best fitting model was selected based on the highest likelihood. The significance test was performed by comparing the deviance difference with an X^2 distribution of the first degree of freedom.

The following procedure was used to select variables and FP function (Ambler, 2001; Royston, 2005).

First, the best fitting FP2 model was compared with one from which the variable in question has been omitted. If the p-value from this test was not significant, the variable was omitted from the model.

Second, non-linearity of the effect of the variable was tested by comparing the FP2 model with the linear one. The linear model was accepted if the test statistic was not significant.

Third, a comparison was made between FP2 and FP1 models. In the case of a not significant p-value, the simpler FP1 function was chosen. Otherwise, the more complex FP2 function was selected.

This approach allowed distinguishing between factors of main interest and confounders. Most commonly, a nominal p-value of 0.05 was used for variable selection, but a higher one of up to 0.15 for confounders (Dales, 1978; Mickey, 1989).

The explanatory variables that best predict the outcome variable at the domain level were selected by using these multivariable fractional polynomial models. The goodness of fit was estimated as the proportion of variation in the outcome variable explained by the model.

ANNEX 5.A2

Variables used in explorative analysis

ACCRED	Accreditation
ADDFIN	Additional financing for the implementation of NCCP
CASEM23	Case management
CASEMNGT	Cancer networks
COORD24	Coordination
CT_GDP	Computer tomography scanners per 1 million population and GDP
DRUG_CLIN	Clinical use of selected (n = 10) innovative cancer drugs
DRUG_FRE	Provision of at least three out of ten innovative cancer drugs free of charge
DRUG_HERC	Clinical use of Herceptin
GLOBO_BRST	Clinical use of innovative cancer drugs (GLOBOCAN study)
GLS	Guidelines
LICENS	Licensing
MONIT	Monitoring
NCCP	National Cancer Control Plan
ONCO	Number of oncologists per 1 million population
ONCO2	Number of oncologists per 1 million population > 10
OPTTH	Provision of optimal treatment > 80% patients
PET	Positron emission tomography scanners per 1 million population
QA	Quality assurance
RESPON	Responsibility
SCRB_FRE	Screening programme, provision free of charge
SCRB_INT	Screening programme, interval
SCRB_LOW	Screening programme, low age limit
SCRB_NAT	Screening programme, national rollout
SCRB_POP	Screening programme, population coverage
SCRB_R97	Screening programme, introduction before 1997
SCRB_RNG	Screening programme, age range

STEWARD	Stewardship in cancer care and control
STRAT	National cancer strategies
SUMBC	Breast cancer screening programme composite score
SUMCC	Cervical cancer screening programme composite score
TARG	Cancer targets or objectives
THC	Number of comprehensive cancer centres per 1 million
THC2	Number of comprehensive cancer centres per 1 million > 3
TIMEFR	Timeframes
TNEH	Total National Expenditure on Health
WT_REF	Referral time < 30 days (from GP to specialist)
WT_TH	Waiting time < 30 days (from diagnosis to treatment)

ANNEX 5.A3

Results of fractional polynomials univariate analysis

Table 5.A3.1. **Fractional polynomials univariate analysis, breast cancer in 2002**

Variable	P-value	Adj. R^2
GDP	0.00	48
TNEH	0.00	49
DRUG_HERC	0.14	4
DRUG_FRE	0.27	1
GLOBO_BRST	0.21	4
PET	0.05	13
PET2	0.35	0
ONCO	0.23	4
ONCO2	0.14	5
THC	0.04	16
THC2	0.03	13
SCRB_POP	0.02	14
SCRB_NAT	0.29	1
SCRB_R97	0.02	16
WT_REF	0.06	9
WT_TH	0.09	7
OPTTH	> 0.35	47
TARG	0.14	4
TIMEFR	0.01	19
MONIT	0.02	14
GLS	0.01	21
CASEM23	0.14	4
CASEMNGT	0.02	14
QA	0.17	17

StatLink http://dx.doi.org/10.1787/888932866811

Table 5.A3.2. **Fractional polynomials univariate analysis, cervical cancer in 2002**

Variable	P-value	Adj. R^2
GDP	0.00	34
TNEH	0.00	29
DRUG_FRE	0.22	2
CT_GDP	0.13	7
PET	0.14	7
PET2	0.26	1
THC	0.03	19
THC2	0.19	3
SCRC_LOW	0.24	1
SCRC_R97	0.27	1
WT_REF	0.27	1
WT_TH	0.29	1
OPTTH	0.02	26
TARG	0.03	12
ADDFIN	0.23	2
TIMEFR	0.00	27
MONIT	0.02	16
CASEM23	0.04	10
ACCRED	0.07	7

StatLink http://dx.doi.org/10.1787/888932866830

Table 5.A3.3. **Fractional polynomials univariate analysis, colorectal cancer in 2002**

Variable	P-value	Adj. R^2
GDP	0.00	45
TNEH	0.00	42
DRUG_CLIN	0.28	1
DRUG_FRE	0.13	5
CT_GDP	0.18	5
PET	0.02	21
PET2	0.18	3
ONCO2	0.17	3
THC	0.02	21
THC2	0.04	11
WT_REF	0.09	7
WT_TH	0.06	10
OPTTH	0.00	40
TARG	0.16	4
TIMEFR	0.01	19
MONIT	0.03	13
GLS	0.03	12
CASEMNGT	0.09	6
QA	0.04	10

StatLink http://dx.doi.org/10.1787/888932866849

Table 5.A3.4. **Fractional polynomials univariate analysis, lung cancer in 2002**

Variable	P-value	Adj. R^2
GDP	0.07	12
TNEH	0.07	12
DRUG_CLIN	0.25	1
DRUG_FRE	0.30	0
GLOBO_LUNG	0.27	2
CT_GDP	0.00	35
PET	0.13	8
PET2	0.13	5
WT_TH	0.16	4
OPTTH	0.30	0
NCCP	0.13	5
TIMEFR	0.35	0
MONIT	0.05	11
GLS	0.16	4
CASEMNGT	0.08	7
LICENS	0.34	0

StatLink http://dx.doi.org/10.1787/888932866868

Table 5.A3.5. **Fractional polynomials univariate analysis, breast cancer by GDP level in 2002**

Variable	Low GDP (n = 11) P-value	High GDP (n = 20) P-value
GDP	0.27	> 0.35
TNEH	> 0.35	0.09
DRUG_FRE	0.27	0.32
CT_GDP	0.05	0.11
PET	0.08	0.07
ONCO	0.10	0.03
ONCO2	> 0.35	0.16
THC	0.30	0.21
THC2	0.08	0.20
SCRB_INT	> 0.35	0.24
SCRB_RNG	> 0.35	0.12
SCRB_LOW	0.25	0.06
SCRB_POP	0.09	> 0.35
SCRB_R97	> 0.35	0.08
SCRB_FRE	0.26	> 0.35
WT_REF	0.34	> 0.35
OPTTH	0.04	0.07
ADDFIN	0.23	0.02
TIMEFR	> 0.35	0.20
MONIT	> 0.35	0.25
CASEMNGT	> 0.35	0.34
QA	0.35	> 0.35
LICENS	> 0.35	0.20
ACCRED	0.06	> 0.35

StatLink http://dx.doi.org/10.1787/888932866887

Table 5.A3.6. **Fractional polynomials univariate analysis, cervical cancer by GDP level in 2002**

Variable	Low GDP (n = 11) P-value	High GDP (n = 20) P-value
GDP	0.16	> 0.35
TNEH	0.21	> 0.35
DRUG_FRE	0.18	> 0.35
CT_GDP	0.08	0.13
PET	0.04	> 0.35
ONCO	> 0.35	0.34
THC	0.22	0.06
THC2	0.06	> 0.35
OPTTH	0.03	> 0.35
TARG	0.07	> 0.35
STEWARD	> 0.35	0.20
TIMEFR	0.05	0.11
MONIT	> 0.35	0.10
CASEM23	0.31	0.11
CASEMNGT	> 0.35	0.22
COORD24	0.09	0.06
QA	> 0.35	0.08
ACCRED	0.00	> 0.35

StatLink http://dx.doi.org/10.1787/888932866906

Table 5.A3.7. **Fractional polynomials univariate analysis, colorectal cancer by GDP level in 2002**

Variable	Low GDP (n = 11) P-value	High GDP (n = 20) P-value
GDP	0.12	> 0.35
TNEH	> 0.35	0.16
DRUG_FRE	0.11	0.18
CT_GDP	0.01	0.02
PET	0.02	0.05
ONCO	0.18	> 0.35
THC	0.29	0.21
THC2	0.08	0.28
OPTTH	0.01	> 0.35
STRAT	> 0.35	0.31
TARG	0.29	> 0.35
ADDFIN	0.35	> 0.35
TIMEFR	> 0.35	0.28
COORD24	0.29	0.12
QA	0.14	> 0.35
ACCRED	0.03	> 0.35

StatLink http://dx.doi.org/10.1787/888932866925

Table 5.A3.8. **Fractional polynomials univariate analysis, lung cancer by GDP level in 2002**

Variable	Low GDP (n = 11) P-value	High GDP (n = 20) P-value
GDP	0.11	> 0.35
TNEH	0.14	> 0.35
GLOBO_LUNG	0.04	> 0.35
CT_GDP	0.01	0.00
PET	0.26	> 0.35
PET2	0.28	> 0.35
WT_TH	> 0.35	0.31
OPTTH	0.01	0.30
NCCP	0.28	0.29
TARG	> 0.35	0.16
STEWARD	0.20	> 0.35
MONIT	0.09	> 0.35
GLS	0.05	> 0.35
CASEMNGT	0.08	> 0.35
COORD24	0.20	0.05
QA	0.23	0.18

StatLink http://dx.doi.org/10.1787/888932866944

ANNEX 5.A4

Results of fractional polynomials multivariable analysis

Table 5.A4.1. **Fractional polynomials multivariable analysis, resource in 2002**

Variable	Coefficients			
	Breast cancer	Cervical cancer	Colorectal cancer	Lung cancer
TNEH	0.004	0.002	0.004	0.001
CT_GDP	0.023	0.035	0.042	0.387
THC2	4.495	3.410	5.150	1.231
DRUG_CLIN	–	–	–	1.456

StatLink http://dx.doi.org/10.1787/888932866963

Table 5.A4.2. **Fractional polynomials multivariable analysis, practice in 2002**

Variable	Coefficients			
	Breast cancer	Cervical cancer	Colorectal cancer	Lung cancer
SUMBC/SUMCC	0.456	0.160	–	–
WT_REF	3.963	2.247	3.915	–
WT_TH	1.317	0.265	2.149	1.928
OPTTH	6.885	6.713	9.022	0.949

StatLink http://dx.doi.org/10.1787/888932866982

Table 5.A4.3. **Fractional polynomials multivariable analysis, governance in 2002**

Variable	Coefficients			
	Breast cancer	Cervical cancer	Colorectal cancer	Lung cancer
TIMEFR	4.334	5.353	5.147	2.608
MONIT	1.232	2.182	1.851	–
GLS	2.282	–	1.013	0.213
CASEMNGT	2.241	–	1.801	1.881
QA	2.688	–	2.268	–
CASEM23	–	2.991	–	–

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Chapter 6

Policy recommendations

Chapter 6 sets out what governments should do to reduce the burden of cancer and improve performance of cancer care systems in their countries. The recommendations are based on different approaches countries have taken in tackling cancer in terms of resources, practice and governance, and associations found between particular policy approaches and the best survival for breast, cervical, colorectal and lung cancer.

Introduction

This chapter provides recommendations for organising and governing cancer care systems based on the findings of Chapters 2-4, which looked at differences in the approaches countries have taken in tackling cancer (in terms of resources, practice and governance), and Chapter 5, which explored associations between particular policy approaches and the best survival for breast, cervical, colorectal and lung cancer, to build policy recommendations.

Allocating resources adequately and effectively to ensure fair and affordable access to cancer care

Cancer care consumes a significant portion of the national spend on health care, but increasing the resource investment in cancer care, including in medical devices and institutions, is associated with better survival. This association is particularly strong at lower spending levels, emphasising the importance of adequate resource allocation for countries in this group. Countries need to develop forward-looking policies and use and invest in cancer care resources both effectively, through cost-effectiveness assessments, and fairly, by giving adequate support, particularly to the vulnerable. Then, when challenges emerge, flexible and timely policy responses are needed.

Strategic planning and flexible policy responses

The development of institutional and professional capacity requires forward-looking planning. Planning should follow a comprehensive approach that examines changing demands for cancer care and challenges related to supply of health workforce, institutional capacity, medical technologies and medical practices. For example, policies on medical devices have important organisational implications for cancer care systems, such as training the workforce and inter-facility agreements on the shared use of the technology.

Policies also need to respond to specific local needs, as population profiles and geographic settings are often region-specific. In order to ensure high-quality cancer care and to increase efficiency, a number of countries have pursued more centralised cancer care delivery by concentrating resources and expertises at specialised institutions, but the best strategies to make gains in efficiency through specialised care delivery seem to differ across countries, particularly due to differences in geographic access to cancer care and the organisation of health care. The appropriate approach needs to be identified for each country in order to maximise the benefit of specialised care delivery while promoting care co-ordination among different providers. Local needs also need to be assessed for developing policies, particularly for medical devices and professionals, as unequal distributions are often reported.

Even if policies have been developed in a forward-looking manner, they may become outdated due to changing demand for cancer care and challenges that emerge unexpectedly, hence countries need to respond flexibly by implementing timely policy

changes. Many countries face challenges around shortages of medical devices, professionals and institutions and inadequate access to these. For example, as developing specialist training and institutional capacity takes time, countries have adopted flexible policies, such as promoting and increasing the role of nurses and other professionals and providing financial support for travel to health care facilities to compensate the increased cost to patients. As cancer survivors increase in numbers, demand for follow-up and palliative care in outpatient settings and at home may increase, so besides increasing the role of nurses, countries may need to invest more resources to deliver such care, such as expanding the role of GPs.

Purchasing medical devices effectively and efficiently

Decisions on allocating resources to cancer care can quickly become politically charged. New therapeutic options are always emerging in the field of cancer care, and patients are understandably keen to have the complete range of treatment options available to them. Nevertheless, given the finite nature of resources, every investment decision means that other treatments must be given up, whether in cancer care or in other fields of health care. Therefore, countries are advised to invest according to effectiveness by conducting Health Technology Assessments (HTAs).

Robust and transparent mechanisms are needed around HTAs. The mechanisms need to ensure that only cost-effective, or comparatively effective, drugs and technologies are taken up and, where possible, that disinvestment occurs where procedures are poorly cost-effective or are poorly effective compared to other options. Such mechanisms have been developed for drugs in many countries, but further progress would be beneficial, particularly for equipment, as some countries appear to have an excessive supply of some diagnostic equipment and overuse of diagnostic services.

Due to sensitivities concerning the uptake of new medical devices, it is also important to have an independent and transparent mechanism by which to judge the marginal benefit of a novel therapeutic option. Many countries already have independent mechanisms, but such mechanisms should be as transparent as possible and, although unavoidably technical, should also involve patient and public representation.

Delays in assessing the value for money of new treatments are another source of inefficiency, and should be minimised. Some delay is inevitable – rigorous trials of drug safety cannot be compromised, but delays in statutory approval processes once safety and effectiveness has been established can be harmful and costly. In order to reduce regulatory delays, countries can pursue cross-national harmonisation and mutual recognition of the approval process. Both the European Medicines Agency and the Australia/New Zealand Therapeutic Products Authority are examples of successful joint regulatory schemes, and similar efforts could be undertaken in other parts of the world. Furthermore, financial resources need to be secured to allow the uptake of new but safe and effective drugs, and some countries have established separate financial arrangements or changed payment responsibilities to achieve this.

Ensuring fairness and affordability

Cancer care is often expensive, and patients, particularly vulnerable groups, may limit their recourse to health care for high and low value treatments indiscriminately or defer health care use if adequate financial support is not provided. In particular, patients are likely to forego preventive care, as sometimes they do not recognise the value of diagnosing

latent cancers early. It is noteworthy that cancer survival often differs by socio-economic background within countries.

The extent of financial support that each country can provide is different due to varied financial resources and health system challenges, but countries need to identify an adequate level of support for the population and ensure fair and affordable access to high-quality cancer care across population groups. It is important that out-of-pocket costs are removed or reimbursed for screening services, as is already done in many countries. Beyond screening, countries differ with regards to support for out-of-pocket payments; some countries are able to provide cancer care completely free to patients, while others have cost-sharing arrangements for patients. A number of countries focus on ensuring affordable access to expensive medicines, while a few others follow strategies of evidence-based and effective drug use, possibly limiting access to drugs. Adequate cost-sharing rules need to be identified for cancer patients, while taking into account the finiteness of financial resources in health systems for patients with different health conditions and diseases.

It is important to ensure fair and affordable access to cancer care for the vulnerable, including those with high health care spending and those on low incomes. Many countries usually provide financial support for the poorer segments of the population, but the extent of support varies across countries, and it may not be sufficient for some patients in some countries. In addition, to ensure fair access, many countries challenged by problems with geographic access to care also provide financial support for travel to receive health care, but again the amount of support may be too limited in some countries. Adequate levels of financial support need to be identified and provided for vulnerable groups so that they do not forego treatment due to financial reasons.

Promoting best practice in cancer care: doing the right thing at the right time

As Chapter 3 illustrates, countries need to make sure that they provide effective, high-quality cancer care throughout patient pathways. Prevention is an important and effective intervention for cancer control, reducing risk factors and delaying the onset of disease. Early diagnosis and timely and evidence-based care are critical for patients during the phases of recovering from and living with cancer, and improves survival. In addition, more effort can be made within the cancer care systems as well as labour markets to ameliorate the quality of life of cancer survivors and of patients and their carers.

Promoting prevention and early diagnosis

As discussed in Chapter 3, many countries have been introducing prevention policies to avoid and delay the onset of cancer, but further efforts can be made to improve life styles and reduce cancer incidence. Many countries have successfully reduced smoking rates over the past decades through anti-smoking policy measures, and lung cancer incidence has been declining recently. But additional efforts can be made to reduce well-established risk factors for cancer such as obesity, as one-third of cancers are still considered preventable (Koutsokera et al., 2013). In order to increase policy impact, countries need to design prevention measures that improve public participation, promote long-lasting prevention effects, and generate social multiplier effects through a mutual reinforcement of healthy life styles within families and peers (Sassi, 2010). The implementation of multiple prevention policies is also needed, as this effectively generates effects over different time horizons.

Perhaps the most critical element in improving an individual's chances of surviving cancer is early diagnosis and a quick start to treatment. Countries have been promoting the implementation of nationwide population-based screening in the past decades, particularly for breast cancer and, in recent years, colorectal cancer too, and these efforts have led to high screening coverage in at least some countries. Strategies for cervical cancer are divided and several countries pursue early diagnosis through screening and/or provide vaccination.

Screening should be offered only if it proves to reduce mortality, cost-effectiveness is acceptable and high quality is assured (European Union, 2003). Countries may wish to consider whether the depth and breadth of national screening programmes (the age range covered and the frequency of examination, for example) and the methods of invitation are adequate for covering the target population effectively and efficiently. They also need to take account of potential risk of overdiagnosis and false-positive results and the role of informed decision making in screening programmes.

Once countries decide to implement screening programmes based on evidences, further supply side efforts can be made, such as providing incentives based on well-designed pay-for-performance schemes and performance assessment feedback to providers and developing quality assurance mechanisms. On the demand side, countries can make additional efforts to involve and educate the public. This is particularly important, because they are the prime producers of their own health. Countries can increase public awareness, particularly among the disadvantaged, about the benefit and harm of regular screening through awareness-building campaigns and interventions.

As the possibility of new prevention and early diagnosis methods emerges, such as HPV vaccinations for cervical cancer and screening for colorectal cancer, countries should also invest and develop programmes according to local assessments of needs and cost-effectiveness.

Enhancing the evidence-based, timely delivery of cancer care

The care cancer patients receive should be based on evidence and current best practice, without exception, and appropriate financial incentives need to be provided to promote such care delivery. As described in Chapter 3, adherence to evidence-based cancer care is variable across countries and also across regions within some countries, leading to different cancer outcomes. To reduce the likelihood of unacceptable variations in care standards or processes, countries should develop national clinical guidelines around the management of the most common cancers. The quality of care can also be improved and efficiency enhanced by multidisciplinary care at specialised centres, thereby pooling the expertise of different specialists and ensuring that each centre has sufficient patient volumes to support safe, effective and continuously improving care. Similarly to screening, financial incentives, quality assurance mechanisms and monitoring and evaluation, including feedback to providers, should also encourage improvements in quality, and further efforts in these areas can be made.

Once cancer is diagnosed, patients need to access high-quality care in a timely manner. Waiting times to see a cancer specialist and to start surgical, radiotherapeutic, chemotherapeutic or combination treatment should be minimised, but variations persist within and across countries. Significant socio-economic differences in cancer survival are often reported due to differences in access and waiting times (Verdecchia, 2008; Souliotis et al.,

2009; Lejeune, 2010). Hence, countries should be able to respond to evidence of geographic or socio-economic inequalities in access (Athanasakis et al., 2012).

Countries should develop a clear understanding of the pattern of excessive or inequitable waiting times for cancer care in their population and respond with policies suited to the local context. Long waiting times are often caused by shortages and unequal distributions of resources along with inefficient referral systems. One easy solution to resolve waiting times may be increasing the investment in resources such as medical devices, but different policies can be pursued. A number of countries established maximum waiting time guarantees and have set up fast-track pathways. Countries are also seeking to increase efficiency through enhancing care co-ordination and streamlining cancer care delivery pathways. Promoting care co-ordination is particularly important as cancer care is not provided only at specialised centres, but often in the community, where patients live and their support system exists. Furthermore, the monitoring and evaluation of waiting times is also key to ensuring the timely delivery of cancer care. Countries with higher waiting times need to examine these policy options and implement policies suited to the local context.

Supporting labour market activities and providing services to improve the quality of life of patients and carers

The report mainly focuses on care that has some association with cancer patients' survival and mortality, but it is also critical for countries to ensure the quality of the patients' lives. Like any other patients requiring continued health care, cancer patients across countries often face the risk of losing their jobs and of reduced working hours during and after treatment. In the United States, for example, the likelihood of breast cancer survivors working after treatment was lower than that of women without cancer (Bradley et al., 2005; Hassette et al., 2009). A Korean study had similar findings, and the working survivors also reported reductions in wages, working hours and opportunities for promotion (Ahn et al., 2009). Hence, beyond the boundary of the cancer care systems *per se*, additional supports are needed for cancer patients and survivors.

Countries need to implement measures to utilise the active participation by cancer patients and survivors who are willing to take part in labour market activities. Many countries are facing population-ageing, leading to shrinking labour force populations and an expected increase in cancer incidence in the coming years. Several countries have introduced measures to support cancer patients and survivors, such as facilitating the uptake of sick leave and handicap subsidies, but further efforts are needed across countries. Psychological support, including counselling, is also critical to better labour market outcomes (Carlsen et al., 2008).

Furthermore, countries need to deliver high-quality services for cancer patients at the end of life. A number of countries deliver palliative care at home as well as in other settings, including hospices, nursing homes and specialised palliative institutions. But a few countries are still lagging behind, and the infrastructure for these services needs to be developed further.

Countries also need to assure the quality of life of families and other carers. Caring for cancer patients can be challenging; for example, a study in Canada found that 5% of informal caregivers of breast cancer patients had quit their jobs or declined a promotion (Grunfeld et al., 2004). A number of countries have different labour market and tax policies

to support carers, such as paid leave, flexible work schedules, tax credits and exemptions and income supplements (Colombo et al., 2011; Gerkens and Merkur, 2010; Marchildon, 2005; Rosen and Samuel, 2009; Chun et al., 2009). Countries can also provide counselling and psychological and moral support.

Strong governance: Ensuring quality and continuously improving care

In order to seek ongoing improvements in how cancer care is provided and in the outcomes such as survival and quality, countries need to pursue a consistent policy approach and develop strong governance that addresses the specific challenges they face. As a way of strengthening the governance of cancer care, countries should spell out the ambitions and values of their cancer care systems in cancer control plans. Countries are also advised to develop targets and guidelines to operationalise the plans together with various stakeholders and to strengthen monitoring arrangements, to demonstrate whether the goals are being met. Quality assurance (QA) mechanisms can identify and reward good practice or take action when standards are not being met.

Steering cancer control with operationalisation plans agreed by various stakeholders

The bedrock of governance is a national cancer control plan. NCCPs can focus political and public attention on the performance of the cancer care system and on unwarranted variations in outcomes, and they can attract new resources and force debate on difficult topics, such as resource allocation. They also offer opportunities to consider cancer care in the round (bringing in social care, for example), thereby improving quality across the entire care pathway, and to reinforce the common goals shared by patients, medical professionals, researchers and other stakeholders at the national and regional levels. The quantitative analyses in Chapter 5 show that having an NCCP in place is associated with improvements in survival for cancer.

But developing an NCCP may not be an appropriate solution for all countries. Some countries set up targeted cancer strategies, effectively addressing specific challenges, and these targets are sometimes integrated into broader national health policies. In addition, cancer care remains governed at the regional level in some countries. Hence, depending on the organisation and governance of the health care system, the most suitable policy framework for cancer control needs to be identified and operationalised.

Cancer care is complex and involves many different stakeholders: when developing targets and guidelines to operationalise cancer control efforts, all the stakeholders should be involved to ensure that implementation is as effective as possible. For example, regional stakeholders should be involved during the development of an NCCP in order to increase its impact, as they know local needs and are often health care providers themselves. Patient groups should also be closely involved to ensure that the patient perspective is heard and that there is scope for responding to patient preferences across the care pathway.

Strengthening monitoring and reporting while minimising administrative burdens

If national targets and guidelines are set to operationalise cancer control efforts, robust monitoring must follow. Good monitoring allows patients, providers and payers to assess whether the system is delivering cancer care that is effective, safe, responsive and accessible in an efficient and equitable manner.

Given the shortages of cancer equipment and the inadequate distribution reported in some countries, regular monitoring and evaluation of the use of the equipment, facilities and workforce may need to be undertaken to develop policies to ensure that access to cancer care is equitable and matches need irrespective of location, wealth, ethnicity or other socio-economic dimensions.

Additional efforts are also needed to monitor the quality of cancer care. Some countries have been monitoring different quality dimensions of care such as the effectiveness of key treatments and the patient-centeredness of cancer care, as is described in Chapter 4, and such efforts should be continued. Alongside this, patient safety is another core dimension of high-quality cancer care, but our picture of the safety of patients undergoing cancer care remains very incomplete. For instance, it is not always clear whether an unsafe event (such as a deep vein thrombosis) occurred before or during admission or was associated with an episode of cancer care or some other diagnosis. In order to promote high-quality cancer care, further work needs to be done to ensure the systematic measurement and assessment not only of effectiveness and patient-centeredness but also of patient safety.

Publishing performance data can also serve to focus minds and resources and initiate change, and further efforts can be made in this area. Reporting performance assessments will encourage providers to make quality improvements and will also facilitate informed patient choice, which also leads to further quality improvements.

Monitoring may add administrative burdens and this needs to be minimised. A growing number of countries monitor evidence-based drug use, evidence-based care delivery and the timeliness of cancer care, which often add to administrative burdens as these assessments sometimes require specific information such as the effectiveness of particular treatmentregimes on specific patient groups. These monitoring efforts have often led to quality improvements, but efforts should be made to minimise the administrative burdens associated with monitoring.

Promoting quality assurance through feedback mechanisms for strong governance

Robust QA mechanisms are the final strand in the strong system of cancer care governance needed to underpin ongoing improvements in care. QA programmes are particularly important to safeguard quality: through accrediting cancer services and facilities and licensing the clinical workforce, identifying and rewarding good practice, and taking action when standards are not being met.

QA mechanisms have been developed in subsystems such as use of cancer drugs and evidence-based and timely delivery of cancer care, but system-level QA mechanisms are often less robust and may lack associated correction measures. Introducing more vigorous QA mechanisms may appear difficult, but countries should start by setting up stronger feedback mechanisms for providers to encourage their performance and quality improvement.

Demonstrating and promoting success through better data

To improve cancer care systems, monitoring and benchmarking is important not only at the national but also at the international level. As shown in Chapters 1-4, international comparison reveals the large variations across countries in cancer outcomes, cancer care resources and practices, and the governance of cancer care systems. International

comparison allows identification of the strengths and weaknesses of each country's cancer care systems.

Countries are hampered, though, by the shortage of data in making assessments of whether they are reaching targets and are performing well or instead compare badly with other countries. Several steps could help to improve cross-country reporting on the performance assessments of cancer care systems as detailed below.

Improving the outcome measures of cancer care systems

To assess the success of their fight against cancer, policy makers should consider investing more in cancer registries to collect internationally comparable survival estimates by cancer stage. Many countries are able to provide comparable cancer survival data for all patients diagnosed as a group, but success of treatment is critically dependent upon the stage of disease at which treatment starts. Therefore, staging information at diagnosis is needed to understand whether changes in survival are due to earlier detection or to better treatment. Although an increasing number of national cancer registries collect staging information, the definitions and robustness vary, and achieving comparability across countries remains a major challenge (Box 6.1).

Box 6.1. **Cancer registries across countries**

Many countries have established cancer registries and they include Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, England, Finland, France, Germany, Iceland, Ireland, Israel, Japan, Korea, Malta, the Netherlands, New Zealand, Norway, Poland, Singapore, Slovenia, Sweden and the United States but data coverage and availability vary across countries.

Several countries have national registries. For example, Finland has a well-established national cancer registry and all providers are obliged to report to the registry. Information on remissions and relapses is also reported. In Sweden, each cancer centre has its own quality registry, covering 20 different cancers, and the National Cancer Registry in the National Board of Health and Welfare oversees the national trend and regional differences in cancer control, using data across all oncology centres. The Korea Central Cancer Registry is a hospital-based nationwide cancer registry, covering the entire population.

Region-specific cancer registries are available in some countries. In Poland, cancer registry compiles data from local registries and publishes national data regularly while in France, cancer registries collect data regionally and country-level survival by cancer is calculated using 15 district registries. Spain does not have a National Cancer Registry, and the existing 13 regional cancer registries provide 26% coverage of the population. In Switzerland, cancer registries are established in a number of cantons. The National Institute for Cancer Epidemiology and Registration tries to harmonise cantonal cancer registries to analyse data and to establish registries in remaining cantons. In Japan the coverage of cancer registries varies across regions, and data from these sources cannot be linked at the patient levels easily.

Cancer registries in some other countries also do not have the national coverage. In the United States, the SEER programme collects and publishes cancer incidence and survival from population-based registries covering 26% of the US population reports.

Box 6.1. **Cancer registries across countries** *(cont.)*

Stage at diagnosis is collected in a number of countries including the Czech Republic, Denmark, Ireland, Korea, the Netherlands, Norway, Singapore, Slovenia, Sweden, Switzerland and the United States. In the Czech Republic, and Sweden, stage information is collected by using TNM classifications. Danish Cancer Registry also collects stage information based on TNM and SEER classifications while in Norway, cancer registry collects stage information by TNM classification for colorectal, ovarian and breast cancers and by SEER high-level classification for the other cancers. In the Netherlands, cancer registries have collected and reported data on stage and outcomes since 1986. But in some countries such as Hungary, Ireland, Korea, Malta and Poland stage at diagnosis is not complete.

Several countries were able to calculate survival by stage by 2010, and they include Austria, Belgium, the Czech Republic, England, Finland, Iceland, Ireland, Israel, Japan, the Netherlands, New Zealand, Norway, Singapore, Slovenia, and the United States. In Iceland, it is possible only for breast and cervical cancers.

Cancer registries in several countries collect treatment and outcome data, allowing analysis on the effectiveness of cancer care interventions. For instance, in Slovenia and Sweden, registries have been collecting treatment and outcome data, including remission and relapse while in Switzerland, treatment and outcome data are available in some cantonal registries. Furthermore, in the United States, 17 SEER registries routinely collect data on first course of treatment, and active follow-up for vital status, besides patient demographics, primary tumour site, tumour morphology and extent of disease.

Source: OECD HCQI Systems of Cancer Care.

Internationally co-ordinated efforts are also needed to improve the timeliness, accuracy and comparability of staging and survival data. The joint IARC/CONCORD-2 initiative, which aims to collect extensive information from cancer registries across the world, is of particular importance in this regard.

Knowing the spend on cancer care to evaluate value for money

Currently, comparable estimates of national expenditure on health are only available at an aggregate level. Some countries are able to track all health expenditure by disease group, but in some other countries this is only possible for specific sectors, such as hospital settings. In the latter case it is not possible, therefore, for policy makers to know whether they are getting good value out of their global investment in cancer care.

The OECD's System of Health Accounts (SHA) provides a validated template for countries to identify what health care activities take place, who provides them and how they are financed. Although increasing numbers of countries are able to provide disease-specific expenditure data, minor differences in methodology reduce the validity of international comparisons, necessitating a significant ongoing body of work to harmonise and integrate the collection of financial data. Efforts are underway to systematise the collection of SHA data according to an agreed shortlist based on ICD, an important step recently endorsed by the European Commission's EUROCHIP-3 Common Action (the European Cancer Health Indicator Project), including the collection of SHA data by major cancer diagnostic groups.

Measuring the practice of cancer care to improve cancer care performance

Countries also vary in their ability to measure the practice of cancer care, and data are often not strictly comparable cross-nationally, as is discussed in Chapter 3, hence further progress in applying coherent definitions is needed for the meaningful international reporting and monitoring of the practice of cancer care. International comparison is particularly difficult with regard to data concerning adherence to clinical guidelines, information that is needed to evaluate deviations from evidence-based best practice. Reliable data around treatment choices and waiting times experienced across the pathway are also needed so that patients and governments can judge whether the system is delivering high-quality cancer care. Systematic measurement of practice is important in considering ways to improve the quality of cancer care.

As cancer patients receive care by different providers across their pathways, linkage of clinical and administrative data sets is needed. This is a complex and challenging area, however, in which only a few countries have made meaningful progress. A recent OECD study found that only around half of OECD countries regularly undertake data linkage studies to monitor health care quality and that much of this variation in activity appears due to differing national attitudes to the balance of risk between protecting personal data and studying system performance (OECD, 2013). These objectives need not be oppositional however, and an effective and acceptable balance can be struck (as demonstrated, for example, by legislative frameworks to prevent spread of infectious disease). Countries need to do more to enable and encourage secure and privacy-respecting data linkage in order to strengthen national information infrastructure and, thereby, expand the opportunities for health care quality improvement.

Understanding effectiveness, patient experiences and safety so as to improve the quality of cancer care

Currently, there are few systematic assessments of effectiveness, patient centeredness and the safety of cancer care. Countries need to begin exploring mechanisms to measure and assess these important quality dimensions. For example, Patient Reported Outcome Measures (PROMs), collected through patient-based surveys, focus on measuring health and the impact that treatments or lifestyle adjustments have on the quality of life from the patient's point of view. Such information allows countries to more fully understand the burden of cancer (beyond the merely clinical) in a population and to assess whether the health care system is effective at reducing this burden. With regards to patient safety, only a few robustly comparable indicators are available internationally, and further work is needed to develop indicators on patient safety, using care across pathways. Currently, data are restricted to safety during and after surgical procedures and health care-associated infections for patients with any diseases and conditions. But there is wide variation in reporting rates even for these indicators, and this is known to explain up to half of the observed variation in patient safety indicators between countries. Countries, therefore, need to look at ways to encourage health care providers to identify unsafe events more consistently.

Further investigation into effectiveness, efficiency and equity is likely to require data linkage across a full set of markers for diagnosis and intervention from both providers and patients themselves. To support countries in enabling data linkages and analysis of personal health data for statistics and research, the OECD's HCQI project currently works with OECD member states to foster appropriate practices for access to and use of data,

including data security, and guidance on governance mechanisms (OECD, 2013). This work is intended to reduce unnecessary obstacles to statistics and research that can arise from differences in health information privacy legislation and in the interpretation of what is necessary and helpful to respect patient's privacy rights. These international developments can be useful as countries undertake legislative reform related to the protection of health data and initiate steps to strengthen their information infrastructure.

Thus, different data sources such as administrative, clinical and survey data should be utilised for assessing cancer systems. For some of the larger countries, some detailed but comparable patient level data can be used to complement the system level data to assess cancer care performance.

Conclusion

This chapter makes four sets of recommendations for countries to improve performance and quality of cancer care.

First, countries need to allocate resources adequately and effectively to ensure fair and affordable access to cancer care. These resource allocation policies need to be forward-looking, but when challenges emerge, flexible and timely policy responses are needed.

Second, countries should promote best practice of cancer care throughout pathways including prevention, early diagnosis, treatment and palliative care and also ensure quality of life of cancer patients and their carers.

Third, countries need to have strong governance function by steering cancer control with operationalisation plans agreed by different stakeholders. Strong governance of cancer control should be backed up by monitoring and reporting of cancer care performance and quality assurance mechanisms.

The last policy priority concerns data related to outcomes, cost, practice and quality of cancer care for evaluating performance within and across countries. Systematic measurement in these areas, monitoring and reporting across regions and providers, and international benchmarking are important to further improve cancer care performance. Different data sources such as administrative, clinical and survey data should be utilised for assessing cancer systems and linking data would provide further insights.

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ANNEX A

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Notes

1. Note by Turkey: The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey shall preserve its position concerning the "Cyprus issue".
2. Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

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