

European health systems and cancer care

A. Micheli^{1*}, J. W. Coebergh², E. Mugno¹, E. Massimiliani¹, M. Sant¹, W. Oberaigner³, J. Holub⁴, H. H. Storm⁵, D. Forman⁶, M. Quinn⁶, T. Aareleid⁷, R. Sankila⁸, T. Hakulinen⁸, J. Faivre⁹, H. Ziegler¹⁰, L. Tryggvadóttir¹¹, R. Zanetti¹², M. Dalmas¹³, O. Visser¹⁴, F. Langmark¹⁵, M. Bielska-Lasota¹⁶, Z. Wronkowski¹⁶, P. S. Pinheiro¹⁷, D. H. Brewster¹⁸, I. Pleško¹⁹, V. Pompe-Kirn²⁰, C. Martinez-Garcia²¹, L. Barlow²², T. Möller²², J. M. Lutz²³, M. André²³ & J. A. Steward²⁴

¹Unit of Epidemiology, Istituto Nazionale per lo Studio e la Cura dei Tumori, Milan, Italy; ²Erasmus M.C., Rotterdam and Comprehensive Cancer Centre, South Eindhoven Cancer Registry, Eindhoven, The Netherlands; ³Cancer Registry of Tyrol, Innsbruck, Austria; ⁴Institute of Health Information and Statistics of the Czech Republic, Czech Republic; ⁵Danish Cancer Society, Denmark; ⁶Northern and Yorkshire Cancer Registry and Information Service (NYCRIS), Office of National Statistics, England; ⁷Department of Epidemiology and Biostatistics, Institute of Experimental and Clinical Medicine, Tallinn, Estonian Cancer Registry, Northern Estonian Regional Hospital Foundation's Cancer Centre, Tallinn, Estonia; ⁸Finnish Cancer Registry, Finland; ⁹Registery Bourguignon des Cancer Digestifs, Dijon, France; ¹⁰Saarland Cancer Registry, Saarland Ministry of Public Health, Saarbrücken, Denmark; ¹¹Icelandic Cancer Registry, Iceland; ¹²Italian Cancer Registry Network, Torino, Italy; ¹³Maltese National Cancer Registry, Malta; ¹⁴Comprehensive Cancer Centre, South, and Comprehensive Cancer Centre, Amsterdam, The Netherlands; ¹⁵Institute for Epidemiological Research, Norway; ¹⁶Warsaw Cancer Registry, Poland; ¹⁷Instituto Portugues de Oncologia, Portugal; ¹⁸Scottish Cancer Registry, Cancer Intelligence Unit, Edinburgh, Scotland; ¹⁹National Cancer Registry of Slovakia, Slovakia; ²⁰Cancer Registry of Slovenia, Institute of Oncology, Ljubljana, Slovenia; ²¹Granada Cancer Registry Andalusian School of Public, Granada, Spain; ²²Swedish Cancer Registry, Centre for Epidemiology, National Board of Health and Welfare, Stockholm, Sweden; ²³Registre Genevois des Tumeurs, Switzerland; ²⁴Welsh Cancer Intelligence and Surveillance Unit, Wales

Introduction: Data on the survival of all incident cases collected by population-based cancer registries make it possible to evaluate the overall performance of diagnostic and therapeutic actions on cancer in those populations. EUROCARE-3 is the third round of the EUROCARE project, the largest cancer registry population-based collaborative study on survival in European cancer patients. The EUROCARE-3 study analysed the survival of cancer patients diagnosed from 1990 to 1994 and followed-up to 1999. Sixty-seven cancer registries of 22 European countries characterised by differing health systems participated in the study. This paper includes essays providing brief overviews of the state and evolution of the health systems of the considered countries and comments on the relation between cancer survival in Europe and some European macro-economic and health system indicators, in the 1990s.

Overview of the European health systems The European health systems underwent a great deal of re-organisation in the last decade; a general tendency being to facilitate expanding involvement of the private sector in health care, a process which occurred mainly in the eastern countries (i.e. the Czech Republic, Estonia, Poland, Slovakia and Slovenia). In contrast, organisational changes in the northern European countries (i.e. Denmark, Iceland, Finland and Sweden) tended to confirm the established public sector systems. Other countries, including the UK and some southern European countries (i.e. England, Scotland, Wales, Malta and Italy) have reduced the public role while the systems remain basically public, at least at present. Our findings clearly suggest that cancer survival (all cancer combined) is related to macro-economic variables such as the gross domestic product (GDP), the total national (public and private) expenditure on health (TNEH) and the total public expenditure on health (TPEH). We found, however, that survival is related to wealth (GDP), but only up to a certain level, after which survival continues to be related to the level of health investment (both TNEH and TPEH). According to the Organisation for Economic Co-operation and Development (OECD), the TNEH increased during the 1990s in all EUROCARE-3 countries, while the ratio of TPEH to TNEH reduced in all countries except Portugal.

Conclusions Cancer survival depends on the widespread application of effective diagnosis and treatment modalities, but our enquiry suggests that the availability of these depends on macro-economic determinants, including health and public health investment. Analysis of the relationship between health system organisation and cancer outcome is complicated and requires more information than is at present available. To describe cancer and cancer management in Europe, the European Cancer Health Indicator Project (EUROCHIP) has proposed a list of indicators that have to be adopted to evaluate the effects on outcome of proposed health system modifications.

Key words: cancer, EUROCARE, health systems, macro-economic variables, survival

*Correspondence to: Dr A. Micheli, Unit of Epidemiology, Istituto Nazionale per lo Studio e la Cura dei Tumori, Via Venezian, 1, 20133 Milan, Italy. Tel: +39-02-23902867; Fax: +39-02-26681292; E-mail: micheli@istitutotumori.mi.it

Introduction

The national health care systems that developed in western European countries after the Second World War were organised along a

variety of different lines. In some countries, the health service was almost completely public; in others, the private sector played an important role. The methods of financing also varied: in some countries, costs were met almost completely out of general taxation; in others, insurance played a major role, that could be mutual (i.e. organised by trade or professional associations and essentially non-profit) or private. The European reality therefore provided an opportunity to compare the various organisational models, also in relation to care outcomes. Although such comparisons are lacking, there has been a tendency since the 1980s for European health services to undergo major structural changes, generally involving a reduction in the role of the public sector, and a facilitation of the expansion of the private sector. The rationale for this is that the public sector is considered less cost effective than the private sector; at the same time overall health care costs have been constantly rising, to some extent due to increasing demand. Yet, adequate comparisons of public, private and mixed models have not been undertaken in terms of such fundamental variables as life expectation at birth and at various ages, risk of disease and disease prognosis. These structural changes seem to have been politically motivated rather than evidence-based.

The incidence of cancer has increased markedly in Europe since the 1950s—partly as a result of population ageing—and most European countries have allocated considerable resources to affront this problem. However, there have only been limited attempts to contain these costs by establishing primary prevention programmes. In many countries, specialised hospitals, institutes and other facilities have been set up, and research on cancer, including epidemiological research, has expanded markedly. In most countries, the number of population-based cancer registries has increased, while in some, national cancer registration infrastructures were established as early as the first decade after the Second World War [1–4]. Through the European Network of Cancer Registries (ENCR), which encourages uniformity of data treatment and collection, it became possible to validly compare the risk of cancer occurrence and, with the EURO CARE study, the cancer patients' survival across populations.

The following essays provide brief overviews of the state and evolution of the health systems of the European countries participating in the EURO CARE-3 study [5]. EURO CARE-3 is the third round of the EURO CARE project, the largest yet collaborative study on cancer survival in Europe. These overviews provide a background to the EURO CARE-3 study, which monitored and analysed the survival of European cancer patients diagnosed from 1990 to 1994 and followed-up to 1999. The relationship between cancer survival in Europe and macroeconomic and European health system indicators is also presented and commented on.

Overview of the European health care systems

Health care in Austria (by W. Oberaigner)

The Austrian health service is, in its general aspects, under the responsibility of the federal parliament; however, legislation delegates responsibility for services to the provinces. Nearly everybody is covered by health insurance schemes, membership of which is obligatory. However, these schemes are run by about 15

public insurance companies, which do not all offer identical health insurance policies although differences are small. For the very few people not covered by insurance, e.g. the homeless, health services are paid for by social services.

In addition to the public insurance companies, there are private insurance companies offering various additional services. One of the most common additional options is the possibility to choose the treating doctor. For these private insurance companies, there are two kinds of policies, the main type is one which pays essentially all the cost of treatment except for some special drugs and dental treatment. The second type pays a certain percentage of treatment costs up to a certain limit.

For all those who are covered by insurance, visits to the doctor are generally free of charge except for some fixed fees to be paid quarterly (€3.60, in 2003). Hospital admissions are almost free (a nominal €8 per day is charged, 2003).

Hospitals are paid for by the insurance companies, local communities and the provincial and federal government on the basis of a diagnosis related group (DRG) system. Most hospitals are public; there are a few private hospitals, most of which are concerned with treating specific diseases.

The diagnosis and treatment of cancer is free and there are no additional charges for chemotherapy. Nearly all cancer patients are treated in hospitals. Exceptions are melanoma and early prostate cancer, which may be diagnosed and sometimes treated by specialised practitioners. Cancer is diagnosed and treated mainly according to guidelines published by medical societies. Most cancer patients are treated at general hospitals; there are only a few specialised oncological hospitals (mainly concerned with haematological malignancies). Cancer treatment is offered at most hospitals. To a limited extent, there has been a move towards cancer treatment in specialised cancer treatment centres.

Intensive Prostate-Specific Antigen (PSA) screening is being carried out in the Tyrol. Mammographic screening for breast cancer is available throughout Austria, although screening programmes are not organized according to international guidelines. Cervical smear screening for cervical cancer is offered by gynaecologists, but again there is no organized programme. General health checks are available to everybody free of charge once a year. These are mainly performed by general practitioners (GPs). Most screening activities are free of charge and are paid by insurance companies, although there have been slight changes in this respect over the last decade.

With regard to palliative care, hospices have been set up in recent years, but they are not able to cover for a large portion of terminal cases. Most terminal cases are supported by the very well established home-based care system.

Nationwide cancer registration has been established since 1969 following legislation which obliges every hospital to document its cancer cases. In some provinces, there are local cancer registries covering the population of their province. These local cancer registries send their notifications to the nationwide register.

Special conditions in the Tyrol. In the Tyrol, which is covered by the Tyrol Cancer Registry, cancer diagnosis and treatment is provided by the university hospital and nine district hospitals. For most cancer sites, approximately one half of the patients are treated by

departments of the university hospital where treatment is of very high quality. In some of the district hospitals, interdisciplinary oncological groups have been established, bringing together oncologists from both the district and university hospitals.

For some cancer sites, almost all patients are treated at the university hospital. This includes leukaemias and lymphomas, head and neck cancers, ovarian cancers and most advanced melanomas. Furthermore, a high percentage of lung cancer cases are treated at a centre related to the university hospital, and all radiotherapy is carried out at the university hospital. For cancers where surgery is the main treatment, the service is more decentralised. PSA screening started in the Tyrol in 1992, increasing the incidence of very early stages and resulting in an increase in survival.

Health care in the Czech Republic (by J. Holub)

After World War II, the initial achievements in health care in the former Czechoslovakia were infection control, provision of public health services and the training of physicians and paramedics. Unification of health care under the state administration in 1951 initiated the gradual development of a system of small health care districts providing GP and paediatric services. Basic bed care establishments were divided up into three levels according to the level of care. This system culminated in the 1966 National Health Care Act, which included measures to ensure that the health care needs of all regions were met uniformly.

Major political changes in 1989 led to reforms in health care. In particular, health care financing was transferred from the state to insurance corporations (formally private but subject to government control) who negotiate contracts with health service providers on behalf of the insured. Health insurance contributions are obligatory for most, but the state pays the contributions of certain groups (children, pensioners, the unemployed). Health care privatisation began with the disintegration of the former health centres and the development of real freedom to choose one's health care provider.

The separation of Czechoslovakia into the Czech Republic and Slovakia in 1993 had practically no effect. At present, GP, paediatric and dental services are mostly private. Hospitals are predominantly public. The Ministry of Health manages university hospitals; smaller hospitals are managed by regional or municipal authorities, and only a few are private. The health insurance system finances ~80% of all health care; direct out-of-pocket contributions by patients are required for some medications and account for <10% of total expenditure on health; the latter exceeds 7% of GDP.

Aspects of cancer care in the Czech Republic. The 1966 National Health Care Act firmly established the system of cancer patient care. Oncological units were established at district and regional levels and in two central institutions (Masaryk Oncological Institute, Brno and Oncological Clinic for Children, Praha-Motol). The realisation that cancer incidence was increasing resulted in potentiation of cancer care services in the 1970s. This also facilitated the follow-up of several preventive programmes first launched in selected districts in the late 1970s. These measures and improved methods of treatment did not stop the increase in incidence, but did stop the increase in mortality, as demonstrated by analysis of long-term trends (see Cancer Incidence in the Czech Republic at

www.uzis.cz). A slightly higher incidence growth rate after 1990 is probably due to improved diagnostic methods and population ageing.

Data collection and processing by the National Oncological Registry (NOR) is based on obligatory notification of all diagnosed tumours (since the end of the 1950s), subsequent control notifications and three-stage data processing (since 1976). Notification forms contain data on the patient and a description of the cancer with classification according to International Classification of Diseases (ICD) and TNM codes [since 1983 also International Classification of Diseases for Oncology (ICD-O)]. The forms are sent to local NOR units by the diagnosing physician. The obligatory control notification contains details of treatment, identification of the follow-up health unit and assessment of the efficacy of treatment. The checked notifications are passed to regional NOR units, which carry out analyses and add additional information. Finally notifications are passed to the Institute of Health Information and Statistics (the central NOR unit). Here final data aggregation and analysis is performed, including correlation with mortality data from the Czech Statistical Office [where Death Certificate Only (DCO) cases are identified]; if necessary, clarifications from regional units are obtained. The central unit also compiles annual publications. At present the only regional cancer registry participating in EURO CARE is that covering West Bohemia, one of eight Czech regions.

After 1990, public awareness of cancer improved and fund-raising by charities increased, when non-profit, non-government associations dealing with oncological patients were established. The aims of these associations are to prevent cancer and improve the quality-of-life of cancer patients; most are affiliated to the League Against Cancer of the Czech Republic.

Health care in Denmark (by H. H. Storm)

Health care in Denmark is mainly public, is financed through taxes and is free to most of the 5.5 million inhabitants. The National Board of Health is responsible for health statistics and all the centralised registries (patient, pathology, mortality and cancer).

Primary health care through GPs is organised by the Health Care Reimbursement Scheme. Most primary health care services are free. Total health care expenditure (public, 82%; private, 18%) amounted to 8.4% of GDP in 1999. All doctors are licensed by the state; pharmacies are authorised by the Ministry of Health. In the primary health care sector, some 3400 GPs, 900 specialists, 10 700 local authority nurses, 3800 dentists, 250 chiropractors and 300 pharmacies serve the population in 273 municipalities.

Hospital services are the responsibility of 14 county administrations and one central administration for Copenhagen. The hospitals are responsible for specialist services (e.g. high technology diagnostic examinations, endoscopy, surgery and pathology), disease prevention and care. Only a fraction of such services are provided by the private sector.

In 1999, there were 83 hospitals in Denmark with 24 000 beds, 9200 doctors and 25 900 nurses. However, there is a trend towards centralisation and specialisation, leading to larger and fewer hospitals. There are university hospitals in Copenhagen (Rigshospitalet and Amtssygehuset i Herlev), Odense and Århus that have special-

ist oncology departments and radiotherapy facilities. There are also oncological centres in Ålborg and Vejle. Each specialist centre serves ~1 million people. Cancer surgery and some chemotherapy are also carried out at the larger central hospitals in each county. Aftercare, palliation and rehabilitation are the responsibility of local units and the primary care sector.

Screening for cervical cancer started in the 1970s and national coverage was reached in 1990. Mammographic screening began in the early 1990s in Copenhagen and Funen, and must be available by law in all counties by 2008. A pilot screening programme for colorectal cancer is in place in Funen.

The Danish Cancer Registry is nationwide and population-based and has incidence data dating from 1943. Mandatory reporting of cancer was introduced in 1987, and since 1988, the National Patient Discharge Registry has been a source of data in addition to notifications from hospitals and physicians. Pathology departments only report cancers found at autopsy. A National Pathology Registry was established in 1999. About 92% of cancers are confirmed histologically. Death certificates provide date and cause of death of registered and unregistered cancer cases. DCO cases have been <5% since the 1950s, and in recent decades the figure has dropped to around 1–2%.

The seventh revision of the International Code of Disease (ICD) was used in all years, and from 1978, coding was also according to ICD for Oncology. A core dataset is kept on each individual including date of birth, sex, date of cancer diagnosis, diagnosis, method of verification, date of death and cause of death and place of residence at diagnosis. The completeness of registry data is 95–98% [6, 7], although some problems were reported by an evaluation after 50 years of operation [4, 5, 8].

The Danish Cancer Registry carries out extensive quality control and verification procedures, which account for up to half of the registry staff's time. Physicians supervise coding. Computerised procedures search for logical errors and incompatible, unusual and rare sex, site, morphology, stage and treatment combinations. Cancer incidence reports are published regularly [2–3, 9]. A detailed description of cancer registry history, procedures and research has also been published [10, 11].

A national death index has existed since 1943; it has been coded according to ICD-8 since 1971, and according to ICD-10 from 1995. Death certificates on cancer patients are of satisfactory quality with >80% of records correct and complete [7].

A National Cancer Control Plan was established in 2000 following the EUROCARE results and survival comparisons with other Nordic countries. Substantial government funds are now allocated to diagnostic and therapeutic equipment, shortening waiting lists and clinical guidelines. New chemotherapy and radiotherapy regimens have been introduced. The plan also envisages a public health and health promotion programme, focusing on lifestyle problems such as tobacco, alcohol, diet, physical inactivity, obesity and accidents. In total, the investment per annum in improving cancer care has been about €100 million and is expected to double in the coming years.

Health care in England (by D. Forman and M. Quinn)

The National Health Service (NHS) was set up in the UK in 1948 to provide healthcare for all, based on need, not ability to pay. It brought hospital services, family practitioner services (doctors, pharmacists, opticians and dentists) and community-based services into one organisation, funded primarily by the taxpayer. The NHS is managed by the Department of Health, which is responsible for putting the Government's health policy into practice; it also sets targets for the NHS and monitors performance. Around 1 million people work for the NHS in England and it costs more than £50 billion (about €74 × 10⁹) per year to run. The infrastructure of the NHS in England has undergone numerous reorganisations in recent years, generally in the direction of decentralisation and local control of resources.

Aspects of cancer care in England. Partly in response to evidence that patients in different parts of the country received treatment of varying quality and type, in 1995 the Calman–Hine report [12] recommended the establishment of networks of multidisciplinary care teams based in dedicated cancer centres, with the aim of ensuring that all cancer patients had equal access to first-rate specialist services. Much effort has since been invested in the development of such services. The NHS Cancer Plan [13], the first comprehensive national cancer programme, was published in 2000. Its aims are as follows: to save more lives; to ensure people with cancer get the right professional support and care, as well as the best treatments; to tackle inequalities in health; and to build for the future through investment in the cancer workforce, strong research and preparation for the genetics revolution.

The plan provides a strategy for bringing together prevention, screening, diagnosis, treatment and care for cancer, and the investment needed to deliver these services in terms of improved staffing, equipment, drugs, treatments and information systems. A principal objective is that by 2010, 5-year cancer survival rates will compare with the best in Europe. The Cancer Plan will be supported by new funding, and by 2006 there will be considerably more cancer specialists, radiographers, nurses and other cancer staff.

Cancer registration in England. Local cancer registration began in the early 1920s to follow patients treated with radium. In 1963, a network of regional cancer registries, funded by regional health authorities, was established. The objectives were to improve the service to patients through good record keeping and efficient follow-up, and to provide information for epidemiological studies, research into treatment efficacy, planning and assessment of cancer services, and the production of national statistics. In 1993, it became mandatory for NHS hospitals to provide core information items to the regional cancer registries and for the registries to send these data to the Office for National Statistics (ONS). Since 1971, all new cancer registrations have been 'flagged' on the National Health Service Central Register (NHSCR), so that details of all cancer patient deaths can be sent back to the regional registry for routine survival calculations. The essential features of the system have remained unchanged for over 30 years.

There are currently nine cancer registries in England whose activities, together with those of registries in Scotland, Wales and Northern Ireland, are co-ordinated through the UK Association of

Cancer Registries (UKACR). This provides a means of stimulating the development of cancer registration, of information procedures and practices, and of research based on cancer registry data.

In the years since the publication of the Calman–Hine report [12] and the National Cancer Plan [13], the role of cancer registries has been extended. They have contributed to studies on variations in outcomes for cancer patients across the UK and to investigations of the causes of these variations. Cancer registries are also increasingly being asked to provide data to support the planning and monitoring of cancer service delivery, including the national breast and cervical screening programmes.

The latest review of cancer registration in England was undertaken in 1999 [14]. It made key recommendations for strengthening the registries so that they would be able to provide robust data to support the planning and monitoring of cancer service delivery. The Department of Health subsequently published an action plan [15] to improve the organisation and effectiveness of the cancer registries in England. The cancer registry minimum data set has been revised [16] and includes disease stage and treatment details for all cancers.

Health care in Estonia (by T. Aareleid)

Over the past decade, Estonia has undergone major political, social and economic changes. Estonia was part of the USSR from 1940 to 1991, and its health care system was similar to that of other Soviet republics [17]. The Soviet health system was funded from the state budget and claimed to provide health services free of charge to the whole population.

After independence in August 1991, Estonia became an open market economy and health care was transformed from a centralised, state-controlled system into a decentralised health insurance-based system [18]. The health insurance legislation, which came into force in 1992, established one central and 17 regional health insurance funds. The Health Care Organisation Law of 1994 stipulated that the Ministry of Social Affairs is responsible for health policy, analysis of population health status, general health care planning and providing tertiary care at the national level. The municipalities are responsible for planning and providing primary and secondary care. Primary care is mainly provided by family practitioners, who are under contract to the Health Insurance Funds. Municipal and county hospitals mostly provide secondary care. Tertiary care hospitals provide highly specialised services and also secondary care for their regions. Since 1998, a number of hospitals have become private.

The present insurance-based system covers almost all medical services. The list and prices of services are fixed and regularly reviewed by the Ministry of Social Affairs. In 1993, a patient reimbursement scheme was introduced for prescription-only drugs purchased from outpatient pharmacies in Estonia. All pharmaceuticals used in hospitals are free for insured patients. The health system is mainly financed by employers, who pay a surcharge of 33% on salaries as social tax; 13% of this tax is channelled to health insurance and 20% goes to state pension insurance.

The GDP and health expenditure of Estonia are considerably lower than many other European countries. In 1999, the total per

capita health expenditure of Estonia was seven times lower than that of Finland and 12 times lower than that of Norway [19].

Aspects of cancer care in Estonia. During the 1990s, patients suspected of having cancer by primary and secondary care facilities were mainly referred to two specialised cancer centres (Tallinn and Tartu) that provided cancer surgery, radiotherapy and chemotherapy. As a result of the on-going health care reforms, the share of cancer surgery performed by general hospitals is increasing. In recent years, guidelines for cancer treatment have been developed and implemented in Estonia.

No nationwide cancer screening programmes have as yet been introduced. Opportunistic mammographic screening has been carried out in some regions of Estonia since the mid-1990s.

Cancer registration in Estonia. The Estonian Cancer Registry (ECR) is population-based and covers the whole country (45 216 km²; population, 1.4 million, according to the 2000 census). Cancer registration in Estonia dates back to 1953, when compulsory notification of new cases of cancer was introduced in the former USSR. The ECR was founded in 1978, but reliable incidence data have been available since 1968, when cancer registration in Estonia became centralised [20]. Cancer case reporting is mandatory under a legislative decree issued by the Minister of Social Affairs. The ECR receives notifications from treating physicians and pathology and haematology laboratories. The ECR is under the Ministry of Social Affairs, and funding is provided by the state via this ministry. Since the end of 2001, the ECR has been operating as a subunit of the Cancer Centre of the North-Estonian Regional Hospital Foundation.

The International Classification of Diseases for Oncology, 2nd edition (ICD-O-2) is used for the coding of cancers. The date of diagnosis is used as the index date for calculating incidence and survival. The ECR follows the patients up to death or emigration by linkage to the annual file of death certificates, and to the Population Register.

Since 1999 the ECR has published annual reports on cancer incidence. Data from the ECR have been used for a number of descriptive and analytical epidemiological studies, including international comparisons [21]. A considerable increase in the use of data is to be expected if the National Cancer Control Programme is implemented. This was drawn up by a Working Group and presented to the government in spring 2000. However, the programme has neither been approved nor received funding as yet.

Health care in Finland (by R. Sankila and T. Hakulinen)

The National Sickness Insurance Act specifies that every Finnish resident has equal access to health care and is entitled to consult a physician at a municipal health centre for a minimal fee, while >90% of the costs of hospital admissions are reimbursed. The costs incurred consulting private physicians or purchasing medicines are only partly reimbursed. In the larger towns and cities, the private sector occupies an important position, complementing the services offered by municipal authorities. Regional differences in the availability of care and diagnostic facilities are small. In 2002, Finland had over 15 000 active physicians and 44 000 hospital

beds in 400 institutions. The health system has not been modified recently and no modifications are expected in the near future.

The Central Population Register can provide estimates of population size and its age and sex structure at any given point in time. In 2002, the population of Finland was 5.2 million, with around 65% living in urban municipalities. Statistics Finland provides population life tables based on linkage between the file of annual deaths and that of the entire population.

The proportion of the active population working in various sectors in 2000 was as follows: public services, 32%; industry, 22%; commerce, 14%; finance, insurance and business services, 10%; agriculture and forestry, 8%; transport and communications, 8%; and construction, 6%.

The 460 municipalities of Finland are responsible for the local provision of public health and medical services. In 1994, the country was divided into 22 health care districts, five of which (Helsinki, Kuopio, Oulu, Tampere and Turku) include university hospitals and medical faculties. The five university hospitals serve as regional cancer centres with specialist diagnostic, treatment and research facilities. However, the diagnosis and treatment of cancer are only partly centralised. Four other hospitals have radiotherapy units and cancer surgery is practised in the central hospitals of all the health care districts. There are about 80 pathology laboratories in Finland.

Nationwide population-based organised mass screening programmes exist for cervical cancer (smear test) and for breast cancer (mammography).

Finnish Cancer Registry. The entire population of Finland has been covered by cancer registration since 1953. The Finnish Cancer Registry was founded in 1952 and subsequently supported by the Cancer Society of Finland in collaboration with the National Board of Health (currently the National Research and Development Centre for Welfare and Health—STAKES). About half the costs of running the registry are provided by the state-controlled gambling industry. The Finnish Cancer Registry receives reports from physicians, hospitals, institutes with hospital beds, and pathology and cytology laboratories, as well as death certificates. On average, there are five notifications per cancer case. Notification has been compulsory since 1961.

The death certificates of all cancer patients are provided by Statistics Finland and are used to complete the series of incident cancer cases and in the follow-up patients. The registry performs regular checks of files of persons who have emigrated from Finland and of the Central Population Register to ensure identification of all registered cases whether alive or dead. Registration and comparisons are facilitated by the use of a unique personal identification number assigned to each resident. As a result, practically no patients are lost to follow-up.

If a cancer case is notified from a pathology or cytology laboratory or known from a DCO, or if the information received is incomplete or contradictory, further information is sought from hospitals and other institutions. Patients and their relatives are never contacted during routine registration or patient follow-up. The index date for calculating incidence and survival is the date of diagnosis. All disease coding is supervised by a physician; a

slightly modified version of ICD-7, expanded to include histology and certain information on tumour behaviour, is employed.

In addition to preparing the official cancer statistics for Finland, the Finnish Cancer Registry also provides data for planning purposes, clinical and pathological studies and for cancer patient follow-up. The registry also carries out research, particularly in cancer epidemiology, survival analysis, health care evaluation and the development of biostatistical methods. Over the past 50 years, about 1500 scientific works and 100 PhD theses have been published on the data from the Finnish Cancer Registry.

Health care in France (by J. Faivre)

The French National Health System (Sécurité Sociale) is funded by citizens' and employers' contributions. The citizen generally contributes 21% and the employer 42% of the gross salary. The system provides health services for all citizens, even those without resources, and has been in place since 1945. Patients may be treated in either public or private health facilities and the patient is free to choose (the same reimbursement being provided whatever the place of treatment). Care is provided in hospitals (which account for ~50% of health spending) and by doctors and specialists working in the community. The provision of health care is now organised on a regional basis in order to match spending more closely to the requirements of the population. The health system in France is regarded as delivering a high quality service, with freedom of choice and generally no waiting lists. People can get the treatment they need irrespective of their social or work status. However, this quality comes at a price: health expenditure in relation to GDP is among the highest in Europe.

Aspects of cancer care in France. There are 30 university hospitals and 20 comprehensive cancer centres. These structures are scattered all over France, and they carry out research as well as providing treatment. About 50% of patients are treated in public hospitals (including some comprehensive cancer centres) and the other half in the private sector. Extensive cancer care facilities (surgery, radiotherapy and chemotherapy) are available in all the main urban centres. Medical oncologists and other medical specialists perform chemotherapy. The costs of cancer diagnosis, treatment and surveillance are completely covered by the Sécurité Sociale.

Cancer registration in France. In the late 1970s, about 5% of the French population were covered by cancer registration; this figure had increased to 13.5% by the beginning of the millennium. There are 11 general and nine specialised cancer registries: three for digestive system cancers, two for haematological malignancies, one for breast and gynaecological cancers, one for thyroid cancers and two nationwide childhood cancer registries (haematological, other sites). All registries belong to the network of French cancer registries (FRANCIM) which meet five times a year to coordinate scientific and political activities. FRANCIM makes available standardised information. French cancer registries are mainly financed by the Institute of Health Surveillance (InVS) and the National Institute for Health and Medical Research (INSERM).

Registration is active in all cancer registries, with information collected from pathology laboratories, public and private hos-

pitals, social security offices and GPs. Because death certification is poor, death certificates are not used to register patients, but may serve to verify the completeness of registration and identify cases not reported to the registry.

Only four French cancer registries have contributed to EURO-CARE-3: the general ones of Calvados and Isère, and the specialised ones of Côte-d'Or (digestive tract, haematological, breast and gynaecological cancers) and Calvados (digestive cancers). In all these registries patient vital status is actively ascertained once a year. The main source of information is the municipality of birth which on request provides information on vital status. Death certificates are also collected monthly at the local level; these are anonymous, but it is relatively easy to find information of the subject. Other sources of information are municipality of residence, GPs and specialists.

Health care in Germany (by H. Ziegler)

In Germany, everyone has the right to health care and nursing care. This comprises all services contributing to the health of the population by treating patients, promoting their physical and mental well-being or rehabilitating them. A multitude of governmental and non-governmental institutions employing 2.1 million people (7.4% of the working population) is involved in these activities.

The organisation of the health system is closely linked to the organisation of the country. The authorities responsible for public health services are the Bund, the Länder and the Gemeinden, and other institutions as specified by law.

The statutory health insurance funds are obliged by law to provide comprehensive service for their members. The major funds are local sickness funds and schemes for industrial workers and public service employees. There are also voluntary schemes; but the two systems differ fundamentally.

Approximately 90% of all citizens (72 million people) are covered by the 396 statutory funds. Up to a certain income level, membership is obligatory; higher-income employees and the self-employed may contribute as voluntary members or entrust their medical insurance to private funds. The statutory funds receive a fixed contribution of up to a maximum of 15% of gross pay, which is split 50:50 between employee and employer. For people who live on social assistance, contributions are paid by the Länder. Retired people have to pay regular contributions to meet a small part of their medical costs.

Benefits include medical and dental fees, hospital payments, prescriptions, laboratory tests, rehabilitation measurements and medical appliances. Members of statutory schemes have to provide extra payments to partly meet the costs of services. Expenses for cancer treatment and after-care are also covered.

Seven and a half million people (9.1% of the population) are members of private schemes. In these schemes, contributions vary with the comprehensiveness of the cover taken and the individual risk of falling sick.

The aim of the system is to provide all citizens with equally good care irrespective of their financial situation, position in society or place of residence. Yet, the coexistence of statutory and

private insurance schemes has created a 'dual-class' system that favours the wealthy who can afford comprehensive coverage.

The annual cost of the German health system is nearly €260.000 000 000—greater than 10% of the GNP.

Aspects of cancer care in Germany. Cancer treatment is carried out by public hospitals, other non-profit-making institutions and private clinics and practices. The original cancer programme was set up in 1971, and since the restructuring in 1982, the population has been screened for cervical, breast, rectal, prostate (DRE) and skin cancer. Tests are annual and free. One screening colonoscopy is offered to 56-year-old people (since October 2002). Mass screening mammography for women and PSA testing for men is expected to start soon.

Since 1980, cancer treatment has been coordinated under a federal government programme and is provided by various structures:

- Cancer Centres: these have large catchment areas and are attached to large university hospitals. They diagnose and treat cancers, and carry out oncological research.
- A series of regional hospitals dedicate considerable resources to cancer treatment.
- A considerable number of private oncological practices provide diagnostic and aftercare services, as well as outpatient treatment.

Cancer registration in Germany. Following a federal law providing for the establishment of a network of regional cancer registries covering the entire country, all Länder have made a start in setting up cancer registries. The legislation allows the Länder considerable latitude with regard to the reporting system and organisation. Most registries are aiming to cover the total population of their respective areas. However, four Länder have created registries that cover only a proportion of their populations. Seven Länder have a double structure with a separate office that encrypts patient identity information before it is handed over to the actual registry. Some have introduced compulsory notification, others rely on voluntary notification. Nevertheless, almost all require, more or less, informed consent of the patients. Appropriate derogations—pathologists are allowed to notify without consent—assure complete ascertainment of cases.

For epidemiological research, rigorous measures ensure that the data collected by the different registries are comparable. Follow-up of patients is largely passive. The regional registries pass their data to a central institute in Berlin where they are jointly analysed. For most registries incidence is still incomplete, but it is expected that this will be remedied in the coming years. Refusal of informed patients is only 2%.

Since the inception of EUROCARE, the Saarland Registry is the only German contributor to provide reliable incidence data for the whole of its area. In the south-west, bordering France and Luxembourg, Saarland is the second smallest area in the Republic with 1.1 million inhabitants and covers an area of 2600 km².

Health care in Iceland (by L. Tryggvadóttir)

The Ministry of Health and Social Security of Iceland is responsible for the overall administration of health care. The health care system is regulated by the Health Service Act of 1990 which gives all inhabitants right of access to the best available health care,

building on a similar act of 1974. There is also an act on the Rights of Patients (1997) that aims to ensure there is no discrimination on grounds of sex, religion, belief, nationality, race, skin colour, financial status, etc. The Social Security Act of 1993 regulates various forms of social security insurance.

The 1990 Health Service Act reinforced primary health care, stating that primary health care centres should be the cornerstone of care, supported by outpatient clinics of hospitals and other specialised institutions. Primary health care services are available to all, and an objective in recent years has been to ensure uniformity of services throughout the country.

A new health plan published in 2001 identified seven priority areas—alcohol, other drugs and tobacco, children and adolescents, older adults, mental health, cardiovascular disease and stroke, cancer and accidents—and stipulated quantifiable goals for each. The primary health care structure is considered the main vehicle for attaining all these goals.

Public health reports have been produced in Iceland for >100 years. The basic prerequisites for health, such as food, housing, income and education, are generally quite equitably distributed, although recent evidence has brought to light some economic inequalities. One area that requires more attention is the lack of data on perceived health, quality of life, social health and social support.

The health service in Iceland is primarily (85%) financed by central government. The remaining 15% is contributed by patients as payments for attending specialist and health care centres, or for medications.

Hospitals in Iceland are classified as specialised teaching hospitals, general hospitals or community hospitals. Admission to hospital is free of charge. The specialised hospitals carry out most of the surgery in Iceland and also most of the specialist procedures. The country is almost totally self-sufficient with respect to the availability of specialised health care, in spite of its small population (280 000 inhabitants). Nearly all types of surgery are performed. Icelandic physicians go abroad for postgraduate training and bring back knowledge from numerous countries around the western world.

The health care system in Iceland has not changed greatly since the 1974 law was enacted. Thus the conditions in the decade of EURO CARE-3 (the 1990s) are basically as described above. Only in more recent years has there been a tendency towards increasing privatisation and only the future will reveal if this leads to changes in terms of access or quality.

Aspects of cancer care in Iceland. Cancer care is an integral part of the above system. Cancer surgery is performed mainly in two hospitals and neurosurgery and radiation treatment are confined to the University Hospital in Reykjavik. Nationwide screening programmes for cervical and breast cancer have been in place since 1964 and 1987, respectively. Since 1987, the Icelandic Cancer Society has provided a hospice-like service for terminally ill cancer patients who wish to stay at home, focusing on relief of symptoms and psychological care for the patient and family. A general palliative care unit was established at University Hospital (Reykjavik) in 1999 and a geriatric unit in 2001, where terminally ill patients and their families are offered care in a hospital setting.

Cancer registration in Iceland. A national population-based cancer registry has been operating since 1954. The main sources of data for the registry are the country's pathology and haematology laboratories. Information on histologically confirmed cancer is complete, as the registry gets electronic notifications of all cancer diagnoses from the pathology laboratories. On the other hand, coverage of clinically-diagnosed cancers is probably not 100%, but nearly so. The registry gets notifications from all hospital departments, health care stations and from practising specialists. Incomplete information is followed up by contacts with the notifying institutions. Finally, electronic notifications of all cancer diagnoses mentioned on death certificates, both as the underlying cause and in other contexts, are received from Statistics Iceland.

Health care in Italy (by R. Zanetti)

Prior to 1978, the Italian health system was financed by large public insurance funds which collected contributions directly from salaries. The insurance funds were directly responsible for the delivery of primary care. The funds also bought, on behalf of their members, second level care from hospitals which were mainly owned by the central, regional and local authorities and managed by independent councils. Deficits were covered by central government.

In 1978, a major health reform initiated the Italian National Health Service (INHS) that was inspired by the British model. The INHS provides health care for all people living in Italy with few exceptions. At the beginning, the system was free to the user, the costs being born out of general taxation.

The basic structure for delivering health services was the Local Health Unit (or USL), which typically covered 100 000–200 000 inhabitants. The USLs were administered by boards appointed by local authorities. This system resulted in the political parties having a major influence on the management of health services. Up to the early 1990s, central government covered over-budget health spending by the regions.

Over the last 10 years major changes have been introduced to the INHS, the main ones are as follows:

1. Replacement of USL governing boards by managers.
2. Introduction of the principle that the budget should be balanced.
3. Patients required to pay part of the costs of primary care items.
4. Introduction of DRG to cost in-hospital services.
5. Introduction of buyer–provider scheme on a per-capita basis.
6. Private hospitals and laboratories allowed to participate in buyer–provider scheme.

Implementation of point 1 has only partially reduced the influence of political parties. The budget balance constraint has slowed down the rise in health expenditure, but not improved the quality of care. The requirement that patients make out-of-pocket contributions to costs has been criticised as extra direct taxation. The introduction of the DRG system was introduced to rationalise the use of resources. The provider–buyer scheme, allowing private companies to compete with hospitals, etc. in offering services, has only introduced market elements to a very limited extent.

Many of these changes are only now beginning to have an effect on outcome. For this reason, in the 1990s—the decade with which EURO CARE-3 is concerned—the Italian health system was still

very much the public one created in the late 1970s. For political and social reasons, the implementation of the health system reforms have been delayed in southern Italy. Several indicators show poorer health outcomes in the south than in the north, although current and investment costs are similar in both parts of the country. Thus, the long-established migration of patients from the south to the north of Italy for treatment continues.

Aspects of cancer care in Italy. There are now seven specialist cancer institutes in Italy (four in the north). These are concerned with both treatment and research and are answerable to, and receive funds from, the Ministry of Health; hence, they are largely independent of local or regional control. However, most cancer patients are not treated at these institutes but at general hospitals.

Cancer registration in Italy. In the early 1990s, about 10% of the Italian population was covered by cancer registration. The proportion had increased to >20% by the beginning of the millennium. Once again, most cancer registries are in the north. The cancer registries produce cancer incidence, mortality and survival statistics. They link cancer case files with health service and municipal files which record deaths and other information. Cases whose life status remain unknown after these automated linkage procedures are actively traced to ensure that the data are as complete as possible, so that survival and other estimates are as accurate as possible [22].

Health care in Malta (by M. Dalmas)

The Maltese archipelago consists of three main islands—Malta, Gozo and Comino—covering a total area of 315 km², with a resident population of 394 641 (2001) and a population density of 1252 per km².

The Maltese state health care system is organized at the national level. There are no formal regional or district tiers. The system is financed from general taxation and is free at the point of use. All residents, irrespective of income or ability to pay, have access to all services in the public health centres and hospitals. The cost of prescriptions is partially met by the patient, but low income households are entitled to free medicines. Moreover, residents with selected chronic conditions, including cancer, are entitled to free medication.

Primary health care is provided by public health services and by private GPs; these two systems function independently. The private sector accounts for about two-thirds of the workload in primary care. The state-run primary health care system, mainly delivered from eight health centres, covers general practice, community care, immunisation, the school health service and an extensive range of preventive, curative and rehabilitative services.

Secondary and tertiary care are provided by public hospitals. The principal acute general hospital is St Luke's in Guardamangia. It provides a full range of basic hospital services and specialist care, including transplant surgery and open heart surgery. Malta is almost self-sufficient in tertiary care provision—a few patients are sent abroad for treatment, usually to the UK. A large

new acute general hospital, the Mater Dei Hospital in B'Kara, is currently being built and will start functioning in 2005.

Oncology and dermatology services are provided by the smaller Sir Paul Boffa Hospital in Floriana. Another small public hospital provides acute geriatric rehabilitation services. Gozo, with a population of ~30000, has its own smaller general hospital which provides basic services and some specialised care.

A number of small private clinics provide inpatient care. Three private hospitals have been established since 1995 and private health care facilities continue to grow.

Three government departments have public health functions:

1. Public Health, concerned with the environment;
2. Health Promotion, conducts campaigns to promote healthy lifestyles;
3. Department of Health Information (DHI), of which the cancer registry forms part; responsible for data collection for disease registers, for monitoring hospital activity, for information about the population's health status and health services in general.

Health care financing in Malta is split between the statutory (60%) and the private (40%), and is currently at 8.8% of GDP.

Extensive health reforms are being implemented. They aim to establish integrated management approaches and provide more client-oriented, outcome-driven and financially sustainable services. Decision-making and financial responsibility is being devolved to hospitals and health centres, while the policy formulation, resource allocation, monitoring and regulatory roles of the Health Division (Department of Health) will be strengthened. The reforms also aim to redirect resources into health promotion and disease prevention.

Aspects of cancer care in Malta. Cancer is diagnosed and treated at all levels of the health service in Malta. There is one cancer centre on the islands: the Oncology Department at the Sir Paul Boffa Hospital. All radiotherapy and most chemotherapy are carried out in this department. All residents have access to the cancer treatment and rehabilitation services offered by this facility for free.

The Maltese National Cancer Registry (MNCR) covers the entire population and has been operating since 1991. All malignancies and most *in situ* cancers are registered. Non-melanocytic skin carcinomas are registered, but are often excluded from general analyses of the cancer burden. Information on cancer diagnosis is currently obtained from six hospitals (three public and three private hospitals) and 10 pathology laboratories. For each registration, one or more sources of information are received and examined.

Passive and active methods are used to follow registered cancer cases. Copies of death certificates bearing a cancer diagnosis are received from the National Mortality Registry (also at the DHI). Death details of cases already registered are extracted and new cases are processed to initiate registration. Active methods include regular linkage of the MNCR database with the Mortality and National Public Registry databases, as well as review of hospital files of registered cancer cases. Files of deceased patients are reviewed by MNCR staff prior to archiving.

Health care in The Netherlands (by J. Willem Coebergh and O. Visser)

The Netherlands Health Service developed gradually from a decentralised to a centralised system during the second half of the 20th century. It now provides health care for almost everyone living in The Netherlands, and is funded by a group of mutual and private insurance companies. Insurance premiums are obligatory deductions from wages and salaries, being a percentage for the lower paid 60% and a fixed sum for everyone else.

In 1984, a budget capping system was introduced, affecting every domain in the health system, which became more rigid in 1992. Capping ignored technological and demographic changes (more elderly and less people born since the early 1970s) and resulted in closure of about half of the hospitals and the loss of ~50% of beds resulting in shortages of supply. In addition, insufficient GPs were trained.

Aspects of cancer care in The Netherlands. Cancer care is traditionally delivered by general hospitals and 20 regional radiotherapy centres; the latter were originally reasonably well organised and funded, but they were unable to adapt to the rising demand. In addition, there are oncological centres at the eight university hospitals, which also carry out fundamental and clinical cancer research. The Netherlands Cancer Institute, in Amsterdam, is a national reference point for basic and clinical research. The management of childhood cancers has gradually been regionalised to five major centres.

Around 1980, nine regional Comprehensive Cancer Centres (CCCs) were founded which were funded from the budgets of the hospitals served. The mission of these centres is to provide optimal cancer care at the regional level. This was made possible by recruiting more oncological specialists and involving experienced specialists from the university hospitals as advisors. The CCCs are also involved in developing and implementing guidelines for cancer treatment and referral, providing postgraduate training in oncology, and increasing psycho-social and palliative care facilities. Sub-specialisation has improved the quality of cancer care over the last 20 years.

The CCCs also host the regional cancer registries at an annual cost of about €0.25 per inhabitant. Histological diagnoses are provided by 40 local and 30 regional pathology laboratories linked to computerised national registration. The cancer registries collect the minimal data set (including information on primary treatment) from clinical records and are increasingly involved in studies on the quality of cancer care. Regional cancer registries have provided data to the national registry since 1989 [23, 24]. There is no linkage with the Causes of Death Registry at Statistics Netherlands. The registries of Eindhoven and Amsterdam use active methods to ascertain vital status by linking cancer cases to health service and municipal files of deaths, and to the National Death Register at the Central Bureau of Genealogy.

The first Dutch registry in Eindhoven was founded in the late 1950s and in the 1970s covered almost 7% of the Dutch population; it participated in EURO CARE-1 [25]. For EURO CARE-3, coverage has increased to 23% of the population thanks to the participation of the Amsterdam Cancer Registry [26]. Coverage

for childhood leukaemias has been 100% since 1973 [27] with a national registry and the central reference laboratory of the Dutch Childhood Leukaemia Study Group.

Since its introduction in 1990, nationwide mass screening for breast cancer has been gradually extended; at present, women aged between 50 and 70 years are screened every 2 years. In the case of cervical cancer, regional programmes and opportunistic screening have provided data since the mid-1970s. In 1996, a national screening programme was introduced, and currently screening takes place every 5 years for women aged from 30 to 60 years.

Health care in Norway (by F. Langmark)

Mainland Norway covers 306 253 km². In 2000, the population was 4.5 million, the population density 15 per km² and the fertility rate 1.85 children per woman. Almost 65% of the population was economically active, 70% of the men and 57% of the women; only 3% were unemployed. The main occupational areas were as follows: agriculture, 4%; industry, 30%; communications, 9%; commodity trading, 14%; and community services, 43%.

The 435 municipalities of Norway are responsible for delivering primary health care to the population. Hospital care is organised on a regional basis (five regions); there are 14 992 hospital beds available (3.3 per 1000 inhabitants) excluding those in psychiatric institutions. A total of 10 110 physicians were registered in 1998 (2.2 per 1000 inhabitants). There are 30 pathology laboratories. Almost all of these institutions and services are public. All hospital treatment and medication in Norway is in principle free of charge. However, patients are charged a small amount when visiting a private medical doctor. In addition, there are a small number of private hospitals where the patient or the insurance company pay the costs.

Initial cancer diagnosis and treatment are mainly carried out in surgical departments of peripheral and central hospitals. In addition to these, oncological services, including radiotherapy, are delivered by six specialised and well-equipped oncological centres. There is at least one of these centres in each of the five health regions. Childhood cancers are also treated in specialist paediatric centres, and these are often located in the same hospitals as the oncological centres.

Norwegian Cancer Registry. The Norwegian Cancer Registry is a nationwide registry. All new cancer cases in the population must be reported to the registry, as specified by legislation promulgated by the Ministry of Health and Social Affairs in 1951 (Department of Social Affairs, Health Directorate, Journal no. 5972/51 S.D.H.5 Document no. 57/1951). The registry has archived all cancer cases diagnosed in Norway since 1953. In January 2002, a new Health Registry Act came into force strengthening the legal obligation to report cancer cases to the cancer registry.

All hospitals and oncological centres are required by law (Ministry of Health and Social Affairs 1951 and Health Registry Act 2002) to report all new cases of cancer, irrespective of whether the patient is treated, admitted or seen only as an outpatient. The registry also receives reports from individual physicians, from pathology and cytology laboratories (obligatory) and from death

certificates kept in Statistics Norway. On average four reports per case are received. In addition, the registry receives updated date-of-death notifications from Statistics Norway for all individuals living in Norway.

Since 2002, the cancer registry also receives information on cancer patients from the Patient Discharge Registry to secure complete reporting. If a cancer case is notified by a laboratory or known from a death certificate only, or if the information received is incomplete, further information is actively sought from hospitals and other institutions.

The Norwegian data included in the EURO CARE-3 database were coded by registry staff. Site classification was according to a somewhat modified version of the seventh revision (1955) of the ICD. In addition, up to 1968, a broad morphology group classification was also used, while in the period from 1968 to 1992, the Manual of Tumour Nomenclature and Coding 1968 was used, and from 1993, ICD-O has been employed. Primary tumours in different organs in one individual are classified as independent tumours. However, if multiple tumours occur in paired organs or at sites with the same ICD code, e.g. kidney, the case is registered once only as the first recognised tumour.

At regular intervals the registry database is matched against Central Bureau of Statistics files and the date of death is updated. Matching and updating are automated and based on the national personal identification number system.

Reports on cancer incidence, survival, incidence trends and regional variations in incidence are published by the registry. The registry also provides data for planning purposes, clinical and pathological studies, and for cancer patient follow-up. The registry is engaged in active research, particularly in cancer epidemiology, survival analysis and health care evaluation; there is a separate unit concerned with cancer and the environment.

Country-wide screening for cervical and breast cancer is organised by the registry, which is also responsible for the administration of a pilot screening project for the prevention of colorectal cancer.

Health care in Poland (by M. Bielska-Lasota and Z. Wronkowski)

The health care system in Poland used to be financed directly from the state budget: treatment was free to everyone, but provision was inadequate. The General Health Insurance Act of 1997 established a health system financed by compulsory Sickness Funds. Most people are required to contribute. The insured have the right to health services including primary health care as provided by GPs. The insured can choose a GP from among those contracted by the Sickness Fund.

Secondary health services are also free to the insured following referral by a GP, although various secondary services are free without referral (emergency gynaecological, obstetric, oncological, etc.).

The public sector health system is financed by the Sickness Funds and also by central government, municipalities and other public bodies. (In 2002, the National Health Fund was established, which is, in fact, a centralised form of Sickness Funds.) Non-public health insurance companies also exist and are run by

churches, employers, foundations, trade unions and professional bodies.

A snapshot of the health system in 2001. The health system has been undergoing reform since 1999. In 2001, there were 22.4 doctors, 6.2 pharmacists, 2.6 dentists and 48.3 nurses per 10 000 people. Outpatient medical services were provided by 5776 clinics (2201 public) and 2235 health centres (1550 public). Private practices may provide health care under the public system: in 2001 there were 6419 such practices. There are also occupational medicine practices offering private preventive examinations, medical treatment and dental services, financed from private funds only.

In 2001, there were 210 million outpatient medical consultations; 63.5% provided by primary and 34.8% by secondary health care units. The number of consultations in public health care centres is declining, while the number of private medical practices offering publicly financed health services is growing. The total consultancy rate per capita was 6.1 in 2001.

The number of hospital beds has been declining in recent years and was 48.7 per 10 000 in 2001. Meanwhile, the number of people receiving treatment at general hospitals has been growing. At the end of 2001, there were 736 general hospitals (45 private). The private hospitals had 2476 beds and administered treatment to 101 100 patients.

Total public health spending was €7856.5 million in 2001 (4.6% of GDP). Of this the Sickness Funds spent €6587.3 million, mostly on hospital treatment (46.7%), medicines (19.6%) and primary health care (12.9%), while central budget health spending reached €1100.7 million.

Aspects of cancer care in Poland. The first and second Cancer Control Programmes were implemented in 1924 and 1952, respectively; the latter made the reporting of all cancer cases and cancer deaths obligatory. The third Cancer Control Programme (1976–1990) introduced a three-tier system of cancer care, at the top of which are the Maria Skłodowska-Curie Memorial Cancer Centre and Institute of Oncology, Warsaw, with branches in Krakow and Gliwice. The second tier consists of the Regional Comprehensive Oncological Centres which provide care to the standard of comprehensive cancer centres. The third tier is the cancer wards and chemotherapy and radiotherapy units in hospitals, many of which are attached to universities. In 2001, there were 51 oncological clinics in this tier; in addition, there were consultation points and outpatient oncological clinics (total 41) in every large city.

Haematological malignancies are treated at the Institute of Haematology and in teaching hospitals. Cancers in children are treated at the Mother and Child's Institute and the Child's Health Centre, as well as in paediatric departments and wards. Poland has more than 700 specialist oncologists and over 6000 oncological beds.

The National Cancer Registry covers the whole of Poland and collects and processes data from regional registries. The population-based Warsaw Cancer Registry was established in 1963 and also performs studies of the effects of intervention

measures. The Warsaw and Krakow registries participate in EUROCORE.

Health care in Portugal (by P. S. Pinheiro)

Since the second half of the 1970s, when the Portuguese National Health System was set up, most health services have been available to the population almost free at the point of service. There are small charges (<10% of the actual cost) for consultations and investigations, although patients with chronic diseases, children and pregnant women are exempt. There are two payment systems for outpatient medications: the general scheme (40–70% reduction of actual cost) and the reduced scheme for those with low incomes or chronic diseases including cancer (55–85% reduction).

Care provided by the Portuguese National Health System ranges from the most sophisticated to basic preventive medicine. The system is planned, monitored and managed by the Ministry of Health and offers care at large urban hospitals, several dozen regional hospitals and numerous health centres. The health centres specialise in providing primary care.

All residents in Portugal are entitled to health care paid for out of general taxation. Three systems of health care insurance co-exist within the National Health Service: the direct beneficiaries (>75% of the population), the health subsystem subscribers (membership based on professional or occupational category, the largest being the civil service—15% of the population) and voluntary private health insurance schemes which provide care mostly at private hospitals and clinics.

Citizens are treated equally at state hospitals regardless of which insurance system they are enrolled in, while the out-of-pocket costs of treatment/consultation at private practices or clinics vary. For example, the civil service health subsystem usually subsidises a larger proportion of the total cost than the direct beneficiaries scheme.

The number of doctors, dentists and nurses increased greatly between 1960 and the early 1990s. There were 1.7 medical personnel per occupied hospital bed in 1987 compared with 0.24 in 1960. By 1990, there were 2.9 doctors per 1000 Portuguese, a higher ratio than in most western European countries. However, most medical personnel are concentrated in urban centres, to the detriment of those needing health care in rural areas.

Historically, the National Health System's overriding problems have been the long waiting lists for medical care—frequently many months—owing to lack of money, shortage of personnel and inadequate facilities. Medical facilities in Portugal range from those of decades past to the ultramodern. Partly as a result of these inadequacies, there is a substantial private sector that offers supplementary rather than alternative care. Many doctors and other medical personnel work in both the public and private systems, often because of the low salaries paid by the National Health System.

Aspects of cancer care in Portugal. A periodically updated National Cancer Plan has established the main priorities for cancer control in the population. The regional centres of the Specialised Cancer Institute (in Coimbra, Lisbon and Porto) offer the most

up-to-date cancer treatment in the country. There are six public radiotherapy centres. Cancer patients pay reduced income tax and are exempt from all medical fees except those for common medical prescriptions. There have been attempts at population screening programmes at the regional level for breast and cervical cancer, but uptake has been relatively low.

Population-based cancer registration was made mandatory in 1988 and resulted in the setting-up of three regional cancer registries (North, Centre and South). Another smaller registry, Vila Nova de Gaia, in the northern region has been active since 1981. Only the South Portugal Cancer Registry is participating in EUROCORE-3. Its catchment area contains 4.1 million people although survival data is only collected for a quarter of the area, a total of 1.2 million people (11.5% of the total Portuguese population) in both urban and rural areas of southern Portugal. This area, designated the EUROCORE-3 catchment area, comprises the municipalities of Almada, Cascais and Oeiras (all in Greater Lisbon), and the southern districts of Beja, Évora and Faro.

Cancer registration is compulsory in Portugal in all state hospitals and health centres. Registration of cases from private clinics and hospitals started in 1998. Follow-up (vital status) is carried out by checking mortality lists. In the small percentage of cases where doubts arise, mainly due to mistakes in names, date of birth or address, active follow-up is carried out by the hospitals and civil registries are contacted.

Health care in Scotland (by D. H. Brewster)

The National Health Service (NHS) in Scotland is funded mainly through taxation and is mostly free at the point of use. Access to hospital care is controlled by a well-developed system of primary care. The private health care sector in Scotland is relatively small, especially in relation to oncology services.

Scotland has a population of just over 5 million. The majority of the population live in an industrialised belt across the centre of the country, the remainder residing in more sparsely populated areas to the north and south of this. The NHS is organised into 15 health boards, although the populations covered by each health board are quite disparate, ranging from just under 20 000 to over 900 000.

In the 1990s, in parallel with the rest of the UK, the government introduced an 'internal market' into the NHS, by separating responsibility for purchasing health care from its provision. The purchasing function was divided between health boards and a limited number of self-selected fund-holding general (primary care) practices. The provision of care became the responsibility of self-governing NHS Trusts, comprising one or more hospitals. A change of government in 1997 led to the abandonment of the 'internal market' model, although health boards remained responsible for public health and for commissioning the delivery of health care from NHS Trusts to their resident populations. Since the establishment of a parliament in Scotland in 1999, responsibility for the NHS in Scotland has been devolved to the Scottish Executive.

Aspects of cancer care in Scotland. Radiotherapy facilities are provided at five main centres (Inverness, Aberdeen, Dundee, Edinburgh and Glasgow) but many patients with cancer are diag-

nosed and receive surgery and chemotherapy at district general hospitals. Since 1998, there has been a determined effort to re-organise the delivery of cancer care in Scotland through formal 'Managed Clinical Networks'.

Cervical screening began in parts of Scotland in the early 1960s, but coverage was uneven until computerised call–recall systems were introduced in the late 1980s. A national breast screening programme was phased in to Scotland in the late 1980s and offers to screen by mammography all women aged 50–64 years every 3 years, and to screen women older than this 3-yearly on demand. Although there is not a nationwide screening programme for colorectal cancer, a pilot study designed to test the feasibility of screening with the faecal occult blood test was initiated in two parts of the UK (including three Scottish health board areas) in 2000. The PSA test was introduced to Scotland in 1989 and use of the test has increased strikingly since then. Although screening with PSA is not currently recommended in Scotland, there is considerable variation in the incidence of prostate cancer across the 15 Scottish health board areas despite much less variation in mortality.

Cancer registration in Scotland. The Scottish Cancer Registry forms part of the Scottish Cancer Intelligence Unit (SCIU) located within the Information & Statistics Division of the NHS in Scotland [28]. The core registration function is funded by the Scottish Executive Health Department. The registry attained national coverage in 1959. Until 1997, five regional cancer registries carried out registration, and the role of the national registry was limited to coordination, data collation, analysis and publication. Beginning in 1997, the national registry assumed responsibility for all aspects of registration and established a network of out-posted, peripatetic cancer registration officers based in the main hospitals. Cancer is not a notifiable disease in Scotland. Until 1997, the regional registries relied mainly on hospital inpatient sources, pathology records and death records to identify registrations. Since re-organisation, potential registrations are identified from four main computerised sources: hospital discharge records; oncology records; pathology records; and death records. Information from these and other, non-computerised sources is linked to create provisional registrations that are made available to the out-posted cancer registration officers. By referring to medical records, the out-posted staff are able to validate the provisional registration and abstract additional information, which cannot currently be collected electronically. Follow-up is achieved primarily by linkage to computerised death records supplied by the General Register Office for Scotland. The Scottish Cancer Registry has an active programme of quality assurance and the results of many of its studies in this field have been published.

Health care in Slovakia (by I. Plesko)

The health service in Slovakia and former Czechoslovakia has generally functioned effectively. Access free of charge to all health services was guaranteed to all and health insurance to pay for it was obligatory. The basic unit remains the community Medical Station offering general curative assistance on an outpatient basis to population units (village, part of town, factory). A GP

heads the station, assisted by specialists in paediatrics, gynaecology and dentistry, and paramedical personnel.

Because of good transport and the short distances involved, patients who need hospitalisation are treated in district and county hospitals that have specialist facilities, including oncology and radiology. University hospitals are present in three of the eight counties. Institutes of Public Health, present in every district and county, are responsible for disease prevention.

Major political changes in 1989 led to the creation and affirmation of a private health sector. By 2000, 44% of physicians were employed privately and private sector beds had reached 22% of the total. Obligatory health insurance persists, but instead of a single state company, there are several private insurance companies. There are no charges for diagnostic and treatment procedures.

Aspects of cancer care in Slovakia. There are two specialist cancer institutes in Slovakia that provide a complete spectrum of diagnostic and treatment facilities: the National Cancer Institute and the St Elizabeth Institute of Oncology, both in Bratislava. These institutes also train pre- and post-graduate oncological physicians and paramedical personnel, as well as performing clinical research. However, most cancer patients are diagnosed and treated in county, district or university hospitals, although childhood, testicular and haematological cancers are treated in specialist centres.

Peripheral cancer care is provided by outpatient oncology clinics present in every district and headed by an oncology specialist. These structures receive all examinations and treatment results from hospitals and are responsible for active lifelong follow-up of cancer patients and re-hospitalisation if necessary; in some cases they provide specialist treatment. Treatment of cancer patients is free of charge at every level. Screening programmes (free of charge), mainly for cervical cancer and in some districts for breast cancer, are organised by the Ministry of Health in collaboration with local oncology clinics or large hospitals. Some large companies provide screening for their employees (not free). Health education programmes are provided mainly by the League Against Cancer across the country and in some districts by local Institutes of Public Health. Basic research of cancer is carried out by the Cancer Research Institute of the Slovak Academy of Sciences in Bratislava.

Cancer registration in Slovakia. Compulsory notification of cancer patients and deaths, introduced in Slovakia in 1952, did lead to reliable data on the cancer burden. In 1976, the population-based National Cancer Registry was established, covering the whole of Slovakia (a population of over 5.4 million in 2000). Using all available sources (notification forms, reports, death certificates, autopsy and hospital discharge reports), cancer registration has gradually become complete [29]. Notification forms for the collection of core and optional items recommended for cancer registries by the World Health Organisation (WHO) and IARC, and suitable for computerisation, were introduced in 1977. The ICD-9 and ICD-O-1 codes have been used since 1976, and from 1994 have been flanked by ICD-10 and ICD-O-2 codes. The simplified WHO system and current TNM classification are used to define clinical stage.

The National Cancer Registry is situated in the National Cancer Institute (NCI), but in 1990 it became independent with its own budget and dedicated computer centre. It is partially supported by staff of the Department of Cancer Epidemiology in the Cancer Research Institute of Slovak Academy of Sciences.

Physicians are obliged to notify cancer cases to the district oncology clinic, where notification forms are completed and sent to the registry. Oncology clinics are also responsible for the notification of addresses, dates of death and any changes in diagnosis. Date of death (together with completion of DCO cases) is obtained by consultation of death certificates and now also the Slovak Republic Population Office.

Health care in Slovenia (by V. Pompe-Kirn)

The Slovene health care system has characteristics of both the integrated and the contract model of health care. It is relatively centralised with several key administrative and regulatory functions still remaining the responsibility of the state [30]. The main features of the system are the result of historical development and legislation introduced in 1992. It was then that the Law on Health Care and Health Insurance [31] laid the basis for the present system of compulsory health insurance [administered solely by the Health Insurance Institute of Slovenia (HIIS)], supplemented by voluntary health insurance, which is in fact an insurance against co-payments. Other changes introduced at that time permitted the privatisation of health care and transferred some administrative functions to professional bodies, opening the way for further decentralisation and deregulation of the system.

Health services are paid for by the HIIS, based on contracts between this institute and the health care providers. Most private health care providers are also contracted by the HIIS and coexist, on an equal basis, with the network of public health care providers. The HIIS is governed by elected representatives of the employers and the insured. However, the state still retains powers, particularly regarding the contribution rate and what services are provided.

Statutory contributions are the main source (>85%) of health service financing. The largest secondary source of health care funding is voluntary insurance.

Virtually the entire population with permanent residence in Slovenia is covered by compulsory insurance. There are two main groups of insured. The first is white and blue collar workers whose contributions depend on income (not risk-related) and cover non-earning spouses and children. The second consists of people contributing fixed amounts.

Health centres and health stations provide primary care that includes the following: emergency services; general practice; women's health; home nursing; laboratory and other diagnostic facilities; dental care; health aids and appliances; pharmacy services; physical therapy; and ambulance services. In 1999, Slovenia had 64 health centres and 69 health stations, one of which is within 20 kilometres of almost the entire population. Eleven general and 13 mono-specialist hospitals provide secondary inpatient and outpatient care. Tertiary care is provided by the clinical departments of the University Medical Centre and the Institute of Oncology in

Ljubljana, and also at some other mono-specialist hospitals and clinics.

The Slovene health sector has been changing for decades for the same reasons as in other countries (increased expectations, ageing population, new knowledge, more effective and expensive technologies, etc.). However, urgent reform was necessary when Slovenia became independent in 1991, and included long-awaited changes such as decentralisation of decision-making, self-regulation of key groups of health professionals, introduction of a social health insurance system and reintroduction of the private delivery of health care.

Aspects of cancer care in Slovenia. Cancer treatment is free at the point of use, its costs being met by compulsory insurance. Cancer care is provided by the Institute of Oncology and the University Medical Centre in the capital Ljubljana, as well as in 11 general and four mono-specialist hospitals. The Institute of Oncology is a comprehensive cancer centre affiliated to the University of Ljubljana. The Institute also houses the Cancer Registry of Slovenia, an epidemiology unit and documentation services. More than 50% of cancer patients are treated at the institute. Radiotherapy and most chemotherapy are administered exclusively at the institute for all except skin cancers.

The population-based Cancer Registry of Slovenia was founded in 1950 [32–35]. It has strong links with the Institute of Oncology, which enables it to participate actively in clinical as well as epidemiological studies. Since 1990, all registered patients are linked at least annually to the Central Population Register using personal identification numbers. Less than 0.5% of registered patients are lost to follow-up.

Health care in Spain (by C. Martínez-García)

Spain has nearly 42 million inhabitants (2001 census). The state is organised into 17 regions or Autonomous Communities (AACC) with their own government and parliament and with populations ranging from 300 000 (La Rioja) to 7.5 million (Andalucía). Each AACC has its own health service structure under a regional health department (Consejerías de Salud). Each AACC is divided into health areas and further subdivided into health zones. Each health area covers ~250 000 persons and provides the following: (i) primary health care, including promotion, prevention, curative care and rehabilitation; (ii) specialised outpatient care through a network of specialised centres, linked to hospitals; and (iii) hospital care (outpatient and inpatient). Each health area is served by at least one general hospital.

Notwithstanding this regional autonomy, the National Health Service (SNHS) is financed mainly through the social security system and general taxation, and provides nearly universal health care free of charge at the point of use. The general principles of the SNHS are enshrined in the 1978 Constitution and the 1986 General Health Act.

Ninety-four per cent of the population are obliged to contribute to the social security system, while 5% (civil servants and their dependants) are covered through a mutual fund system and are free to choose between public provision, within the social security network of centres, and fully private provision. Only 1% of the

population is not formally covered by the SHNS and consists of those not obliged to join the social security system (self-employed professionals and employers).

Most primary health care is public. Hospital beds are 70% public and 30% private (15% not-for-profit). Most private hospitals are funded mainly by the SNHS through reimbursement procedures.

Medications are only partially paid for by the SNHS. The user pays 40% of the price of drugs, although drugs are free to the retired, the handicapped, invalids and people who have suffered occupational accidents. Furthermore, only 10% of the cost is paid (with a limit of about €3) for many drugs for cancer and other chronic diseases.

Aspects of cancer care in Spain. Cancer diagnosis and treatment is mainly carried out in general hospitals. There are only four oncological centres of about 100 beds, three of which are private (not-for-profit). There is an oncology department in most public hospitals of up to 750 beds.

In the early 2000s, there were 14 population-based cancer registries in Spain; data from 11 of these will be included in the new edition of *Cancer Incidence in Five Continents*. There are also two specialised paediatric cancer registries: one regional and one national hospital-based. Approximately 25% of the Spanish population is covered by cancer registration. The registries are located mainly in the north and eastern parts of the country, on a strip ranging from the northern Cantabrian coast to the Mediterranean areas of the south. Most registries are funded by AACCs, but two are partially funded by other sources. There is no national co-ordination scheme and the main links between registries are via shared research projects.

Six general cancer registries contributed to EURO-CARE-3: Granada, Mallorca, Murcia, Navarra, Basque Country and Tarragona, covering nearly 15% of the Spanish population. The Childhood Tumour Registry of Valencia and the National Childhood Cancer Registry also contributed.

Spanish cancer registries are not allowed access to the National Mortality Database to check the vital status of the registered patients. However, most (but not all) registries can access their own AACC mortality databases. However, it is not possible to ascertain death in the small percentage of patients who move out of their health area and are on the population files of another AACC or country.

Follow-up procedures vary between registries. For Navarra, Tarragona, the Valencia Childhood Registry and more recently the Basque Country, there is automatic linkage between the cancer registry database and the corresponding AACC mortality database. In Granada too, linkage is automatic, but there is also active follow-up, through searches in hospital and municipality records. Mallorca and Murcia are not allowed to link their data to the corresponding AACC databases, so follow-up is active and mainly through systematic searches of hospital and municipality records. However, Murcia benefits from automatic linkage to the social security data file. For the National Childhood Cancer Registry, cases are actively followed-up in hospitals by paediatric oncologists.

Health care in Sweden (by L. Barlow and T. Möller)

Overview. The 1982 Health Care Act established that county councils are mainly responsible for the provision of Swedish health care. The major sources of finance for health care are local and national taxes. The small private sector plays a marginal role. There is a strong commitment to equal access to care in Sweden. The act states that the goal is to provide good health care for all citizens. These services are provided at small point-of-service cost to the patient. However, payments are substantially higher for elderly patients receiving long-term care and rehabilitation services provided by municipalities.

Health care delivery is dominated by hospitals. Over 90% of physicians in Sweden are employed by county councils and receive a fixed monthly salary. Primary care is given by health centres, district nurses and maternity/child health structures. In 1992, the municipalities were given responsibility for home care and nursing homes.

The government is responsible for ensuring that the system develops according to overall objectives, although the autonomous county councils and municipalities provide a strong counterweight. The government is also responsible for most of the research and significant parts of health care training. The National Board of Health and Welfare (SoS) has the supervisory role of monitoring the quality of health care provided by county councils, local authorities and private institutions.

In addition to county hospitals, there are tertiary hospitals in each of the six health care regions of Sweden; these provide highly specialised services and are also teaching hospitals.

Oncological centres and cancer care programmes. In 1974 the SoS reorganised cancer care. Within each of the health care regions, an oncological centre was established to co-ordinate cancer care resources, establish regional cancer registries and promote a series of cancer care and prevention initiatives. To guarantee all cancer patients equal care 'cancer care programmes' for most types of cancer have been developed, based on standardised management protocols.

Swedish Cancer Registry. The government-financed Swedish Cancer Registry was established in 1958 and covers the whole population; it is managed by the Centre for Epidemiology at SoS. It relies on the regional registries that collect new cases and perform checks and corrections.

Cancer registration is based on compulsory reporting by physicians in all public and private health establishments. Information on date and cause of death is obtained by computerised linking with the Cause of Death Registry. It has been estimated that 96% of all diagnosed cases are reported to the registry. The registry publishes an annual report of cancer incidence, highlighting trends and changes.

Cancer screening. Breast and cervical cancer screening is available nationally in Sweden. Non-organised PSA screening has grown in recent years.

Health care in Switzerland (by J. Michel Lutz and M. André)

The Swiss health care system is one of the most expensive in the world and has a correspondingly high level of quality. In 1998, the total cost was €27 × 10⁹, representing about 10.5% of GDP. Personal medical expenses vary markedly between the cantons, with a three-fold difference between the lowest and highest, and are related to physician density, average income per inhabitant, availability of a university hospital, etc.

One of the major characteristics of the Swiss health system is its decentralisation, with responsibilities for health provision shared between the Confederation, the 26 cantons and the local communities. Health insurance regulations, disease prevention and health promotion are federal (Confederation) responsibilities (article 117 of the Federal Constitution), while the provision of health care is the responsibility of the cantons, and varies from one canton to another.

A federal law [Loi sur l'Assurance Maladie (LAMal)] which came into effect in 1996, requires that all persons resident in Switzerland have basic health insurance coverage. All insurance companies offer this basic coverage and cannot refuse it to anyone who requests it. There is also social security insurance, such as Assurance Invalidité (AI) which covers expenditure related to the onset of a disability or the presence of a congenital malformation, and an occupation-linked national accident insurance (SUVA) which covers accidents and occupational diseases. Finally, there is military insurance (AM) which covers the costs of health care during military service.

The health care insurance companies receive money not only from an individual's premiums but also from federal and canton funds. Premiums vary according to canton of residence and differ between insurance companies, but do not depend on income. Policyholders with low incomes receive subsidies from the state to pay their premiums, and these subsidies also vary according to canton.

Like that of the United States, the Swiss health care system is closely linked to the market economy. The main responsibility of the state is to provide a legal framework in which economic freedom is guaranteed. Switzerland has both private and public sector medicine and the patient is free to choose his doctor.

Cancer registration in Switzerland. Nine cancer registries cover about 60% of the Swiss population: four registries are in German-speaking areas (Basel, Grisons-Glaris, St Gall-Appenzell and Zurich), four are in French-speaking cantons (Geneva, Neuchâtel, Valais and Vaud) and one covers the Italian-speaking canton of Ticino. All provide data to the Swiss cancer registry network. Only the registries of Basel and Geneva are currently participating in EURO CARE. Both are attached to university hospitals and specialised cancer centres. They link the files of cancer cases to cantonal/community Offices of Population which archive detailed information on each resident, including date of death. In addition, active follow-up for all incident cases ensures that survival and other estimates are as accurate as possible.

With regard to cancer prevention, no national strategy has been adopted, in spite of federal encouragement. Only the cantons of

Geneva, Vaud and Valais currently offer mammographic screening for breast cancer to all women over 50 years of age, with examinations every 2 years.

Health care in Wales (by J. A. Steward)

Wales is a culturally distinct principality of the UK situated on the western side of England. The Welsh language is in common use in many parts of Wales and all official publications, including cancer statistics, must be bilingual. The total population of Wales is just under 3 million with a total land area of 20 640 km².

The National Health Service in Wales is similar to that in England. Historically England and Wales have been closely linked. Unlike Scotland, we share the same system of death registration. Ultimate responsibility for health care in Wales rested with the Department of Health at Westminster prior to devolution. Following creation of the Welsh Assembly Government (WAG) in 1999, this passed to the Welsh Health Minister. Unlike Scotland, the WAG has no tax-raising powers, but the divergence from England has increased. We now have 22 local health boards with health commissioning powers and a primary care focus. Public health services are provided by a National Public Health Service. However, strategic planning rests with the WAG.

Aspects of cancer care in Wales. In 1997, the WAG convened the Cancer Services Coordinating Group (CSCG) in response to the Calman-Hine report. It set down Minimum Standards for Cancer Care in Wales as well as convening Tumour Site Steering Groups of expert clinicians. The CSCG defined the information needs for cancer services in Wales in the form of the Cancer Information Framework and the WAG endorsed this plan. The equivalent to the English National Cancer Plan in Wales is 'Improving Health' which aims to improve cancer survival, as well as devise other key indicators.

The principal oncology centre in Wales is the Velindre Trust in the capital Cardiff (SE Wales), but there is also a major centre at Swansea (SW Wales), as well as a radiotherapy centre in Llandudno (N Wales). These three areas correspond to the three cancer networks in Wales, which are linked together under the CSCG. However, centres in Manchester and Liverpool also provide specialist oncology services to North Wales from England.

An innovative information system for clinical oncologists (ISCO) has been in use in Velindre since 1990 for clinical care of patients. Under the Cancer Information Framework, it is now being rolled out to the whole of Wales (CANISC). It will form the basis of a new way of capturing clinically rich cancer data items in real time, including better quality cancer registration data.

Cancer registration in Wales. A manual system confined to hospitals in West and South Wales only started in 1972. From 1974 a system covering the whole of Wales was set up which utilised electronic capture of data on hospital admissions. A difference from England is that this data set includes an ICD morphology field completed at hospital level by trained clinical coders with full access to clinical notes, including pathology reports. However, this system was primarily intended to produce broad brush planning information rather than high quality data.

This system ran quite well until the late 1980s when limitations of the simple batch processing system became apparent. There was backlog of over 6 years. The Welsh Cancer Intelligence & Surveillance Unit (WCISU) was set up in 1997 to address some of the ongoing data quality issues using a new bespoke interactive cancer registration system: a MS-SQL server system based upon rules-based validation and probabilistic matching/merging. Electronic pathology inputs have been implemented from 1999 onwards. The backlog has been eliminated and we now have a <12 months delay from registration of a complete calendar year to publication.

The system still relies heavily on the quality of hospital admissions data provided to us, but we now carry out statistical quality assurance, sampling at least 5% of all registrations for case note audit and we take a lead on training. There are plans for us to receive a Welsh Cancer Minimum Dataset from clinical teams by electronic means (CANISC). WCISU have been closely involved in the design of this data set.

As we share the same system, follow-up of cancer data in Wales relies on linkage with ONS NHSCR in the same way as the regional cancer registries in England. The WCISU website is on-line at <http://www.wcisu.wales.nhs.uk> [36].

European health systems and survival of cancer patients

Several studies have found correlation between survival of cancer patients and macro-economic variables measuring the wealth of countries, the level of investment in health and social inequalities [37–39; Verdecchia A, Micheli A, Santaquilani M et al., unpublished data]. A report on the survival of cancer patients in England and Wales uncovered survival differences according to class, with deprived classes faring worse [40], while a US study found a strong relation between socio-economic indicators and the survival of patients with cancer of the breast, colorectum and prostate [41].

In the 1990s, European health systems underwent a great deal of re-organisation. The tendency to facilitate expanding involvement of the private sector in health care occurred mainly in the eastern countries (see essays on the Czech Republic, Estonia, Poland, Slovakia and Slovenia). In contrast, organisational changes in the northern European countries tended to confirm, and in some cases reinforce, the established public sector systems (see the Denmark, Iceland, Finland, Norway and Sweden essays). Other countries, including the UK and some southern European countries (see essays on England, Scotland, Wales, Malta and Italy) have reduced the public role while the systems remain basically public, at least at present. In general, the health systems of the remaining countries—that historically have been mixed (insurance-based systems with private sector insurance important)—have not changed their structures (see the reports on Austria, France, Germany, The Netherlands, Portugal and Switzerland). According to the Organisation for Economic Co-operation and Development (OECD) [42] the total national (public and private) expenditure on health (TNEH) increased during the EURO-CARE-3 decade (1990s) in all EURO-CARE-3 countries. The

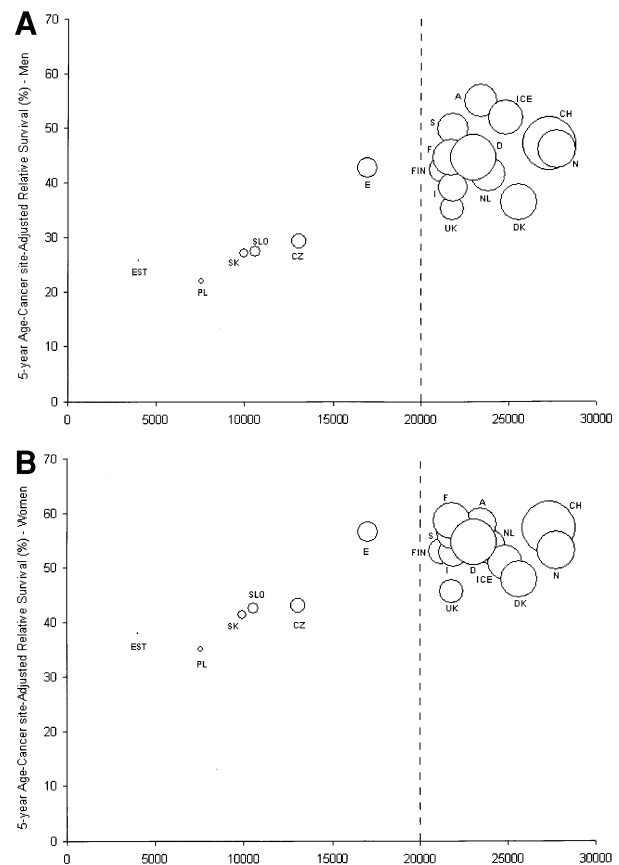


Figure 1. Relationship between gross domestic product (GDP), expressed as parity purchasing power (PPP, US\$), and the 5-year age- and cancer site-adjusted relative survival in the EURO-CARE-3 countries: (A) men; (B) women. The area of the disc is proportional to the total national health expenditure (TNEH). A, Austria; CZ, Czech Republic; DK, Denmark; UK for England, Scotland and Wales; EST, Estonia; FIN, Finland; F, France; D, Germany; ICE, Iceland; I, Italy; NL, The Netherlands; N, Norway; PL, Poland; SK, Slovakia; SLO, Slovenia; E, Spain; S, Sweden; CH, Switzerland. Data on GDP and TNEH from the Organisation for Economic Co-operation and Development (OECD) 2002 [42]; figures for England, Scotland and Wales were combined to give UK figures; figures for Malta and Portugal were unavailable. Survival data from EURO-CARE-3 [43, 44]. UK survival was calculated as the mean survival of England, Scotland and Wales. \$PPP, parity purchasing power per capita (US\$).

greatest increase was in Switzerland and the lowest in Sweden (although data for England, Scotland and Wales, Estonia, Malta, Slovenia and Slovakia were not available). The ratio of total public expenditure on health (TPEH) to TNEH reduced in all countries, except Portugal (65.5% in 1990; 71.2% in 2000). The largest reduction occurred in Poland (91.7% in 1990; 71.1% in 1999). For cancer care, however, the impression from the essays is that the role of the public sector is everywhere undiminished, irrespective of the public/private structure of the health system. Indeed, in some cases an overall reduction in the role of the public sector was accompanied by public initiatives in the cancer field, such as setting up screening programmes or potentiating citizens' access to cancer treatment.

Table 1. Tertiles of total public expenditure on health with corresponding median values (range) of gross domestic product, total national expenditure on health in 1997 and 5-year relative survival adjusted by age and cancer site from EURO CARE-3

Tertile	Country	TPEH ^a (\$PPP)	GDP ^a (\$PPP)	TNEH ^a (\$PPP)	Survival ^c , %	
					Men	Women
			$r = 0.95 (P < 0.001)^d$	$r = 0.95 (P < 0.001)^d$	$r = 0.81 (P < 0.001)^d$	$r = 0.77 (P < 0.001)^d$
I	Estonia	207				
	Poland	332				
	Slovakia	558	10281	677	27.3	41.7
	Slovenia	720	(4062–17026)	(243–1294)	(21.9–42.7)	(35.3–56.9)
	Czech Republic	853				
	Spain	920				
II	Finland	1180				
	UK	1183				
	Italy	1216	21 861	1727	42.0	53.0
	The Netherlands	1328	(21 233–23 878)	(1481–1958)	(35.2–55.0)	(45.9–58.2)
	Austria	1328				
	Sweden	1492				
III	France	1559				
	Switzerland	1568				
	Iceland	1664	25 230	2147	44.8	54.2
	Denmark	1728	(21 766–27 759)	(1988–2841)	(36.4–51.9)	(48.5–58.9)
	Norway	1849				
	Germany	1856				

^aData from OECD 2002 [43]; figures for England, Scotland and Wales were combined to give UK figures; figures for Malta and Portugal were unavailable.

^bData from EURO CARE-3 [43, 44]; UK survival was calculated as the mean survival of England, Scotland and Wales.

^cFive-year age- and cancer site-adjusted relative survival.

^d r values are coefficients for correlation of TPEH with the other variables, with corresponding P values for correlation with all countries as statistical units. GDP, Gross domestic product; \$PPP, parity purchasing power per capita (US\$); TNEH, total national expenditure on health; TPEH, total public expenditure on health.

Relationships between 5-year age- and cancer site-adjusted all cancer relative survival (%) [43, 44] (from now on referred to simply as *survival*) and major economic indicators of the countries participating in EURO CARE-3 are shown in Figure 1 and Table 1. Gross domestic product (GDP), TNEH and TPEH in 1997 were estimated at the country level after cost-of-living adjustments using parity purchasing power per capita (the PPP indicator) [42]. Figure 1 shows *survival* for men and women plotted against GDP; each country is represented on the plot by disks of diameter proportional to TNEH. Overall, *survival* correlated significantly with GDP both for men and women (Pearson's $r = 0.84$, $P < 0.001$ and $r = 0.81$, $P < 0.001$, respectively). However, *survival* increased directly with GDP up to 20 000 \$PPP, but did not correlate with GDP over 20 000 \$PPP (Pearson's $r = 0.19$, $P = 0.55$ and $r = -0.01$, $P = 0.97$, for men and women, respectively) (right-hand side of Figure 1). On the whole, countries with high TNEH (large disks) tended to have high *survival*, and countries with low TNEH (small disks) tended to have low *survival*; except Denmark. For GDP above 20 000 \$PPP, *survival* was related, but not significantly, to TNEH (Pearson's $r = 0.27$, $P = 0.40$ and $r = 0.40$, $P = 0.20$, for men and women, respectively) and to TPEH

(Pearson's $r = 0.24$, $P = 0.44$ and $r = 0.11$, $P = 0.74$, for men and women, respectively).

Table 1 shows median values of GDP, TNEH and *survival* for groups of countries defined by tertiles of the TPEH distribution, which can be taken as an indicator of willingness of the countries to invest in health and cancer control. The correlation between these indicators and TPEH is also shown. Overall GDP and TNEH correlated strongly with TPEH (Pearson $r = 0.95$, $P < 0.001$, for both) and increased with TPEH tertiles. Median *survival* also increased with TPEH tertiles and correlated strongly and significantly with TPEH ($r = 0.81$, $P < 0.001$ and $r = 0.77$, $P < 0.001$, for men and women, respectively).

The data presented in Figure 1 and Table 1 clearly suggest that *survival* is related to macro-economic variables. They indicate that cancer survival is related to wealth (GDP) but only up to a certain level, after which cancer survival continues to be related to the level of health investment.

Cancer survival depends on the widespread application of effective diagnosis and treatment modalities [45–47], while the availability of these depends on macro-economic determinants, including health and public health investment.

Analysis of the relationship between health system organisation and cancer outcome is complicated and requires more information than at present available. The European Cancer Health Indicator Project (EUROCHIP) [38] has proposed a list of indicators to describe/monitor cancer and cancer treatment in Europe. It is important that these indicators are adopted so as to provide more complete information that will make it possible to evaluate the effects on outcome of proposed health system modifications and find the macro-economic reasons for low levels of survival of cancer patients.

Acknowledgements

We are very grateful to Emily Taussig and Samba Sowe for their editorial support and Don Ward for the English revision of the manuscript. The EUROCARE project was supported by the BIOMED-2 Programme Contract No. BMH4-CT98-3390 and the Compagnia di San Paolo (Torino, Italy). The present study was also partially supported by EUROCHIP (European Cancer Health Indicator Project) subsidised by the European Commission under the Health Monitoring Programme [Grant Agreement No. SI2.328473 (2001CVG3-515)].

References

- Waterhouse J, Muir C, Shanmugaratnam K, Powell J. Cancer Incidence in Five Continents, Volume IV. IARC Scientific Publications No. 42. Lyon, France: IARC 1982.
- Muir C, Waterhouse J, Mack T et al. Cancer Incidence in Five Continents, Volume V. IARC Scientific Publications No. 88. Lyon, France: IARC 1987.
- Parkin DM, Muir CS, Whelan SL et al. Cancer Incidence in Five Continents, Volume VI. IARC Scientific Publications No. 120. Lyon, France: IARC 1992.
- Parkin DM, Whelan SL, Ferlay J et al. Cancer Incidence in Five Continents, Volume VII. IARC Scientific Publications No. 143. Lyon, France: IARC 1997.
- Capocaccia R, Gatta G, Roazzi P et al. and the EUROCARE Working Group. The EUROCARE-3 database: methodology of data collection, standardisation, quality control and statistical analysis. *Ann Oncol* 2003; 14: v14–v27.
- Østerlind A, Jensen OM. Evaluering af cancerregistreringen i Danmark 1977: En præliminær evaluering af Cancerregisterets og Landspatientregisterets registrering af cancertilfælde. *Ugeskr Laeger* 1985; 147: 2483–2488.
- Storm HH, Michelsen E, Clemmensen IH, Pihl J. The Danish Cancer Registry—history, content, quality, and use. *Dan Med Bull* 1997; 44: 535–539.
- Holm NV, Hauge M, Jensen OM. Studies of cancer aetiology in a complete twin population: breast cancer, colorectal cancer and leukaemia. *Cancer Surv* 1982; 1: 17–32.
- Krasnik M, Frølund C, Rosenstock S et al. Forekomst af lungekræft i Danmark 1943–1986. *Ugeskr Laeger* 1994; 156: 3021–3025.
- Ministry of Health Working Group on Cancer Registration. Proposal for Modernised Update of the Cancer Registry. Copenhagen, Denmark: Ministry of Health 1995.
- Clemmesen J. Statistical studies in the aetiology of malignant neoplasms. V. Trends and risks. Denmark 1943–72. *Acta Pathol Microbiol Scand Suppl* 1977; 261: 1–286.
- Department of Health and Welsh Office. A policy framework for commissioning cancer services. A report by the Expert Advisory Group on Cancer to the Chief Medical Officers of England and Wales. Calman-Hine report: <http://www.doh.gov.uk/cancer/pdfs/calman-hine.pdf> (6 November 2003, date last accessed). London, UK: Department of Health 1995.
- Department of Health. The NHS Cancer Plan [on-line] <http://www.doh.gov.uk/cancer/pdfs/cancerplan.pdf> (6 November 2003, date last accessed). London, UK: Department of Health 2000.
- Cancer Registration in England: A way forward. [on-line] <http://www.doh.gov.uk/cancer/pdfs/gillis.pdf> (6 November 2003, date last accessed). London, UK: Department of Health 2001.
- Action Programme for Cancer Registration. [on-line] <http://www.doh.gov.uk/cancer/pdfs/actionprogramme.pdf> (6 November 2003, date last accessed). London, UK: Department of Health 2001.
- Cancer Dataset Version 4.0 [on-line] <http://www.nhsia.nhs.uk/cancer/pages/dataset/docs/dataset.pdf> (6 November 2003, date last accessed). London, UK: Department of Health 2003
- Winkelmann RA, Okeanov A, Gulak L et al. Cancer Registration Techniques in the New Independent States of the Former Soviet Union. IARC Technical Report No. 35. Lyon, France: IARC 1998.
- European Observatory on Health Care Systems. Health Care Systems in Transition: Estonia. Copenhagen, Denmark: WHO 2000.
- Nielsen J. Nordic/Baltic Health Statistics 1999. Copenhagen, Denmark: Nordic/Baltic Medico-Statistical Committee (NOMESCO) 2000.
- Rahu M. Estonia. In Parkin DM, Whelan SL, Ferlay J et al. (eds): Cancer in Five Continents, Vol. VII. IARC Scientific Publications No. 143. Lyon, France: IARC 1997; 466–469.
- Thomson H, Rahu M, Aareleid T, Gornoi K. Cancer in Estonia 1968–1992: Incidence, Mortality, Prevalence, Survival. Tallinn, Estonia: Institute of Experimental and Clinical Medicine 1996.
- Zanetti R, Gafà L et al. (eds). Cancer in Italy, Vol. 3. Incidence Data from Cancer Registries, 1992–98. Rome, Italy: Il Pensiero Scientifico Editore 2002.
- De Winter G, Schouten LJ, van Leeuwen FE, Coebergh JWW. Incidence of cancer in The Netherlands, 1989. First report of Netherlands Cancer Registry. Utrecht, The Netherlands: Netherlands Cancer Registry 1992.
- van Dijck JAAM, Coebergh JWW, Siesling SM, Visser O. Trends of Cancer in The Netherlands, 1989–1998. [on-line] www.ikc.nl. Utrecht, The Netherlands: Vereniging van Integrale Kankercentra 2002.
- Coebergh JWW, Janssen M, Louwman M, Voogd AC. Cancer Incidence, Care and Survival in the South of The Netherlands, 1955–1999: a Report from the Eindhoven Cancer Registry with Cross-border Implications. Eindhoven, The Netherlands: Integraal Kankercentrum Zuid 2001.
- Comprehensive Cancer Centre Amsterdam. Kankerregistratie. [on-line] <http://www.ikc.nl/ika/index.html> (6 November 2003, date last accessed).
- Coebergh JWW, van der Does-van de Berg A, van Wering ER et al. The Netherlands: Dutch Childhood Leukaemia Study Group (DCLSG), 1973–82. In Parkin DM, Stiller CA, Draper GJ et al. (eds): International Incidence of Childhood Cancer. IARC Scientific Publications No. 87. Lyon, France: IARC 1988; 263–265.
- Scottish Cancer Registry. [on-line] <http://www.show.scot.nhs.uk/isd/cancer/cancer.html> (6 November 2003, date last accessed).
- Plesko I, Kramarova E, Vlasak V et al. Development of registration and cancer incidence rates and trends in Slovakia. *Eur J Cancer* 1991; 27: 1049–1052.
- Albrecht T, Cesen M, Jakubowski E et al. Health Care Systems in Transition 2001. Slovenia. [on-line] <http://www.who.dk/document/e74468.pdf> (6 November 2003, date last accessed). WHO Regional Office for Europe. European Observatory on Health Care Systems 2001; Vol. 3–No. 18 (2001). Copenhagen, Denmark.

31. Law on Health Care and Health Insurance. Official Gazette of the Republic of Slovenia 1992; 9: 590–601.
32. Cancer incidence in Slovenia 2000. Ljubljana, Slovenia: Cancer Registry of Slovenia 2003.
33. Pompe-Kirn V, Primič-Žakelj M, Ferligoj A, Škrk J. Atlas of cancer incidence in Slovenia 1978–1987. Ljubljana, Slovenia: Cancer Registry of Slovenia 1992.
34. Pompe-Kirn V, Zakotnik B, Benulič T et al. Cancer patients' survival in Slovenia 1963–1990. Ljubljana, Slovenia: Cancer Registry of Slovenia 1997.
35. Pompe-Kirn V, Zakotnik B, Zadnik V. Cancer patients' survival in Slovenia 1983–1997. Ljubljana, Slovenia: Cancer Registry of Slovenia 2003.
36. The Welsh Cancer Intelligence & Surveillance Unit. [on-line] <http://www.wcis.u.wales.nhs.uk> (6 November 2003, date last accessed).
37. Micheli A, Gatta G, Verdecchia A. Studying survival of cancer patients in different populations: its potential and role. In Verdecchia A, Micheli A, Gatta G (eds): *Survival of Cancer Patients in Italy: the ITACARE Study*. Tumori 1997; 83: 3–8.
38. Micheli A, Capocaccia R, Martinez C et al. Cancer control in Europe. A proposed set of European Cancer Health Indicators. Eur J Public Health 2003; 13 (Suppl 3): 116–118.
39. Kogevinas M, Pearce N, Susser M, Boffetta P. Social Inequalities and Cancer. IARC Scientific Publications No. 138. Lyon, France: IARC 1997.
40. Coleman MP, Babb P, Damieki P et al. Cancer Survival Trends in England and Wales, 1971–1995: Deprivation and NHS Region. Studies in Medical and Population Subjects No. 60. London, UK: HMSO 1999.
41. Mariotto A, Capocaccia R, Verdecchia A et al. Projecting SEER cancer survival rates to the US: an ecological regression approach. Cancer Causes Control 2002; 13: 101–111.
42. Organisation for Economic Co-operation and Development (OECD). OECD Health Data 2002, 4th edition. Paris, France: OECD 2002.
43. Coleman MP, Gatta G, Verdecchia A et al. and the EUROCORE Working Group. EUROCORE-3 summary: cancer survival in Europe at the end of the 20th century. Ann Oncol 2003; 14 (Suppl 5): v128–v149.
44. Sant M, Aareleid T, Berrino F et al. and the EUROCORE Working Group. EUROCORE-3 survival results with commentaries. Ann Oncol 2003; 14 (Suppl 5): v61–v118.
45. Gatta G, Capocaccia R, Sant M et al. Understanding variations in colorectal cancer survival in Europe: a EUROCORE high-resolution study. Gut 2000; 47: 533–538.
46. Sant M, EUROCORE Working Group. Differences in stage and therapy for breast cancer across Europe. Int J Cancer 2001; 93: 894–901.
47. Gatta G, Capocaccia R, Coleman MP et al. Childhood cancer survival in Europe and the USA. Cancer 2002; 95: 1767–1772.