Health Reform

MEETING THE CHALLENGE OF AGEING AND MULTIPLE MORBIDITIES

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Foreword

The ageing of our societies is at the same time one of our greatest achievements and one of our biggest challenges. A longer lifespan is something few people would spurn and it opens up great opportunities in our personal, social and economic lives; yet in practice it is often accompanied by living with disease. Indeed, increasingly people – and the health systems that serve them – have to cope with more than one chronic disease at a time, a situation known as multimorbidity.

How to reorient health systems to meet the challenge of multimorbidity was the theme of a conference held by the OECD and the Business and Industry Advisory Committee (BIAC) to the OECD as part of the OECDs 50th anniversary celebrations. This present volume contains five of the papers prepared for this conference, along with a sixth, on measuring quality in the presence of multimorbidity, on a topic which there was not enough time to address during the conference but which is nevertheless of huge importance.

In addition to the authors of the chapters included in this publication, many valuable contributions were made during the conference. We would particularly like to thank Aart De Geus, Michael Hodin, Anand Parekh, Aaron Cohen, Fernando Alvarez del Rio, Patrick Jeurissen, Antero Kiviniemi, Eric de Roodenbeke, Jane Halton, Gavin Brown, Ri De Ridder, David Gordon, Christopher Viehbacher, Zeynep Or, and Roland Schneider for presenting, chairing a session, or commenting on the papers presented. Thanks are also due to Daniel Garley, Isabelle Vallard and Judy Zinnemann for organising the conference; to Marlène Mohier for preparing the chapters for publication; and Mark Pearson for editing the conference volume.

Particular thanks are due to the Business Industry Advisory Committee, and in particular Hanni Rosenbaum from the BIAC Secretariat and Nicole Denjoy, the Chair of the BIAC Task Force on Helalth Care Policy, for taking the initiative in proposing the joint conference and in helping the OECD organise it.

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Acronyms

ACSCS	Ambulatory care sensitive conditions
ADL	Activities of daily living
AMI	Acute myocardial infarction
BAN	Body Area Network
BMI	Body mass index
CAALYX	Complete Ambient Assisted Living Experiment
CDC	Center for Disease Control and Prevention
COPD	Chronic obstructive pulmonary disease
CVA	Cerebrovascular accident
CVD	Cardiovascular disease
DBC	Diagnosis Based Costing
DMARD	Disease modifying antirheumatic drugs
DRG	Diagnostic Related Groups
EBM	Evidence-based medicine
EIP	European Innovation Partnerships
EMEA	European Medicines Agency
FDA	Food and Drug Administration
GDP	Gross domestic product
GP	General practitioner
HTA	Health technology assessment
IADL	Instrumental activities of daily living
ICHA	International Classification for Health Accounts
ICN	International Council of Nurses

ICT	Information and communication technology
IqWiG	Institute for Quality and Efficiency in Health Care
LTC	Long-term care
LTCI	Long-term care insurance
NCD	Non-communicable diseases
NICE	National Institute for Clinical Excellence
NIH	National Institutes of Health
NSAID	Non-steroidal anti-inflammatory drug
OORH	Owner occupied retirement housing
PACE	Programme for All-Inclusive Care for the Elderly
PGEU	Pharmaceutical Group of the EU
PHLS	Public Health Leadership Society
PPS	Prospective payment systems
QALY	Quality adjusted life year
RCT	Randomised clinical trial
SHI	Social Health Insurance
SIP	Strategic implementation plan
SIPA	System of Integrated Services for Aged Persons
TA	Technology assessment
TAEN	The Age and Employment Network
UN	United Nations
VPD	Vaccine preventable diseases
WCRF	World Cancer Research Forum
WHO	World Health Organization
WLD	Wearable Light Device
WMA	World Medical Association

Executive Summary

When the OECD was founded in 1961, health systems were gearing themselves up to deliver acute-care interventions. Sick people were to be cured in hospitals, then sent on their way again. Medical training was focused on hospitals; innovation was to develop new interventions; payment systems were centred around single episodes of care.

Although health systems have delivered big improvements in health since then, they can be slow to adapt to new challenges. In particular, these days, the overwhelming burden of disease is *chronic*, for which “cure” is out of our reach. Heads of state and government met in New York in September 2011 to address the challenge of “non-communicable diseases” (NCDs) such as cancers and cardiovascular diseases. This was only the second time that the United Nations has held such a high-level meeting on a health issue (the first being on HIV/AIDS, a decade before). Even in developing countries, many more people die of such diseases than die from infectious diseases such as malaria, AIDS and dysentery. In emerging and developed countries, the overwhelming burden of disease is due to NCDs, and health systems have been adapting to address such problems.

Managing the transition from a health system oriented around tackling infectious diseases to one which addresses non-communicable or chronic diseases is hard enough. Getting a non-communicable disease is related to lifestyle choices, so health systems need to take prevention more seriously, tackling obesity, lack of physical exercise, harmful use of alcohol, and tobacco consumption. An emphasis on *managing* disease, rather than curing it, is necessary so that people can get on with their lives as well as they can, despite their illness.

No country can yet claim to have completely reoriented their health system to deal with NCDs, though progress has undoubtedly been made. However, that very progress is raising its own set of issues. Increasingly, developed countries are finding that their biggest challenge is dealing with people who do not just have one chronic disease; they have several. They have arthritis, dementia, and a cardiovascular problem, for example, or diabetes as well as breast cancer. They have “multiple morbidities”, and health systems must change still more if they are to address the health needs of such people properly. How do payment systems, innovation policies and human resource policies need to be modernised so that OECD health systems will continue to generate improved health outcomes in the future at a sustainable cost?

The OECD and the Business Industry Advisory Committee (BIAC) hosted a conference to address these issues. Leading researchers presented their views on where policy needs to go next. High-level policymakers debated how their countries are responding to the challenge and stakeholders from the health professions, hospitals and patients' rights organisations made sure that discussions stayed focused on the practical things which need to be done to meet the challenges of multimorbidity.

This volume contains six background chapters that were prepared for the conference. **Professor Gerard Anderson** helped put the challenge into context (*Chapter 1*). In the United States, for example, 85% of all health care utilisation is by people with at least one chronic condition, and 65% is by people with multiple chronic conditions. Two-thirds of all spending in the Medicare programme (the US public health coverage for elderly people) is on people with five or more medical conditions.

Change is required in five areas, according to Professor Anderson. First, biomedical research needs to take into account the fact that most people who take a new drug will have medical conditions other than the one for which the new drug is designed. Second, health professions will need to be trained differently. Third, payment systems need to be reformed, to reward providers who deliver appropriate care, rather than high cost care. Fourth, health provision needs to be co-ordinated better and focused on delivering health, not care – hence more focus on prevention is justified, for example. Finally, he suggests that we need different measures of the quality of the health system. At the moment, most attempts to measure quality – those of the OECD included – tend to focus on particular diseases, so they will measure survival rates of people with a particular cancer, for example. But this misses the reality of many people who are sick because of more than one disease at a time.

The rise of multimorbidity is closely linked to the ageing of the population. In the wealthiest OECD countries life expectancy has increased by approximately ten years over the past fifty years, and in other countries the increase has been even more rapid. **Rebecca Taylor** argues in *Chapter 2* that seeing ageing as imposing a burden on society is misguided. Living longer is about living better and that means being able to be an active member of society far longer than in the past, be that through working, volunteering or being consumers. Living better while living longer is not however automatic and requires appropriately supportive environments and policies, which she goes on to outline. Many of these lie outside the health area. But better disease prevention and management; reforms to the financing of health; imaginative use of new technologies; and new ways of organising and delivering health care and social care are needed which focus on enabling people to remain independent and healthy for longer and seek to avoid or delay the need for resource-intensive institutional care.

The main thesis of *Chapter 3* builds on the discussion about how to integrate health and long-term care. **Professor Geoff Anderson** argues that we are at a crossroads in thinking about financing of care for older people with multimorbidity and multiple needs. One path points to bundling payments, transferring risk and traditional market competition. This makes sense if we believe that the problems around ageing and disease are *risks* – and therefore can be managed, through careful analysis of what the risks are, then pooling and sharing the risks appropriately. Competition would encourage low costs and high quality care. The other path points to whole system targets with minimum specifications, pooled budgets and innovative market models. This path makes sense if we think the problems of ageing are linked more to uncertainty than risk. If this is the case, we want to encourage as much innovation and flexibility in services as possible, while gathering risks in as wide a pool as possible so that society does what it can to deal with future problems in the fairest way manageable. It is not obvious which path is best, but they are pointing in very different directions, and soon governments will have to decide which route to go down.

Chapter 4 considers how health workforce policies and health professions need to change to deal with multimorbidities. **Thomas Plochg, Niek Klazinga, Michael Schoenstein, and Barbara Starfield** are critical of the way in which health professions (and more especially physicians) are becoming more and more specialised in particular diseases and body parts. There is a natural logic in this happening, and it has led to many improvements in medical care, but the big problem in considering people with many diseases at once is to understand the needs of the person, not of the disease. This should result in an increased need for people who are specialised in being generalists. However, there are barriers to this happening, and so government policy – and those responsible for self-regulation of the professions – need to take steps in a number of areas, from training right through to the funding of research in order to help promote the development of the health professions we will need in the future.

Richard B. Saltman, Johan Calltorp and Aad A. de Roo look at innovation in the organisation of health care in *Chapter 5*. They explore strategies for implementing organisational innovation and partnership in health, and consider how new types of co-operation between actors in the systems can be helpful in improving clinical, organisational and financial outcomes. The chapter draws on innovative examples of service delivery from the Netherlands, Sweden and the United States.

Chapter 6, the final chapter, was prepared by **Bruce Guthrie, Sally Wyke, Jane Gunn, Marjan van den Akker and Stewart Mercer**. It seeks to describe actual patterns of morbidity using data from Scotland. They confirm that multimorbidity is common, and rises sharply with age. They go on to look at the effects of multimorbidity on mortality; on functional status and quality of life; and on health services use, and health care quality and safety. The results should, they believe, change policy in a number of ways. There are implications for the creation of clinical evidence and guidelines; for health system organisation and delivery of care; and for measuring health service performance for people with multimorbidity.

This executive summary has to finish on a sad note. Professor Barbara Starfield, died shortly after completing Chapter 4 of this volume. Professor Starfield was a leading researcher in health policy, and was especially influential in stressing the importance of primary care. We are honoured that we are able to include some of her thoughts in this volume.

Chapter 1

The latest disease burden challenge: People with multiple chronic conditions

Professor Gerard Anderson
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In order for the transformation of the health care system to be successful, all aspects of the health care system must evolve to meet the new challenges created by a changing burden of disease. This chapter focuses on five components of the health care system that have evolved continuously over the past 50 years and will continue to need to evolve if the health care system is going to be responsive to the current and future burden of disease. The five components of the health care system are: 1) *biomedical and health services research,* 2) *health professions education,* 3) *financing of health care services,* 4) *delivery systems, and* 5) *quality metrics.*

Introduction

When the OECD was founded in 1961, the health care systems in most OECD countries were focused on treating infectious diseases, although acute illness was already the predominant reason why most people sought medical care. During the past 50 years, OECD health care systems have gradually transformed themselves to focus on treating acute illnesses. Currently, the predominant reason why people seek medical care in most OECD countries is chronic disease. As a result, another transformation is underway and OECD countries are beginning to respond to the growing cost and prevalence of chronic conditions. The latest challenge is the growing prevalence, cost and poor outcomes associated with people with multiple chronic conditions.

The need for a transformation of the health care system to focus more on chronic disease is being recognised at the highest levels of government. On September 19 and 20, 2011 the leaders of the member states of the United Nations will get together to discuss chronic diseases (United Nations General Assembly, 2011). The last time the leaders of the United Nations got together they planned an international strategy for AIDS. This time the focus will be chronic diseases which are responsible for over half of the burden of disease in the world and over three quarters of the burden of disease in most industrialised countries (WHO, 2010).

In order for the transformation of the health care system to be successful, all aspects of the health care system must evolve to meet the new challenges created by a changing burden of disease. This chapter focuses on five components of the health care system that have evolved continuously over the past 50 years and will continue to need to evolve if the health care system is going to be responsive to the current and future burden of disease. The five components of the health care system are: *1)* biomedical and health services research, *2)* health professions education, *3)* financing of health care services, *4)* delivery systems, and *5)* quality metrics.

Each of these components require years of transformation for the health care system to respond to the changing burden of disease. It is necessary for OECD countries individually and collectively to have a plan that will guide this transformation to meet the growing needs of people with chronic disease and multiple chronic diseases.

One important thing for policy makers to recognise is that not all five components are likely to change at the same rate and some of the components are heavily dependent on changes being undertaken in other components. By recognising the varying time lags that different components require, policy makers can accelerate the transformation in certain areas and help their health care systems become more responsive to the needs of people with chronic and multiple chronic diseases.

Creating an evidence base to treat people with chronic and multiple chronic conditions is a critical first step. As this chapter will show there is little scientific evidence on the best way to treat people with multiple chronic conditions. Having an evidence base to treat people with multiple chronic conditions is a necessary first step. However, changing the evidence base can take years and therefore it is necessary to begin as soon as possible.

The research infrastructure already in place is designed primarily to study acute and infectious diseases. Most of the research on chronic disease focuses on individual chronic diseases and not people with multiple chronic conditions. Increasingly, we need an evidence base to treat people with multiple chronic conditions since they represent over half of the hospital and physician encounters in most OECD countries and will become an increasing percentage of utilisation and spending in the coming years.

The educational system requires time to transform. An educational system that is not addressing the health care needs in the future is a significant problem. Physicians tend to practice in the same medical specialty for nearly 40 years and it is important to train physicians, nurses and other clinicians for the future needs of the country.

An ongoing challenge in the next decades will be to design payment and delivery systems that improve care for people with multiple chronic conditions. Fortunately, changing the payment and delivery systems can take comparatively less time. However, they require an evidence base and clinicians trained appropriately to be successful and this is why it is important to give priority to research and education. Quality metrics need to be expanded and revised, but this requires an evidence base.

Perhaps the greatest new challenge that the OECD countries will face over the next few decades is treating people with multiple chronic conditions. The systems are already beginning to address the growing cost and prevalence of people with chronic conditions. As the populations in each country grow older, the proportion of the population with multiple chronic conditions increases. Although there is not good data on the prevalence or cost of multiple chronic conditions in many OECD countries, it is likely that one quarter of the population has multiple chronic conditions and they utilise over half of all medical care services. These are people with combinations of chronic diseases such as hypertension, arthritis, dementia, COPD, heart disease and diabetes.

In many OECD countries, biomedical and health services research, health professions education, financing and delivery systems, and quality metrics are slowly becoming oriented to the prevention and treatment of single chronic diseases. The challenge will be to orient the health care system to help people with multiple chronic conditions. Biomedical research on chronic diseases generally focuses on single chronic diseases like diabetes while often ignoring the co-existing conditions a diabetic may have. In fact, people with multiple chronic conditions are often excluded from randomised clinical trials which make it difficult to create an evidence base to guide their care. Medical education in many countries still has a “body part by body part” orientation instead of an integrated approach. Similarly, delivery and financing systems are still generally focused on single chronic diseases. Disease management programmes, for example, tend to focus on a single disease. Quality metrics tend to focus on how the system is treating a specific disease.

This chapter uses the five dimensions to provide a general overview of the evolution of OECD health care systems over the past 50 years. It summarises some of the major changes that have occurred since the OECD was founded and attempts to forecast changes that will be needed in the future. The chapter focuses on how each of the five components have responded to the changing burden of disease in the past and how they will need to respond to the growing prevalence and cost of people with chronic and especially multiple chronic conditions in the future.

The increasing burden of chronic conditions and multiple chronic conditions

The burden of disease changed dramatically in the 50 years since the OECD was established. Table 1.1 shows the rates for infectious and parasitic diseases in 1960 and 2008 for eight OECD countries that had data in both years. Because of both public health and clinical advances, there have been tremendous reductions in the rates of infectious diseases in all eight countries. Similar reductions are seen in other OECD countries over different time periods. Note the number of deaths from infectious diseases include AIDS.

When the OECD was established, countries were already skilled at preventing and treating infectious diseases. As the prevalence of infectious diseases declined; more attention turned to acute illnesses. In most OECD countries, all five components of the health care system became focused on preventing and treating acute illnesses. Acute illness became the primary concern of the latter half of the 20th century.

Table 1.1. Age adjusted rates of infectious and parasitic diseases per 100 000 people

	1960	2008
Austria	394	53
Finland	547	39
Greece	1059	26
Hungary	771	42
Iceland	199	13
Ireland	464	35
Japan	1 152	52
Poland	1 342	84

Source: OECD Health Data 2010.

Chronic diseases are now the most common reason why people seek medical care in OECD countries. In the United States, for example, 85% of all health care utilisation is by people with at least one chronic conditions and 65% is by people with multiple chronic conditions (Robert Wood Johnson Foundation and the Johns Hopkins Bloomberg School of Public Health, 2010). While not all of these expenditures are used to treat chronic conditions (people with chronic conditions get in auto accidents), the numbers show the high proportion of health spending attributable to people with chronic conditions and multiple chronic conditions.

In most OECD countries, there is already reasonably good data on the prevalence of infectious diseases and acute illnesses because data systems have been established to collect this data. However, the burden of disease is changing and it takes time to revise the data systems to collect information on chronic diseases. Given that chronic disease now represents over half of the burden of disease in most OECD countries; more effort is needed on collecting data on the cost and prevalence of chronic disease. The OECD, for example, has information in its database on the prevalence of most infectious diseases, but not on many chronic diseases. One possible reason is that the data on chronic disease is not collected uniformly by all OECD countries. Efforts to standardise data collection across OECD countries for chronic diseases are needed.

The information gap is especially striking for people with multiple chronic conditions. Most likely people with multiple chronic diseases are responsible for the greatest burden of disease in most OECD countries in 2011 and their cost and prevalence will increase in the future as the population's age. However, we were unable to find data in most OECD countries on the prevalence of people with multiple chronic diseases. We also could not identify the most common chronic disease combinations; how much the various combinations of chronic disease cost over the year; or the rates of adverse events by the number of chronic conditions. This information is not available on the OECD data set.

The cost and prevalence of people with multiple chronic conditions is likely to be significant. In the United States, for example, two-thirds of all spending in the Medicare programme (the programme that insurers people over age 65 or who are disabled) is for people with more than five chronic conditions (Robert Wood Johnson Foundation and the Johns Hopkins Bloomberg School of Public Health, 2010). Analysis of the Medicare data also shows that the quality of care often becomes worse as the number of chronic conditions increases. For example, Medicare beneficiaries with four or more chronic conditions were 99 times more likely to have a preventable hospitalisation than someone with no chronic conditions; 90% of all hospitalisations for ambulatory care sensitive conditions (preventable hospitalisations) were for Medicare beneficiaries with multiple chronic conditions; and 98% of readmissions to an acute care hospital within 30 days occur in Medicare beneficiaries with multiple chronic conditions (Wolff *et al*., 2002).

As more epidemiological data on people with multiple chronic diseases becomes available; the focus will become how to create an evidence base for people with multiple chronic conditions. Data is power and tends to drive decision making.

Because research takes time to diffuse into general practice, it is necessary for clinical and health services research to anticipate epidemiological trends far in advance. A commonly used statistic is that it takes 17 years from publication in a medical journal to diffusion into general practice. Add to this another 3-10 years for the research idea to get funded; the research study to collect and analyse the date, the results to get published; and it can take 25 years for a new idea to diffuse into general medical practice.

Because of this time lag in getting research incorporated into practice, policy makers who fund biomedical research must anticipate the epidemiological changes so that the research findings will be relevant to the burden of disease 25 years later.

A challenge that policy makers face is how to shorten the length of time from new idea generation to broad diffusion in medical practice. Continuing medical education, practice guidelines, financing and delivery reforms, and quality metrics can be used to accelerate the diffusion rate.

Perhaps more important is that an evidence base is needed to inform decision makers about what works and what does not work in caring for patients. This evidence base is especially lacking in the care for people with multiple chronic conditions.

Biomedical and health services research are the foundation for changing the health care system. Together they create the knowledge base for preventing and treating disease, educating new clinicians, designing new financing and delivery systems, and creating quality metrics.

Biomedical and health services research

Biomedical and health services research is fundamental to changing the health care system because it provides the evidence base for knowing what is clinically appropriate for the patient. It also governs how clinicians are taught and influences how the financing and delivery systems are organised. Quality metrics rely on biomedical research. Without comprehensive and inclusive evidence on the safety and efficacy of medical interventions, clinicians may provide sub-optimal, or worse, potentially harmful treatment regimens to patients with multiple chronic conditions. A study examining the relevance of practice guidelines for people with multiple chronic conditions found that "applying good clinical practice procedures to a hypothetical 79-year-old woman with moderate severity osteoporosis, osteoarthritis, diabetes mellitus, hypertension, and chronic obstructive pulmonary disease leads to a potentially harmful treatment regimen" (Boyd and Fortin, 2010).

The rise of biomedical research began in Germany in the late 19th century. Clinicians in Germany began using the scientific method to train physicians and to conduct clinical experiments. The scientific model was then adopted by many other countries over the next few decades and became the standard for biomedical research in the world.

Biomedical research began to make significant advances in the late 19th century and this continued throughout the 20th century. One of the most significant entities that fostered biomedical research in the 20th century was the establishment of the National Institutes of Health (NIH) in Bethesda, Maryland. Starting as a small laboratory, it has grown to be the premier funder of biomedical research in the world. Biomedical research made tremendous strides during the 50 years of the OECD.

A key idea behind the foundation of NIH is a series of research institutes focused on specific diseases (*e.g.* National Cancer Institute). This focus on individual institutes created the model under which researchers would focus on single diseases such as AIDS, breast cancer, diabetes, or renal disease. Biomedical research became focused on studying discrete illnesses instead of addressing the multitude of diseases a person might have. Other OECD countries adopted a similar approach to NIH. Disease specific research became the predominant model of biomedical research in the latter half of the 20th century.

A problem with this single disease approach is that the burden of disease has continued to change and now people with multiple chronic conditions are responsible for a high percentage of health care spending and utilisation in most OECD countries. The approach to conducting biomedical research may require a new model to respond to the growing prevalence of people with multiple chronic diseases.

For example, the gold standard for conducting clinical trials is the randomised clinical trial (RCT). This type of trial measures a treatment's effect by randomly assigning participants to an intervention or control group. Randomisation allows researchers to identify causal relationships between a medical intervention and an outcome because it eliminates the potential bias that could taint the study findings. The design of the RCT aims to measure efficacy and not effectiveness. While efficacy measures the effect of a therapeutic agent under controlled conditions and settings, effectiveness measures a treatment's effect under less controlled conditions in "real world" health settings. Measuring efficacy is much easier in patients with a single disease. Therefore, it is very common for people with multiple chronic conditions to be excluded from randomised clinical trials.

A recent article in the *Journal of the American Medical Association* (JAMA) showed that 81% of RCTs exclude people with common medical conditions; 39% exclude older adults; and most surprisingly only half of the time is the exclusion criterion judged to be clinically relevant (Harriette *et al.*, 2007). The problem with the existing model can be illustrated most easily by picking up a recent issue of a clinical journal. For example, the first issue of the *New England Journal of Medicine* published in 2011 presented the findings of two clinical studies. Zannad *et al.* studied patients with systolic heart failure. The methods section contained a long list of categories of people who were excluded in the clinical trial. After listing a series of medical conditions like AMI, it then contained a catchall category "any other clinically significant, coexisting condition" (Zannad *et al.*, 2011) The Pimentel *et al.* study of patients with irritable bowel syndrome excluded patients with a series of medical conditions including diabetes, renal disease, thyroid disease, AIDS and also patients taking a series of drugs such as antibiotics in last 14 days, antipsychotic or anti diarrheal drugs (Pimentel *et al.*, 2011).

The lack of an evidence base has important implications for guidelines and quality metrics. One study found that many clinical practice guidelines fail to adequately provide guidance for patients with multiple chronic conditions (Boyd *et al.*, 2005). Without an adequate evidence base for treating people with multiple chronic conditions, it is difficult to design quality metrics, practice guidelines, or even design payment and delivery systems that are evidence based.

The exclusion of people with multiple chronic conditions from clinical trials presents the practicing clinician with a dilemma. Should the clinician follow the treatment protocol recommended by the clinical trial even if their patient would have been excluded from the clinical trial? Because different physicians might reach different conclusions on the relevance of a clinical study to a specific patient, it is common to see practice variation across physicians even when they rely on the same clinical trial. The current clinical research model is not providing an adequate evidence base for treatment of the most expensive and complex patients.

A challenge over the next ten years will be how to provide clinical evidence on the most effective way to treat people with multiple chronic conditions. There is precedence for changing the inclusion/exclusion criterion for clinical trials. Thirty years ago, most clinical trials excluded women. It was recognised that treatments that work on men may work differently on women. In the early 1980s, the Director of the NIH changed this policy and now most clinical trials are required to include women. Similarly, until the early 2000s most clinical studies excluded children. The FDA and the EMEA during this time implemented regulations and market-based incentives to spur research in pediatrics. Likewise, treatments may work differently on people with a single and with multiple chronic conditions. A number of different approaches are possible to include people with multiple chronic conditions in clinical research, but it will require the leadership of policy makers to set the direction.

Emphasis should be placed on funding research efforts that measure the effectiveness of therapies for patients with multiple chronic conditions. Fortunately, there are a variety of alternatives that would increase the evidence base for people with multiple chronic conditions. Our preliminary, informal review suggests that among most promising policy options are: pragmatic clinical trials; not covering off label use; clinical effectiveness research; post-marketing surveillance; and sophisticated modelling using existing data.

Pragmatic clinical trials are designed to address systematic flaws in the production of scientific evidence. According to a seminal article by Tunis, Stryer and Clancy published in the *Journal of American Medical Association* in 2003, the supply of pragmatic clinical trials "is limited primarily because the major funders of clinical research, the National Institutes of Health and the medical products industry, do not focus on support such trials" (Tunis *et al*., 2003). This is beginning to change: since this article was published there have been a limited number of pragmatic clinical trials.

Typically pragmatic clinical trials have the following components: *1)* inclusion of clinically relevant alternatives, *2)* inclusion of a diverse population, *3)* recruitment from diverse health care settings, and *4)* collection of data on a wide range of treatment options. If properly designed, pragmatic clinical trials would address the issue of providing an evidence base for people with multiple chronic conditions. Different countries may integrate pragmatic trials into their systems differently. As suggested by Bombardier and Maetzel, for example, while RCTs may be more appropriate for regulatory approval, to study the "true effect" of a treatment, pragmatic clinical trials may be appropriate for formulary approval (Bombardier and Maetzel, 1999). More research is needed to examine how well pragmatic clinical trials actually perform in practice.

Another proposal is to have insurers pay for services only if the patient would have been included in a clinical trial or meets some comparative effectiveness criterion (Garber, 2001). For example, if a drug trial would have excluded a certain patient from the clinical trial then the insurer would not have to pay for the drug in that patient. Under this proposal, only when there is scientific evidence that the drug, device, or procedure has been tested in that type of patient is coverage offered. To implement such a proposal, policy makers must define first what constitutes adequate evidence.

A number of countries have established entities that review the technologies before they are covered. The National Institute for Clinical Excellence (NICE) in the United Kingdom and the Institute for Quality and Efficiency in Health Care (IqWiG) in Germany are two technology assessment agencies that advise decision makers on reimbursement and formulary placement policies based on available clinical and economic evidence.

Clinical effectiveness research compares the benefits and harms of different interventions and strategies in "real world" settings. Many countries are engaged in comparative effectiveness research and much of the work centers around people with multiple chronic conditions. Comparative effectiveness research offers tremendous potential to provide evidence for people with multiple chronic conditions.

Recently, clinicians, biostatisticians and epidemiologists have begun to develop new statistical procedures that could help predict how people with multiple chronic conditions will respond even if they were not included in the original clinical trial. One such model is called Archimedes developed by David Eddy. The core of the Archimedes model is hundreds of equations that represent human physiology and the effects of diseases. Attached to these equations are hundreds more equations and algorithms that simulate the health care system including processes such as tests, treatments, admissions and physician behaviours. Together with population data, the equations are integrated into a single, large-scale simulation model.

There are also large co-operative trials, cohort studies, quasi experimental use of observational data, systematic reviews, meta-analysis, and other approaches that could provide additional information about people with multiple chronic conditions. Performing a retrospective data analysis using medical claims, for example, can produce information reflective of specific populations (for example, a particular combination of chronic conditions of interest) that RCTs cannot easily replicate. Each of these options needs to be reviewed to assess how well they can provide evidence to treat people with multiple chronic conditions.

The same transformation from infectious, to acute and now to chronic conditions is occurring in most low and middle income countries. In these countries, chronic disease is already responsible for over half of the burden of disease. However, because most low and some middle income countries are heavily dependent on foreign and international aid agencies to fund their health programmes; it is the perception of policy makers in the OECD countries that matter to a large extent. The Millennium Development Goals, for example, remain focused primarily on infectious disease and maternal and child health. None of these goals focus on chronic disease, in spite of the high cost and prevalence of chronic diseases in nearly all low and middle income countries. International aid will need to change its orientation to meet the changing burden of disease in low and middle income countries. Hopefully the September 2011 conference at the United Nations will begin to address this issue.

Health profession education

Health professionals can practice medicine for 30-40 years post-graduation. While there is continuing medical education and other opportunities for further training, often what is learned in medical school and residency shapes how a physician practices for the next 40 years. The same can be said for nurses and other health professionals. A key question is whether the health professionals are acquiring the correct skills to meet the changing burden of disease. The number and type of medical specialties in OECD countries has changed over the past 50 years and will need to change in the future to meet the changing burden of disease.

In most OECD countries, there has been a gradual increase in the overall number of physicians and nurses per capita since the OECD was created. It is, however, still debatable if the growth rate is sufficient to keep up with the aging of the population, the growing burden of disease, migration of health professionals, and other factors that influence the supply and demand for health professionals in a specific country.

While it is relatively easy to forecast demographic trends, it is more difficult to predict epidemiological trends and even more difficult to predict technological advances that would alter the need for certain types of health professionals. It is, however, relatively certain that the prevalence of chronic conditions and the prevalence of people with multiple chronic conditions will increase over the next few decades. Therefore, educational systems should make sure that they are focused on better care for people with multiple chronic conditions.

There is considerable variation across the OECD countries in the number of nurses and physicians per capita in 2008. Some OECD countries have more than twice the number of physicians and nurses per capita compared to other countries (OECD, 2008 and 2009). Some of this variation could be the result of accounting differences. However, much of the difference probably reflects different levels of health professionals. While policy makers can do little about the existing stock of health professionals, they can train additional health professionals.

Not all countries are training nurses and physicians at the same rate per capita in 2008. For example, Iceland and Ireland were training three times more physicians per capita than Israel, almost three times as many as Japan, and 2.5 times more physicians per capita than the United States or Turkey. In 2008, Iceland was training more than ten times the number of nurses per capita as Turkey and more than five times more nurses than the Czech Republic, Israel, Italy, or Spain. Clearly, OECD countries are forecasting very different needs for additional health professionals in the future. They are also starting from a different base number of clinicians.

The need for different medical specialties has changed over time. Initially many physicians were trained as infectious disease specialists. Infectious disease specialists require a different set of clinical skills than acute care clinicians and both of them require a different set of skills than physicians treating chronic disease, especially those who treat people with multiple chronic conditions.

Unfortunately, there is very little comparative data on the mix of specialties across the OECD countries. This would be useful to have in order to be able to compare how OECD countries are training physicians and nurses to meet the needs of the next few decades. It is likely that some countries are doing a better job than others in anticipating the needs for medical professionals over the next 40 years.

When the OECD was founded, most health care systems were hospital centric. This was both a legacy of the infectious disease era and the beginning of the acute illness orientation. Between 1960 and 2008, the percentage of the total health bill spent on hospitals in most OECD countries increased initially as the acute care era became predominant and later decreased as the prevalence of chronic disease increased. For example, in Australia, the 40.4% of all health care spending was for hospital services in 1960; the percentage peaked at 52.7% in 1977; and by 2007 it had declined to 39.9%. France showed a similar pattern – 30.9% in 1960, a peak of 51.9% in 1980 and down to 35.0% in 2008.

In spite of the significant change in the burden of disease and the associated change in how health care is delivered, most clinical education remains hospital centric. Physicians, nurses, and other health professionals continue to receive a large portion of their clinical training in hospitals. Policy makers should consider ways to revise the orientation to make clinical education more ambulatory care oriented. Unlike infectious and acute care which tends to be hospital centric, chronic care tends to be more ambulatory based.

Uneven geographic distribution of health professionals has remained a major policy concern in most OECD countries. Rural areas, areas with a high proportion of indigenous populations, and areas with high percentages of minority populations generally have less access to health professionals per capita. This is in spite of these geographic areas having greater health care needs in most instances. Because chronic care is ongoing care, access issues are becoming increasingly important as chronic care tends to be more locally provided.

What is taught in medical school, nursing school, and other health professions schools has changed dramatically since the creation of the OECD. With the growing prevalence of chronic disease and the growing prevalence of people with multiple chronic diseases, the upcoming challenge will be to redesign the curriculum once again. Care co-ordination, electronic health records, and data sharing skills will need to be stressed in the coming decades.

Task shifting in the health workforce presents another option to accelerate the expansion of human resources while reorienting clinicians toward care co-ordination and the chronic disease model of primary care. Several components of a physician’s core competencies are teachable to mid-level providers (nurse practitioners and physician assistants). These mid-level providers can manage care co-ordination for less complex patients and can take on behavioural health counselling and routine tasks of preventive health. This provides additional time for physicians to spend on those medically complex patients with multiple chronic conditions. Some OECD countries have embraced the expansion of the workforce to include these personnel.

Education is only a component of the necessary changes. Physicians, nurses, and other health professionals need to enter an environment that promotes the skills they learn in clinical training. Updating the education curriculum will not be very effective unless: *1)* the research infrastructure creates the evidence base to guide education and patient care; *2)* the payment and delivery systems help them administer the types of care they are trained to deliver; and *3)* the quality metrics measure what they are being trained to provide.

Financing

In most OECD countries, prevention and treatment of infectious disease is predominantly done by public health authorities. In treating infectious diseases, the state often provided the services directly, making the state responsible for both the financing and delivery of health care. As the burden of disease changed, the financing and delivery systems have evolved. There was a greater separation of financing and delivery.

During the tenure of the OECD, most member countries achieved universal health insurance coverage. Some countries already had achieved universal coverage by the time the OECD was established, while others gradually expanded coverage over the last 50 years until they obtained universal coverage. A few OECD countries still have not achieved universal coverage.

In most OECD countries, the system is publicly financed with supplemental private insurance available. Most of the policy debate occurred around what to cover in the basic benefit package and how to pay providers. Both of these issues have gradually evolved as the health care system has moved from acute illness to chronic disease.

When the predominant burden of disease moved to acute illness, some OECD countries established a benefit package based on the economist’s view of insurance. According to economic theory, insurance is meant to cover high cost, unpredictable events. In many countries, the initial benefit packages were designed around the acute care model. Once established, it is difficult to revise benefit packages.

A benefit package oriented around acute illness tends to emphasise inpatient hospital care, emergency room care, and physician services. As chronic disease becomes more prevalent; a greater focus on drugs, devices, long-term care, and social support services was adopted. Over time, most OECD countries have expanded their benefit packages to respond to the growing prevalence of chronic disease.

The major challenge in most OECD countries in the coming decade is how to integrate the medical and social services that are critical to people with chronic conditions. People with multiple chronic conditions are more likely to also have disabilities and the combination of disabilities and multiple chronic conditions complicates the care of their chronic illness and their disability. They also may need help with transportation or activities of daily living. Traditionally, these services were not part of the medical care system. This is beginning to change in most OECD countries.

A payment system oriented around acute illness tends to pay providers using fee-for-service. Each activity receives a separate payment. Over time, fee-for-service oriented payment systems have been demonstrated to induce increasing levels of utilisation and higher levels of health care spending. This has resulted in policy makers looking for alternative payment methods that are more responsive to people with chronic disease.

General practitioners, who tend to treat most of the chronic diseases and provide the care co-ordination, tend to receive less remuneration than specialists in most OECD countries. This reflects the acute care orientation of most systems. Some OECD countries are reducing the differential in order to provide financial incentives for physicians to focus on chronic conditions. The United Kingdom, for example, has increased the income of generalists to be more comparable to specialists. Several Scandinavian countries pay the primary care physician more than the hospital-based physician.

Chronic illness, by definition, requires ongoing care and is not a discrete event. As a result, most of the payment initiatives are moving towards episode of care, capitation, or care co-ordination. Each of these payment changes provides the clinician a greater financial incentive to prevent the chronic disease from occurring, manage it efficiently once it occurs, and select the most cost effective method of treatment over the long run.

The growing prevalence of people with multiple chronic diseases adds a new dimension to the payment issue. For a person with multiple chronic conditions (*e.g.* diabetes, asthma and congestive heart failure), the challenge is to find a way to encourage providers to manage all chronic conditions collectively instead of each one individually. The payment system needs to foster interaction across multiple providers.

Delivery systems

Delivery systems for infectious diseases tend to focus on just one disease. There are generally separate and distinct programmes for the prevention of polio, tuberculosis, AIDS and other infectious diseases. Often there are distinct hospitals and delivery systems to care for each infectious disease. This organisational structure makes sense for infectious diseases because the mode of transmission of each infectious disease is often very different, most patients only have one infectious disease and few patients have multiple infectious diseases.

With acute illnesses, the treatment modalities are generally performed in settings such as acute care hospitals that treat a multitude of acute illnesses. However, providers tend to treat each acute illness as a separate and distinct illness.

Acute care often requires expensive technologies. It is estimated that 27 to 48% of the increase in health care spending since 1960 is attributable to the growth in medical technology (Smith *et al.*, 2009). Much of this expenditure increase occurred in the hospital setting.

As the prevalence of disease has shifted more to chronic care, the demand for hospital care began to ebb and countries began to reduce the number of hospital beds. Good chronic care means ambulatory and not hospital care. Appropriate chronic care is often less technologically driven.

Critical to good chronic care is prevention. Many of the same risk factors – obesity, poor nutrition, alcohol abuse, inadequate exercise, smoking – that cause one chronic disease are also associated with multiple chronic diseases. OECD countries have initiated many programmes designed to address one or more of these risk factors. There is, however, limited sharing of information across countries on what types of interventions are most likely to be successful. The sharing of information across countries is probably most well developed for smoking and least well developed for obesity. Obesity, however, is becoming the major reason for chronic disease in the United States and in many other countries (Stewart *et al.*, 2009).

Raising taxes on tobacco products, for example, has generally been shown to reduce tobacco consumption. Less comparative data is available on efforts such as how urban planning can facilitate walking and bicycling (Matsudo *et al.*, 2002). Labelling of nutritional content requires partnership between government regulators and the private sector to enable individuals to make healthy dietary choices. Schools can require nutrition and exercise education and remove sugary drinks from their cafeterias. Employers can incorporate healthy habits that would benefit employees, potentially lower health care costs, and increase productivity. More information is needed on what works in various settings.

It will also take time for people to understand what they need to do themselves to exercise more, reduce their weight, stop smoking and take other efforts that will reduce their susceptibility to developing one or more chronic diseases. Some of this needs to be done in public engagement campaigns, some through incentive modification, some through group or individual counselling, and other approaches. OECD countries will need to compare information regarding what is most effective in each of these areas.

Unfortunately, in spite of the best preventive practices, many people will still develop chronic conditions and multiple chromic conditions. There are a number of models of how to deliver good chronic care. The chronic care model has been promulgated by the World Health Organization and it combines many of the components of good chronic care into a single model. It emphasises community involvement, team work, and other attributes that are not as common in preventing and treating infectious diseases and acute illnesses.

Increasingly the challenge is how to develop treatment programmes to deal with multiple chronic conditions. One challenge is that most of the demonstrations have found that it is very difficult to improve care and lower costs for people with multiple chronic conditions (Bott *et al.*, 2009).

A review of the literature suggests that successful programmes were careful in: who they enrol, how they involve people with multiple chronic diseases and where the care co-ordinator is physically located (National Coalition on Care Coordination, 2009). It is also necessary to have timely feedback so that the care co-ordinator can know what the other clinicians are doing for the person. Here is where electronic medical records have great promise.

Quality metrics

With infectious disease, the quality metrics to measure good health outcomes have been developed and have been widely disseminated. They are part of the OECD database. For acute illnesses, the structure, process and outcomes of quality is routinely measured. There are standard ways to measure the structure, process and outcomes of care and most OECD countries have adopted similar metrics. They tend to be disease specific and not about people with multiple chronic conditions. Patient safety and hospital acquired infection rates have become a major area of investigation in acute care settings and work in these areas is well established.

Measurement of quality metrics for chronic conditions is still evolving. It is more difficult to assess quality of care for an ongoing chronic disease. Typically quality of care is measured by things such as if the person received a certain treatment. For example, did the person with diabetes have a foot exam to make sure the diabetes did not cause problems that could result in amputation?

Typically, the quality indicators do not measure things like how the care is affecting their quality of life. Often there are few measures on how well care co-ordination is being performed. Care co-ordination is very important for people with multiple chronic conditions and it is not well measured in most OECD countries.

Quality metrics of physician performance are important for shaping physician and patient behaviour. Payments systems linked to performance need to have accurate quality metrics that encourage physicians to offer services to all patients, including those whose health is complicated by multiple conditions. In many cases the physician performance metrics do not include adequate adjustment for patients with multiple chronic conditions.

Clinician performance measures should be developed in order to measure the quality of health care for patients with multiple chronic conditions. Most existing quality metrics have the tendency to encourage clinicians to avoid medically complex patients. More refined performance measures would account for patients with multiple chronic conditions and thereby strengthen the capacity of performance-based payment systems to support care for those with multiple conditions. The new challenge for policy makers is to create quality metrics that measure how well care is being delivered to people with multiple chronic conditions. Currently there are few indicators that measure how well care co-ordination is being undertaken.

Quality metrics need to measure how well people with multiple chronic conditions are managing all the different chronic conditions. Often the care for one chronic disease can influence the best course of treatment for another chronic disease. The interactions across chronic diseases need to be taken into account.

The new challenge for policy makers is to create quality metrics that measure how well care is being delivered to people with multiple chronic conditions. Currently there are few indicators that measure how well care co-ordination is being undertaken.

Conclusions

The transformation to better care for people with multiple chronic conditions begins with biomedical research. Without adequate biomedical research on how best to treat a person with multiple chronic conditions, it will be difficult to create evidence-based quality metrics. As noted earlier, it is difficult to develop practice guidelines or quality metrics for people with multiple chronic conditions. However, since they represent over half the patients the typical physician and hospital sees during the day, it is important to get the measures correct.

Measuring both quality and effectiveness will also depend on access to better information and communication technology systems. As co-ordination of care has become more complex with multiple specialists providing services to a single patient, patient data management has become more complex. Information systems that integrate patient data through unique identifiers have the potential to make patient data available to multiple providers and to public health analysts. This can improve patient care by facilitating a specialist's awareness of a patient's care in totality. It can also augment surveillance, clinical research, and physician performance measures.

The challenge in the coming years will be to design a new delivery system and quality metrics that measure how well a person with a chronic disease is treated over an extended period of time and how well the care systems meets the wide array of needs for the person with multiple chronic conditions experiences. Most of the current metrics are for an individual episode of care.

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Chapter 2

Ageing, health and innovation: Policy reforms to facilitate healthy and active ageing in OECD countries

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While all OECD countries are experiencing unprecedented demographic change, which has the potential to unravel health and social care systems, a negative outcome is not inevitable. This chapter presents some of the policies and measures that can be implemented to support and facilitate healthy and active ageing. These policies have the potential to mitigate the impact of demographic change on society as well as helping older people to continue to be active and productive citizens whether as workers, consumers, volunteers or care givers.

Introduction

Across the OECD, countries are experiencing unprecedented demographic change resulting in increased longevity, an older population that is growing in size and a falling birth rate (OECD, 2010a; UN, 2008; Bloom and Canning, 2008). A larger older population and a comparatively smaller working age population can put a strain on publicly-funded health and social services including health care, social care and pensions (Stauner, 2008; Holmes, 2011; Fendrich and Hoffman, 2007; Christensen *et al.*, 2009; Bloom and Canning, 2008), which demands a policy response from OECD governments.

There are two schools of thought regarding demographic change. The first is to see it as a burden for society or a "silver tsunami" (Fried and Hall, 2008), which will require radical overhaul of health and social care systems (Rajoy, 2008) possibly to the point that they may no longer resemble what they were envisaged to be (Stauner, 2008). For example, providing universal health care for an ageing population will lead to higher costs that will not easily be met by merely increasing contributions (Stauner, 2008; Stabile and Greenblatt, 2010), so we may see an increasing tendency to reduce publicly-funded health care services to a basic minimum, so that those with the means may choose to opt for private health care, thus undermining the public system further (Stauner, 2008).

This approach questions the solidarity-based approach that many social welfare models, particularly in Europe, where the sustainability of pension and other social protection schemes are in danger (Stauner, 2008; Rajoy, 2008). It also pits different generations against each other, as generally working age people are net producers while many older people are net consumers of societal goods and services (Bloom and Canning, 2008). Young workers in particular may resent paying high taxes and social security contributions to fund what are seen as generous pensions, health and social care for the older generation (Stauner, 2008; Stabile and Greenblatt, 2010). We are calling this approach the "zero sum approach".

The second way to look at demographic change is to acknowledge that while it presents many challenges, it can also bring many opportunities. For example, increased longevity and increased healthy life years (Christensen *et al.*, 2009) can enable older people to continue being workers, volunteers and consumers for much longer than in the past, which can benefit employers, younger workers, working families, businesses and third sector organisations who rely on volunteers (Sinclair, 2010; Kuhn, 2010; Holmes, 2011). The International Longevity Centre works on the basis that different generations can make useful, albeit different, contributions to society; this is known as the life course approach.

OECD countries are now addressing the challenges of demographic change in a variety of policy responses. Almost all countries have made changes to their pension systems including among others increasing the state pension age (OECD, 2006; 2007a; 2007b). Many have also increased the contributions that fund health care services while increasing user cost-sharing in the form of higher co-payments, reduced reimbursement or in some cases are no longer publicly funding or providing some services (Folland *et al*., 2009; Santerre and Neun, 2010; Docteur and Oxley, 2003). A shrinking workforce in many OECD countries means that policies that enable flexible working to allow older workers and those with caring responsibilities (for children or older relatives) to participate in the labour market are being introduced in many countries (Stauner, 2008; Relationships Foundation, 2011).

However, alongside these traditional policy responses there are also innovative solutions which include new ways addressing ageing that may involve new technology and new processes. In the area of health, a life course approach includes an increased focus on prevention and the promotion of healthy lifestyles at all stages of life to keep people active and prevent or mitigate chronic disease (Rajoy, 2008; Chappell and Hollander, 2011; Christensen *et al.*, 2009) as well as a focus on keeping people independent and out of institutional care (Martin, 2010).

Changing demographics

In all OECD countries over the last 50 years, life expectancy has increased dramatically and birth rates have fallen significantly in some countries (OECD, 2010a). This is due to substantial improvements in health care, nutrition and other factors (Costa-Font *et al.*, 2008). This is changing the structure of society and raising questions about the sustainability of health, social care and pensions systems that were created with a very differently structured society in mind (Stauner, 2008).

Even in the wealthiest OECD countries life expectancy has increased by approximately ten years (OECD, 2010a). For example, in Germany, life expectancy increased from 69.1 years in 1960 to 80 years by 2007, and in Australia from 70.9 years to 81.4 years over the same period (OECD, 2010a). Less wealthy OECD countries have seen even larger increases in life expectancy, for example, Turkey has seen life expectancy increase from 48.3 years to 73.4 years from 1960 to 2007; during the same period Korea's life expectancy increased from 52.4 years to 79.4 years (OECD, 2010a).

Birth rates have fallen in all OECD countries and in many, in particular the EU member states that belong to the OECD, it has fallen below replacement level of 2.1 children per woman of child bearing age assuming no immigration (Rajoy, 2008; Mann, 2008). Many European countries therefore face depopulation (Rajoy, 2008; Stauner 2008). Falling birth rates have been particularly marked in those countries which had previously had very high birth rates, such as Mexico, where the number of children born to women aged 15-49 was 6.77 in 1970, but only 2.17 by 2006 (OECD, 2010a).

In the European Union, fertility decline has been higher in southern and eastern Europe than in northern and western Europe, with some studies suggesting that higher decline is linked to the strength of the male breadwinner model and low female labour market participation (Costa-Font *et al.*, 2008). It is also important to note that smaller families and increased female labour participation affect the availability of future informal care givers (Costa-Font *et al.*, 2008; Stauner, 2008). Meanwhile, in those countries that have had low birth rates for many decades, including the Czech Republic, the birth rate has fallen further from 1.91 children per woman in 1970 to only 1.33 children per woman by 2006 (OECD, 2010a).

Migration is already playing a role in the population characteristics of some OECD countries (Costa-Font *et al.*, 2008). For example those who emigrated to the United Kingdom and Germany in the 1960s and 1970s are now becoming part of the older retired population (Costa-Font *et al.*, 2008) and in many countries, for example Italy and Austria, the care workforce is being bolstered by formal and informal migration mostly from poorer EU countries (Kuhn, 2010). Mann (2008) points out that many EU member states may only be able to maintain their population through immigration if birth rates remain low.

However, in the European Union, even assuming that current levels of migration stay the same, the size of the working population will fall from 277 million in 2005 to 183 million in 2040 (Stauner, 2008). Migration could help some OECD countries to temporarily ease the pressures of demographic change in the short term, for example pressure on publicly-funded pensions may be eased when immigrants pay taxes and social security contributions, but in the long term those economically active migrants will build their own pension rights, so reform is still needed, even if there may be more time to implement it (Rajoy, 2008; Mann, 2008).

This population decline is leading to a growing older population, which is not only living longer, but is also making up a larger proportion of the population than ever before leading to changes in what is called the dependency ratio or the old age support ratio (the ratio of working age people to people of non-working age) (Bloom and Canning, 2008). In 1950, the OECD average dependency ratio was 7.21, but by 2000 it had fallen to 4.17 and is predicted to fall to 3.34 by 2020 and 2.08 by 2050 (UN, 2008). The United Nations predicted in 2008 that by 2010, the average dependency ratio in the OECD would be 4.12, but this hides differences amongst countries, which sees Turkey with a dependency ratio of 9.83 in 2010 compared to 2.63 in Japan and 2.96 in Italy (UN, 2008). However, looking at the predicted 2050 figures reveals a great deal of convergence with dependency ratios varying from 1.24 in Japan to 3.15 in Turkey, although the majority (20/34 countries) falling between 1.7 and 2.5.

At the same time, there has been both compression and expansion of morbidity (Costa-Font *et al.*, 2008), in what is known as the "epidemiological transition", where people no longer die from infectious diseases due to advances in medical science, but instead are more likely to suffer from chronic and degenerative diseases including cardiovascular disease, diabetes and dementia (CDC, 2003). In the United States, around 80% of people over 65 have one chronic conditions and 50% have two (CDC, 2003).

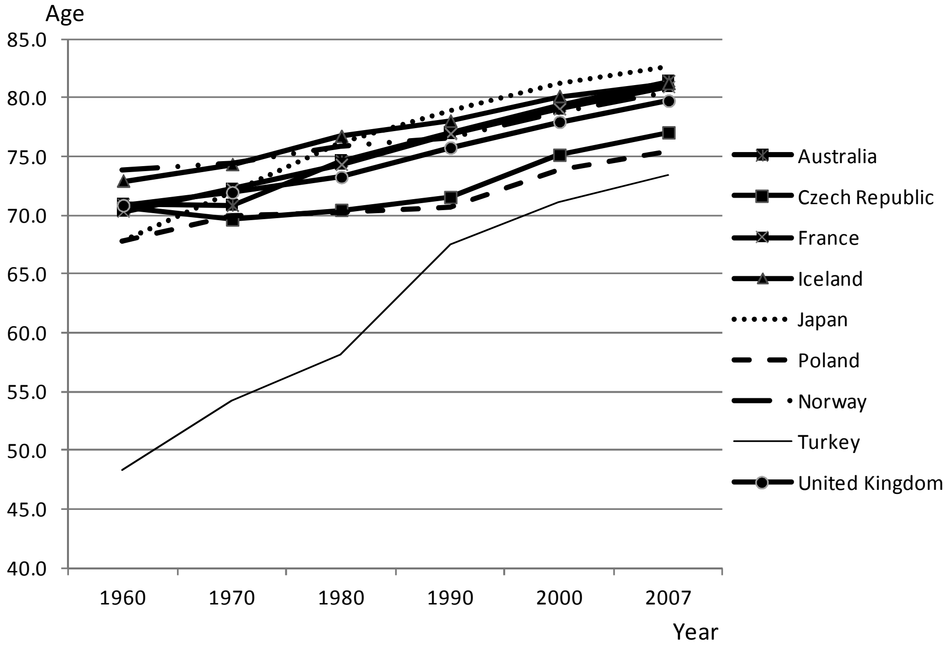
With regard to dementia, the developed world is facing a "tsunami" as demographic change leads to more people reaching an age where they are likely to develop dementia (Bamford, 2010). The *World Alzheimer Report 2009* states that there are currently 35.6 million people with dementia with the numbers set to double every 20 years to 65.7 million in 2030 and 115.4 million in 2050 (Alzheimer's Disease International, 2009). Around 7.3 million Europeans (EU27) had some form of dementia in 2006 (Bamford, 2010). Dementia predominantly affects the over 65s and the risk of developing dementia doubles every five years after the age of 65 (Bamford and Taylor, 2011).

The most common form of dementia is Alzheimer's disease (OECD, 2004; Royal College of Psychiatrists, 2009), which is also the fourth most common cause of disease burden in high income countries (Alzheimer's Disease International, 2009). Dementia rarely occurs alone and is often accompanied by cardiovascular disease and mental health problems such as depression (Bamford and Taylor, 2011). There is evidence from England and the US State of Wisconsin that early diagnosis and intervention (social and psychological as well as pharmacological) can delay admission to care homes (Bamford, 2010).

Chronic diseases are both age and lifestyle related. For example, type II diabetes is linked to obesity and the likelihood of developing chronic diseases including cancer (now often considered as a chronic disease due to advances in medical science) increases with age (WHO, 2003). The lifestyle element of chronic disease means that preventative strategies, particularly those that improve diet and increase physical exercise can help older people reduce the risk of chronic disease and cancer and/or manage chronic diseases more effectively (Rajoy, 2008; WHO, 2003; WCRF, 1997).

What does this mean for OECD countries? Many predictions say it means that countries will have to devote more of their GDP to funding health care, social care and pensions. For example, Costa-Font *et al.* (2008) point to a 2006 study suggesting that European countries will need to increase their expenditure on long-term care by 1.7 percentage points of GDP from 2004 to 2050 due to an increase in the number of older citizens with care needs. Stauner (2008) cites estimates that public expenditure on health care will increase by 1.5% to 2% of GDP by 2050 for most EU countries. Robson (2009) writes that demographic change threatens to push the cost of Canadian government programmes for health, education, families and older people from 15% to 19.4% of GDP over the next 50 years.

Figure 2.1. Life expectancy in different OECD countries, 1960-2007



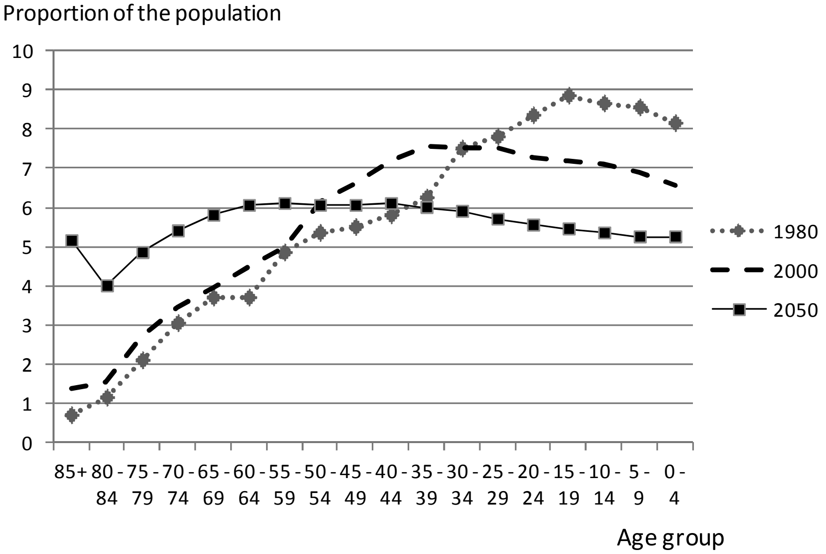
Source: *OECD Health Data 2010*.

Table 2.1. Life expectancy in the OECD, 1960-2007

	1960	1970	1980	1990	2000	2007
Australia	70.9	70.8	74.6	77.0	79.3	81.4
Austria	68.7	70.0	72.6	75.6	78.2	80.3
Belgium	69.8	71.1	73.3	76.1	77.8	79.8
Canada			75.3	77.6	79.0	80.7
Chile				72.9	76.8	77.8
Czech Republic	70.6	69.6	70.4	71.5	75.1	77.0
Denmark	72.4	73.3	74.3	74.9	76.8	78.4
Estonia				69.6	70.6	72.9
Finland	69.0	70.8	73.6	75.0	77.7	79.5
France	70.3	72.2	74.3	76.9	79.0	80.9
Germany	69.1	70.6	72.9	75.3	78.2	80.0
Greece	69.9	72.0	74.5	77.1	78.0	79.5
Hungary	68.0	69.2	69.1	69.4	71.7	73.3
Iceland	72.9	74.3	76.7	78.0	80.1	81.2
Ireland	70.0	71.2	72.9	74.9	76.6	79.7
Israel			73.9	76.7	78.8	80.6
Italy			74.0	77.1	79.8	81.5
Japan	67.8	72.0	76.1	78.9	81.2	82.6
Korea	52.4	62.2	65.9	71.4	76.0	79.4
Luxembourg	69.4		72.8	75.6	78.0	79.4
Mexico	57.5	60.9	67.2	70.6	73.9	75.0
Netherlands	73.5	73.7	75.9	77.0	78.0	80.2
New Zealand		71.5	73.2	75.5	78.4	80.2
Norway	73.8	74.4	75.9	76.6	78.7	80.5
Poland	67.8	70.0	70.2	70.7	73.9	75.4
Portugal	63.9	66.7	71.4	74.1	76.7	79.1
Slovak Republic	70.6	69.8	70.6	71.0	73.3	74.3
Slovenia				73.3	75.5	78.2
Spain	69.8	72.0	75.4	77.0	79.4	81.1
Sweden	73.1	74.7	75.8	77.6	79.7	81.0
Switzerland	71.4	73.1	75.6	77.5	79.9	81.9
Turkey	48.3	54.2	58.1	67.5	71.1	73.4
United Kingdom	70.8	71.9	73.2	75.7	77.9	79.7
United States	69.9	70.9	73.7	75.3	76.7	77.9

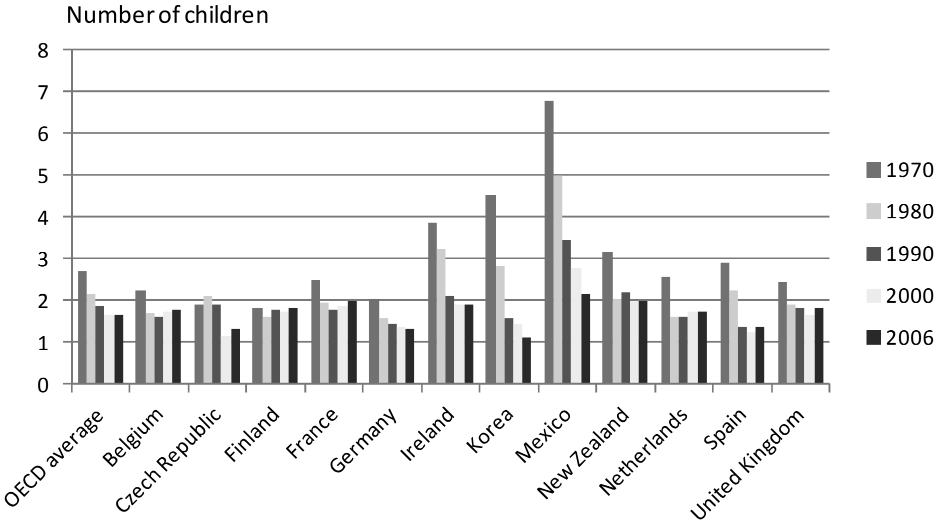
Source: OECD Health Data 2010.

Figure 2.2. OECD population by age groups



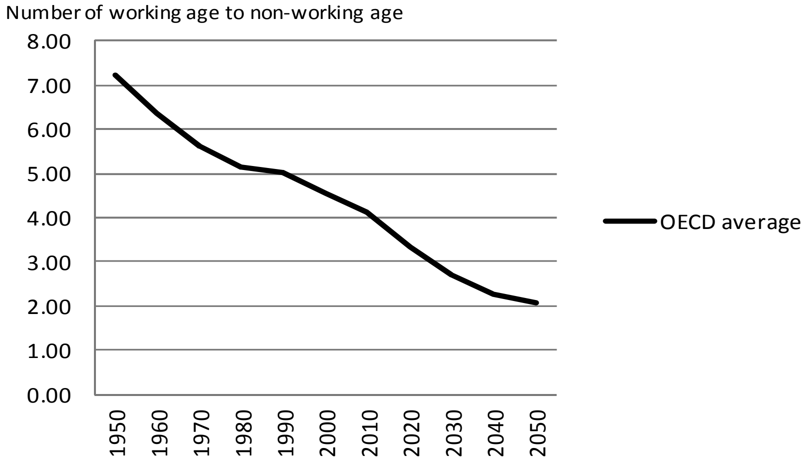
Source: OECD population pyramids (2000 & 2005).

Figure 2.3. Number of children per woman aged 15-49



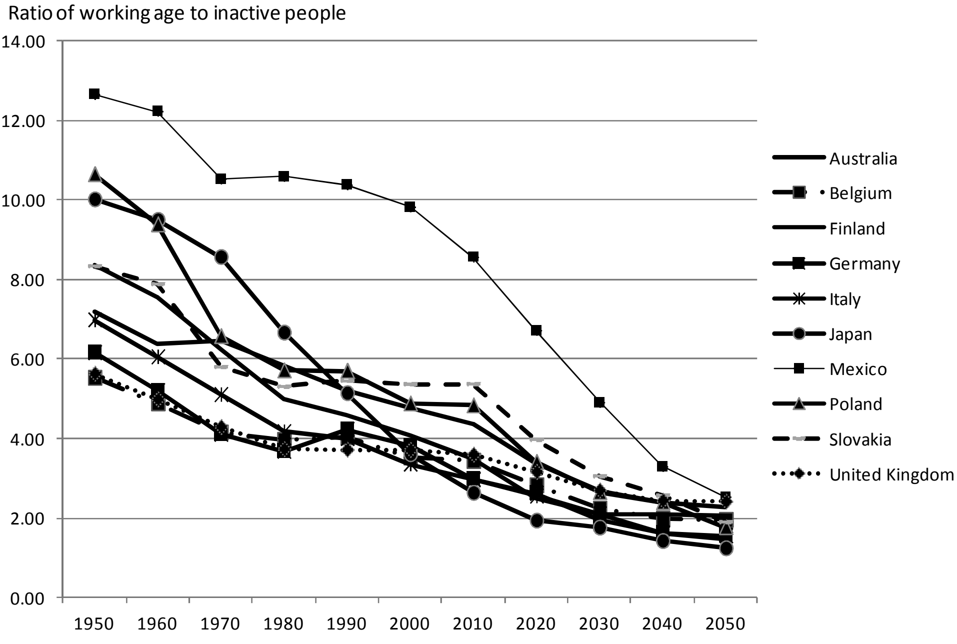
Source: OECD Factbook 2010, "Economic, Environmental and Social Statistics".

Figure 2.4. OECD average dependency ratio



Source: UN (2008).

Figure 2.5. Dependency ratio in selected OECD countries



Source: UN (2008).

The zero-sum approach

Across OECD countries changing demographics are putting pressure on pensions and public services such as health and social care to the extent that funding cannot keep up with spending and the principle of solidarity in social systems is being called into question.

This approach sees older people as burdens on society with their demands on health care and other social welfare service and the solution to the problem being radical reform of social systems (Rajoy, 2008; Mann, 2008). While, no OECD government has yet suggested abandoning solidarity-based social systems leaving people to take care of themselves, some including Stauner (2008), fear that some policy solutions in this area could inadvertently start countries on this path.

Radical overhaul means increasing contributions while cutting public spending on health care, social services and pensions (Stauner, 2008). However, in many OECD countries people are currently facing escalating living costs at the same time as their wages are falling because of pay freezes, inflation or sometimes simply lower wage rates (Kelly, 2011; Semuels, 2011; Mes, 2010). In such a climate, there may be a limit to how much more tax and contributions people are willing and able to pay.

In health care, longevity would be seen as allowing people to live longer in order to be ill or disabled for longer because the rise of chronic disease and functional disability means expanded rather than compressed morbidity (Parker and Thorslund, 2007). Rather than investing in the health of older people to promote healthy ageing, this approach would seek to either reduce services provided or ask older people to contribute more via cost-sharing for health care (Parker and Thorslund, 2007; Stauner, 2008).

There is also a greater risk of damaging the fabric of social welfare systems and their solidarity-based models (Stauner 2008). For example, in health care, Stauner (2008) envisages a “worst case scenario” future of reduced publicly-funded health care services providing only the basics, being abandoned by those with the means to opt out, leaving them further undermined and attacking the principle of social solidarity.

The zero sum approach also pits different age groups against one another, potentially resulting in intergenerational conflict as described in *The Pinch – How the Baby Boomers Took their Children’s Future and Why They should Give It Back* (Willetts, 2010). The current UK Universities Minister believes that the so-called baby boomers are bringing massive health and social care costs, which are being paid for by smaller younger cohorts, many of whom face debts from their education, job insecurity, higher taxes and overpriced housing (Willetts, 2010).

In a similar book entitled *Jilted Generation: How Britain Has Bankrupted its Youth*, two young journalists write about the struggle of their generation including large student loans, endless unpaid internships to try and find that elusive secure job while having to live in poky overpriced housing (Howker and Malik, 2010).) The authors lay the blame squarely at the door of the baby boomers and the errors in policy they have made over the last 25 years, which have disproportionately benefitted the old at the expense of the young (Howker and Malik, 2010).

The zero-sum approach would view older workers working longer as blocking jobs for the young (Kuhn, 2010). While older workers aged over 50 who lose their jobs still find it very hard to find new employment (TAEN, 2011), employers have generally preferred to retain middle to late age workers rather than recruit younger ones in the current economic crisis (Muller-Camen *et al*., 2011). It is therefore true to say that the financial crisis has hit the young (under 25) hardest in terms of unemployment in all OECD countries although there are also significant differences amongst different members (OECD, 2010b). Unemployment among those aged 16-24 was around 20% in the OECD area as a whole in 2010, with around 21.1% in Europe, 18.2% in the United States, but only 8.8% in Japan (OECD, 2010b).

There has also been conflict between public sector and private sector workers, based on the idea that public sector workers can retire earlier on better more stable pensions than their private sector counterparts (BBC News, 2010a). Most public sector pension schemes in the OECD are unfunded comprising of pension contributions from existing employees as well as funding from general taxation (OECD, 2006). For example in the United Kingdom, the public sector pensions commission calculated that around half the public sector pension liability was covered by contributions from employees and employers (BBC News, 2010a). In the United Kingdom, most public sector workers are now required to retire at 65 and even those who can retire earlier such as fire-fighters have seen their minimum age for retirement rise (Muller-Camen *et al*., 2011).

Attempts to reform public sector pensions have provoked angry responses in some OECD countries, for example Greece is currently witnessing demonstrations against the government's austerity package which include significant changes to public sector pensions (Smith, 2011). In France an estimated 2 million demonstrators took to the streets to show their opposition to proposals to reform public sector pensions, but the government still succeeded in passing the plans (*Le Point*, 2010). In Ireland, plans are currently underway to remove tax relief from private sector pensions in order to help fund public sector pensions, a move which is seen as another attack on the private sector, although previous government borrowing and bank bailouts are being blamed more than demographic change (Fitzsimmons, 2011).

Life course approach

There is however another side to this debate, which does not see demographic change as a burden on society, but rather an achievement to be celebrated and the path to opening new opportunities. The life course approach adopted by the International Longevity Centre does not see younger people as productive and older people as burdens, but envisages that people of all ages have positive contributions to make to society, albeit those contributions may change over time.

Living longer is also about living better and that means being able to be an active member of society far longer than in the past, be that through working, volunteering or being consumers. Living better while living longer is not however automatic and requires appropriately supportive environments and policies, which will be further discussed in the policy reforms section of this chapter.

Employers can benefit from the skills and experience of older workers, as can their younger colleagues on both a formal and informal basis (Kuhn, 2010). Formally capitalising on the skills and experience of older workers is particularly important in sectors or organisations where the workforce is ageing, as this can prevent workforce de-skilling as the older workers retire and prevent early retirement at a time of a shrinking overall workforce (Kuhn, 2010; Mann, 2008). Capitalising on older workers requires flexible working, flexible pensions and flexible retirement (van Vuuren, 2011).

There are those who would posit that older workers are contributing to youth unemployment treat the labour market as rigid and unable to respond to change, when historical evidence *e.g.* large increases in female labour market participation during the last 50 years, has shown this to be false (Mann, 2008; Siba and Sinclair, 2010). This view also ignores the fact that age discrimination in the workplace generally disadvantages older workers and favours younger workers, especially when it comes to training and career progression (Kuhn, 2010; Billet and Van Woerkum, 2008; Holmes, 2011).

If older people can continue working, either because they want to or because financially they need to, this can enable them to further build up pensions and other retirement savings (Berry, 2010; Kuhn, 2010). Better off older people can provide new markets for consumer goods and services, although in general businesses have been slow to react to this new market, which as far back as the 1970s was recognised as being potentially bigger than the youth market (Sinclair, 2010a).

Sinclair's research undertaken in the United Kingdom revealed that there was no such thing as "the older consumer", but many sub-groups of older consumers, whose heterogeneity was not purely linked to age, but related to different factors including wealth, geographic location, personal mobility and digital savvy (Sinclair, 2010a). Older consumers encountered barriers including product design, the retail environment, public transport and poor quality marketing, indeed Sinclair (2010a) even found that some wealthier older consumers said they consumed less than they would like to because of various barriers.

Research in other countries has shown similar problems; Dixon (2008) reported that although the over 50s are the main group of restaurant diners in many European cities and therefore a key target market for restaurants, many find reading menus by candlelight in restaurants difficult without reading glasses.

The larger the older population becomes, the more important it will become as a consumer market for existing products and services as well as for new innovations to meet the needs of specific groups of older consumers, such as the market for personal health technology, which has barely got off the ground, except in Japan (Sinclair, 2010b).

A life course approach to health is particularly valuable when one considers that chronic disease rather than age *per se*, which uses up vast amounts of health care resources. Chronic disease prevention is a life course endeavour, but changing to a healthier lifestyle even in later life can reduce the risk of developing chronic disease (WHO, 2003; Chernoff, 2003).

There is evidence that lifestyle habits can reduce and compress serious illness and disability into a shorter period at the end of life (Hubert *et al.*, 2002; Fries, 2003) and evidence showing that it is cost effective to invest in policies to prevent chronic diseases (Chappell and Hollander, 2011).

In respect of cardiovascular disease, a study by Lloyd-Jones *et al.* (2006) found that the absence of the five key risk factors of overweight/obesity (measured by BMI), smoking, high blood pressure, high LDL cholesterol levels and diabetes (measured by fasting blood glucose), resulted in a very low lifetime risk for cardiovascular disease (CVD) and markedly longer survival.

Table 2.2. Lifetime risk for CVD and median survival for men and women by aggregate risk factor status at 50 years old

	Men			Women		
	Lifetime risk of CVD to 75 years old	Lifetime risk of CVD to 95 years old	Median survival (IQR)	Lifetime risk of CVD to 75 years old	Lifetime risk of CVD to 95 years old	Median survival (IQR)
Overall	35%	51.7%	30	19.2%	39.2%	36
Absence of major risk factors	5.2%	5.2%	>39	8.2%	8.2%	>39
Two or more major risk factors	53.2%	68.9%	28	37.8%	50.2%	31

Note: Lifetime risk at the 95% confidence interval, CVD: cardiovascular disease; IQR = interquartile range.

Source: Lloyd-Jones *et al.* (2006).

The difference between those with no major risk factors at 50 years old and those with two major risk factors, is startling. What is particularly interesting is that the risk of lifetime CVD for those without major risk factors is the same at 95 as at 75, whereas for those with two or more risk factors, their lifetime risk increases significantly from 75 to 95 (Lloyd-Jones *et al.*, 2006). While the difference in median survival are less stark; typically the “healthy” 50-year-old will live an additional 8-10 years than those with two risk factors (*op. cit.*), presumably the quality of life of those who do not develop CVD is better than those who do, although the study does not investigate this.

In addition, many diseases that caused serious disability or mortality in the past can now be managed far as a result of advances in medical science (Christensen *et al.*, 2009; Holmes, 2011). Chronic conditions such as type II diabetes and hypertension are diagnosed earlier and treated more effectively than in the past (Christensen *et al.*, 2009). The treatment of some diseases can be revolutionised. For example, people with rheumatoid arthritis, an autoimmune chronic disease characterised by inflammation and pain in the synovial joints, used to expect long-term disability as standard treatment was able to manage symptoms, but not prevent disease progression including joint damage that led to disability (Emery, 2006; Smolen *et al.*, 2007). However, today, there are innovative biotech medicines to treat rheumatoid arthritis sometimes used in combination with other traditional disease modifying antirheumatic drugs (DMARDs) (Emery, 2006; Smolen *et al*., 2007). Clinical trials using this approach to treat early stage moderate to severe rheumatoid arthritis have demonstrated the ability to manage symptoms and prevent disease progression (measured radiographically), which can result in the patient leading a normal life with minimal or no disability (Emery *et al*., 2008; Smolen *et al*., 2007). This indicates the continued need for a dual approach to chronic diseases, namely encouraging innovation in biomedical science as well as better prevention and disease management strategies.

Policy reforms in ageing health and innovation in OECD countries

Non-health related

Pension reform

One very common policy response to increased longevity is pension reform to ensure the future sustainability of pension systems while ensuring that older people receive adequate retirement income (OECD, 2009). The most common measures taken are raising the state pension age, scrapping or limiting the possibility of early retirement and encouraging personal (individual/employer) pension provision (OECD, 2006 and 2009).

Almost all OECD countries have made changes to state pension age; those with a state pension age below 65 are in the process of raising it such as Japan, Korea and the Czech Republic, whereas countries such as the United Kingdom, Germany, Denmark and the Netherlands that already have a state pension age of 65 are increasing it (OECD, 2009; *The Guardian*, 2010). However, it is important to note that most while the state pension age guides retirement, many people retire before reaching it, while others choose to continue working (Berry, 2010; see Table 2.3).

Many countries including Portugal, Turkey, France, Germany, Italy, Japan and Sweden have cut future benefits, although many have targeted cuts so that poorer people are not adversely affected (OECD, 2007). A number of OECD countries, such as France, Hungary, Poland, Portugal and Germany have made personal pension provision more attractive through favourable tax treatment, while other countries such as New Zealand and the United Kingdom have introduced or are introducing opt-out personal pension schemes for people without access to employer-based schemes (OECD, 2009).

Table 2.3. State pension age in OECD countries

	Male	Female	About to change?	Notes
Australia	65	63	Yes	Women's pension age will gradually rise to 65 by 2014 and both will increase to 67 in stages between 2017 and 2023.
Austria	65	60	No	
Belgium	65	65	No	
Canada	65	65	No	The normal pension eligibility is age 65 but an early pension can be claimed from age 60.
Chile	65	60	No	
Czech Republic	62	61	Yes	Retirement age will be increased for men to 63 years from 2016 and for women without children from 2019 and to age 59 to 62 for women with children (depending on number of children they have raised).
Denmark	65	65	Yes	Government propose to raise the age to 67 over an eight year period starting in 2017.
Finland	63	63	No	Under the Employees' Pension Act (TYEL) the retirement age is 63 to 68 years.
France	60	60	Yes	Will be raised to 62 over the next eight years.
Germany	65	65	Yes	This will increase to age 67 between 2012 and 2029. It is possible in some circumstances to retire at 63 years.
Greece	65	60	Yes	There are plans to increase women's age to 65 years.
Hungary	62	62	Yes	Retirement age will increase to age 65 for men from 2018 and for women from 2020.
Iceland	65	65	No	This is for the public sector. The legal retirement age for private sector employees is 67.
Ireland	65	65	No	There is no fixed retirement age for employees. There is a statutory retirement age of generally 65 for some public servants.
Italy	65	60	No	
Japan	60	60	Yes	The pension age is gradually being increased to 65, between 2001 and 2013 for men and between 2006 and 2018 for women.
Korea (Rep. of)	60	60	Yes	The pension age is being increased gradually and will reach age 65 by 2033.
Luxembourg	65	65	No	Normal retirement age is 65 but early retirement at 57 is possible.
Mexico	65	65	No	Normal retirement age is 65 years but early retirement is available from age 60.
Netherlands	65	65	Yes	There are plans to increase the retirement age to 67.
New Zealand	65	65	No	
Norway	67	67	No	60% of employees are entitled to early retirement from the age of 62 years under the early retirement plan.
Poland	65	60	No	There are some professions that are entitled to earlier retirement such as teachers and armed forces.
Portugal	65	65	No	Early retirement is possible in some circumstances from the age of 55 years.
Slovakia	62	57	Yes	The retirement age for women is currently increasing to 62 years by 2014 so that both sexes will be equalised
Spain	65	65	No	
Sweden	61	61	No	The retirement age is flexible, state pensions can be claimed from age of 61 years.
Switzerland	65	64	No	
Turkey	60	58	Yes	There are plans to increase the retirement age in stages from 2035 to age 65 for both men and women.
United Kingdom	65	60	Yes	The retirement age for women is being increased between 2010-20 to 65 years. State pension will rise to age 66 in 2024, age 67 in 2034 and age 68 in 2044.
United States	66	66	Yes	Increasing to age 67 in stages.

Source: The Guardian (2010).

When it comes to incentivising early or later retirement, there are differences (OECD, 2009). Countries can however take different options; for example Germany retains state-funded early retirement which acts as an incentive, whereas the United Kingdom abolished it a long time ago and incentivises people to retire later by improving pension entitlements for those who defer their state pension (Muller-Camen *et al*., 2011).

While some OECD countries such as the United States do not have a default retirement age, many do. Until recently, the United Kingdom had a default retirement age of 65, which meant that an employee could be forced to retire at 65 even if they did not want to (BIS, 2011) The scrapping of the default retirement age was warmly welcomed by older people's organisations and trade unions and cautiously welcomed by employers; retirement will now become the subject of negotiation between employee and employer (BBC News, 2010a).

Flexible working, gradual retirement and lifelong learning

One of the reasons that older workers retire when they are capable of continuing to work is that they face a rather inflexible workplace that gives them the stark choice between continuing to work full-time or stopping work altogether (Berry, 2010; Kuhn, 2010). An ILC-UK discussion paper on the future of retirement finds that many older people favour the idea of gradual retirement, but that gradual retirement options are only available to highly skilled workers (Berry, 2010).

Older workers who wish to continue working, but work fewer hours, may wish to spend their free time pursuing other interests that may include volunteering or looking after grandchildren (Holmes, 2011; Kuhn, 2010, Berry, 2010). Flexible working does not just refer to working hours, but to opportunities for older people to adapt their work to their stage in life through job-redesign and lifelong learning (Kuhn, 2010; Siba and Sinclair, 2010). Job redesign means adapting a person's role to their capabilities, for example an older person may want a similar role, but one that is less physically demanding (Kuhn, 2010; Siba and Sinclair, 2010).

Despite age-discrimination legislation, many companies exclude older workers from training, which encourage them to retire (Kuhn, 2010; Rajoy, 2008; Mann, 2008; Van Vuuren, 2011). Opening up training possibilities to older workers is not just good for employees, employers can benefit as it may avoid them losing experienced employees who can also help to train and mentor younger colleagues (Kuhn, 2010; Rajoy, 2008; Mann, 2008). In addition, flexible working should not just be for older workers, it can enable parents with children, people with caring responsibilities and people with disabilities or chronic conditions to enter the labour market more easily

(Relationships Foundation, 2011; Stauner, 2008; Rajoy, 2008; Siba and Sinclair, 2010). Kuhn (2010) has a vision of lifetime-oriented working time, which would allow different working patterns during different phases of life *e.g.* family leave for those with young children and reduced working hours for older workers.

As demographic change results in a shrinking workforce in many OECD countries, offering more flexible employment including to keep older workers from retiring while they are still able to contribute, will not be a "nice to have" option, but a necessity (Kuhn, 2010; Rajoy, 2008; Mann, 2008). A tool developed in Germany to help employers plan future workforce needs revealed that some would have no workforce left by 2030 if drastic changes to employment policies were not made (Kuhn, 2010). In addition, some companies have found that workers in their 50s are more reliable and take less sick leave than those in their 20s (Siba and Sinclair, 2010), a feature which could encourage more companies to try harder to recruit and retain older workers. Some large companies, for example B&Q, a DIY store in the United Kingdom have already done this (Siba and Sinclair, 2010). Kuhn (2010) suggests that changes in attitudes and working practices such as job redesign and mixed age teams should also be accompanied by workplace-based health promotion.

Van Vuuren (2011) explains that flexible retirement requires three conditions: possibility to adjust pension starting date at minimal cost, willingness of the older worker to adjust his/her labour supply and labour market institutions and conditions that facilitate later retirement. Most OECD countries fulfil the first condition, the majority of older workers are able to fulfil the second, but the third is still a serious challenge (van Vuuren, 2011), although the Scandinavian countries manage this better than others as they have a more positive attitude towards older workers and appropriate policy and legislation in place (Billett and Van Woerkom, 2008).

Appropriate housing

Quality of housing is a health determinant (*e.g.* damp housing can aggravate respiratory illness) (Scrambler, 2008; Howden-Chapman *et al.*, 1999) and New Zealand research has found that housing tenure impacts mortality, with tenants having higher death rates than owner occupiers (Howden-Chapman *et al.*, 1999). Older people's health and well-being can be negatively impacted by their housing because it is too difficult or expensive to heat properly in winter (Howden-Chapman *et al.*, 1999), is difficult to navigate due to lots of stairs or inconvenient layout or is badly situated for public amenities (Oswald *et al.*, 2007; Ball *et al.*, 2011). As people age, housing modifications may be needed to compensate for declining functional capacity (Oswald *et al.*, 2007).

A cross-national EU-funded project called ENABLE-AGE, which looked at the relationship between health and housing for older people made a number of key findings including that older people living in an accessible home had better well-being and lower rates of depression than those living in homes with accessibility problems (Oswald *et al*., 2007). Oswald *et al.* (2007) also found that environmental factors can have negative effects such as increased falls, or positive effects such as independence in daily life and subjective well-being.

Older people are usually driven to move house by push factors such as being unable to manage their house, declining health or mobility, isolation and financial problems (Ball *et al*., 2011). However, in general, older people are reluctant to move, even if their home starts to present practical problems that impact on their quality of life, particularly if they are owner occupiers (Ball *et al*., 2011; Howden-Chapman *et al.*, 1999). Owner occupiers can modify their homes to suit their needs (Oswald *et al*., 2007; Ball *et al*., 2011), *e.g*. through the addition of hand rails and bathroom modification, but there is a limit to such adaptations and they are not always cost-effective (Ball *et al*., 2011).

Ball *et al.* (2011) put forward the case of owner occupied retirement housing (OORH), usually specially designed apartment blocks with communal facilities and support staff on site, as a way to improve the independent, health and well-being of older people. It can also be seen as a way in some countries to free up limited housing stock. Ball *et al*. (2011) point to research in the United Kingdom showing that OORH residents feel able to manage their health better after their move, which has the potential to reduce demand for NHS services, although they acknowledge that OORH is an option only available to home owners with sufficient housing wealth. Van Bilsen *et al*. (2008) undertook research in the Netherlands that found that older people living in sheltered housing had a higher perceived quality of life than similar residents of ordinary houses.

Health related

Health care reform

Health care reform in the majority of countries is driven by a desire to control costs, which have been constantly increasing above the rate of inflation due to a number of factors including advances in medical science (drugs, technology and procedures), population demands and demographic change (Docteur and Oxley, 2003; Santerre and Neun, 2010).

The main focus has been on cost-containment through cutting or limiting budgets *e.g.* hospital budgets, increased cost-sharing and much stricter conditionality for the reimbursement/funding of certain health care services and changes in the way health care providers are reimbursed for services (Santerre and Neun, 2010; Folland *et al*., 2009; Docteur and Oxley, 2003).

In addition, attention has also been paid in some countries to increasing patient choice, in many to improving quality through evidence-based medicine and guidelines and implementing health technology assessment (Santerre and Neun, 2010; Folland *et al*., 2009; Docteur and Oxley, 2003), for example the establishment of the National Institute for Health and Clinical Excellence (NICE) in the United Kingdom, the High Authority for Health (Haute Autorité de Santé) in France, and the Institute for Quality and Economics in Healthcare (Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen) in Germany.

Most of these measures have been designed to manage the rising costs of health care today, but not necessarily deal with the health care demands of tomorrow that will arise due to demographic change (Boult *et al*., 2009) For example, Altenstetter and Busse (2005) are critical of German health care reform noting that has not made any attempt to “reset priorities from curative medicine to prevention and promotion of public health”. There are however, measures designed to refocus health care priorities, examples of which are presented below.

Disease prevention and management

Case study: NHS England Health Checks

The NHS in England is in the process of implementing a programme of health checks for all citizens over 40 to prevent heart disease, stroke, diabetes and kidney disease (NHS Health Check, 2010). Implementation began with pilot projects in 2009 and the programme will be completely rolled out by 2012-13 (*op. cit.*).

Everyone aged between 40 and 74 who has not already been diagnosed with one of the conditions will be invited by their primary care trust[1] for a face to face check-up with a nurse or pharmacist to assess their risk of developing heart disease, stroke, diabetes and kidney disease (NHS Health Check, 2010). If an individual has risk factors, they will then receive advice on how to manage or reduce those risks and be referred on to relevant services *e.g.* weight management, as appropriate (*op. cit.*). If an individual does not show any signs of risk factors, they will be invited for another check in five years time (*op. cit.*).

The Department of Health has undertaken economic modelling to show that the Health Check programme will be cost-effective and clinically effective (*op. cit.*). The DH calculations estimate that the programme will:

- Cost GBP 332 a year, but generate an annual benefit of GBP 3 678 million;
- Cost around GBP 3 500 per QALY (quality adjusted life year) gained;
- Save around 650 lives and prevent 1 600 strokes and heart attacks.

Noting that a programme to identify and manage vascular risks on such a scale has never been done before, some health care professionals are concerned that the assumption of the Department of Health modelling, which is based on 75% uptake, may be overoptimistic judging from the much lower uptake rate in some of the pilot projects (Khunti *et al*., 2011).

The authors also raise the problem of higher cardiovascular risk in people of South Asian origin, risks which often lead to the onset of cardiovascular disease or diabetes when the person is on their 30s, a decade before the health check programme kicks in (Khunti *et al.*, 2011). Another concern is that implementation of the programme is coming at time when primary care services are overstretched and facing tighter budgets (*op. cit.*).

There is also hope that the programme will help reduce health inequalities by detecting and managing risk factors in people who are less likely to access health services who tend to be those from lower socioeconomic backgrounds (NHS Health Check, 2010; Khunti *et al*., 2011).

Pharmaceutical care

Due to the fact that many over 65s have one or more chronic condition, they are often taking several prescription medicines concurrently, a state often referred to as "plurimedicated" (PGEU, 2009; Byrne *et al*., 2011; Holland *et al*., 2007). The complexity of a plurimedicated medication regimen added to problems with memory, visual acuity and dexterity means that older patients are more likely to suffer drug interactions and adherence problems (PGEU, 2009).

In addition, studies have shown that older patients are commonly using some inappropriately prescribed medicine, for example a study conducted by the National Association of Pharmacies in Portugal found that 20.7% of plurimedicated older patients were using at least one inappropriate medication (PGEU, 2009). A study by Byrne *et al*. (2011) found that this was even higher in nursing home residents with 73% of Republic of Ireland nursing home residents using one inappropriate medicine and 67% of residents in Northern Ireland nursing homes. The cost of the inappropriate medicines was estimated to be EUR 170 per person in Northern Ireland and EUR 365 in the Republic of Ireland (Byrne *et al*., 2011).

In order to optimise outcomes and minimise problems related to prescribed medication for older patients, community pharmacy led pharmaceutical care programmes, often comprising medication reviews, have been implemented in many European countries and in the United States (PGEU, 2009). Medication reviews can identify inappropriate medicines and abuse or misuse *e.g.* of sleeping pills (PGEU, 2009). Medication reviews for older people in Sweden reduced the average number of medicines per patient from 12.4 to 10.7 and reduced costs by approximately EUR 160 per patient per year (Jonsson *et al*., 2007), while similar research in Denmark showed that systematic medication reviews for older people could save EUR 50 million per annum (Danish Medicines Agency, 2004).

There are however conflicting results from trials of pharmaceutical care for older patients. While there are those which show significant improvements in patients receiving pharmaceutical care interventions such as the Danish "improving drug therapy for older people" model which was undertaken in seven European countries as reported by Hughes *et al*. (2001), others such as Richmond *et al*. (2010) found no significant change in the appropriateness of prescribing or quality of life of patients. A meta-analysis of 32 studies of pharmacist led medication reviews found that while interventions improved patient's knowledge and adherence to their medication, there was no reduction in mortality or hospital admission (Holland *et al*., 2007).

While the basic premise of pharmaceutical care programmes cannot be called new or innovative, inappropriate medication is still a problem today, as Byrne *et al*. study (2011) of care homes in Ireland has shown. More research needed to understand the success factors of those pharmaceutical care programmes that produce good results and to understand what makes some programmes not work so well. Community pharmacists are already involved with e-prescribing and electronic patient records and such technology will no doubt play more of a role in pharmaceutical care in the future.

Case study: health promotion and chronic disease management in Taiwan

Taiwan has a rapidly ageing population and a very low birth rate which is leading to a larger older population (Kuo, 2010). In recognition of the challenges of an ageing society, Taiwan is attempting to recapture the traditional Asian virtue of filial piety to become an age friendly society (Ti-Chiou, 2010). In recognition of the challenges facing health and social care systems, the government is implementing a broad reaching healthy ageing strategy called "Healthy People 2020" which focuses on health promotion for older people in order to increase healthy life expectancy and decrease health inequalities (Kuo, 2010).

The older population in Taiwan are now experiencing higher levels of chronic conditions such as heart disease, diabetes and hypertension than in the past (Ti-Chiou, 2010). For example among the over 65s nearly 50% have hypertension, 18% have diabetes and overall 62% have one chronic condition (*op. cit.*). This has the potential to put great pressure on the national health insurance system and highlights the need for better management of chronic diseases, especially to prevent future disability (*op. cit.*).

The "Healthy People 2020" programme includes health promotion for older people in Taiwan with a particular focus on the prevention and management of chronic conditions including diabetes, hypertension and asthma (Ti Chiou, 2010). Health care providers follow evidence-based guidelines and community-based health promotion covers eight major topics including physical activity, smoking cessation and social participation (*op. cit.*). Community-based health promotion and other services for older people are provided by or co-ordinated by community-based "service stations" which are situated in easily accessible public facilities (*op. cit.*).

Life course vaccination

The International Longevity Centre (United States, France and United Kingdom) published a briefing paper in 2009 on the impact of life course vaccination on an ageing population (Gusmano and Michel, 2009). The paper presented the concept of life course vaccination to support healthy ageing, particularly in the over 50s (*op. cit.*). The paper highlighted that despite evidence for the effectiveness of vaccination against influenza, pneumococcal disease and other vaccine preventable diseases (VPD), there was a considerable gap in Europe between recommendations and take-up of vaccination, particularly in older people (*op. cit.*).

The paper noted that while most European countries had vaccine recommendations for the over 65s and certain risk groups *e.g.* those with chronic diseases such as asthma and diabetes, an opportunity was being missed to promote healthy ageing by expanding routine vaccination, *e.g.* for influenza and pneumococcal diseases to the 50-64 age group (Gusmano and Michel, 2009). Firstly, age-based vaccine recommendations are generally more effective than risk group recommendations, and secondly a significant proportion (US studies estimate around one third) of this age group have risk factors for common vaccine preventable diseases (*op. cit.*). In addition, many people with risk factors are unaware that they have them (CDC, 2010). From a clinical perspective, given the immune system declines with age leading to a greater susceptibility to infection (immunoscenence), it makes sense to target people in their 50s whose immune systems are generally still robust (Gusmano and Michel, 2009).

From an economic perspective it is equally advantageous, as many 50-64 year-olds are still working and could end up having to take sick leave should they contract a vaccine preventable disease such as influenza, pneumococcal disease or shingles (Gusmano and Michel, 2009). It is notable that long-term sick leave is a common reason for early exit from the workforce (Berry, 2010).

Policy makers are increasingly implementing life course vaccination policies. Last year, the US Centers for Disease Control and Prevention (CDC) for the first time recommended that all people aged 6 months and older should be immunised against influenza for the 2010-11 flu season (CDC, 2010). At an event organised by ILC-UK in March 2011,[2] vaccine experts expressed support for the concept of life course vaccination.

Keeping people out of hospital/in the community

Case study: reshaping care for older people in Scotland

A problem faced by many OECD countries is the potential for an increasing and unsustainable funding gap for the care of a growing older population. In Scotland, attempts are being made to tackle this problem with the “Reshaping care in Scotland” initiative, which aims not only to make future care financially sustainable, but also seeks to change attitudes and implement a philosophical shift from a culture of “dependence” and “incapacity” to one of “independence” and “capacity” (Martin, 2010).

The key aim of the plan is to optimise the independence of older people in their own homes or in a homely setting, which means a shift away from institutional settings to care at home (COSLA/Scottish Government/NHS Scotland, 2011). Other aims include reducing emergency hospital admissions, avoiding prolonged hospital stays and promoting intermediate care for older people coming out of an acute hospital (COSLA/Scottish Government/NHS Scotland, 2011).

The reshaping care initiative has three core themes:

- Coproduction and community capacity building – a new philosophy of care involving partnerships in a community business model to keep people out of the formal care system;
- Creating the right care services and settings - helping people remain at home using telecare and home adaptation, supporting healthy ageing through diet, exercise and falls prevention, telecare, telehealth, and care planning;
- Creating effective care pathways – aiming for a smooth care pathway for frail older people including anticipatory care plans, managed care networks, reablement, and implementation of the dementia strategy.

There are two supporting themes:

- Finance and analysis – reducing hospital provision to enable reinvestment in community services;
- Workforce – education, training and support to reshape care, integration across primary and social care as well as across statutory, third sector and informal care providers.

The background to this initiative is analysis of the relevant data which shows that if care services for older people in Scotland were to continue as they had been, there would be a 22% rise in costs by 2016, by which time 20% budget cuts are expected and a 74% rise by 2031, which is clearly completely unsustainable (Martin, 2010). Currently, over 60% of health and social care expenditure for older people is spent on institutional care in hospitals and care homes, one third of which is for emergency admissions to hospital (COSLA/Scottish Government/NHS Scotland, 2011). If no changes are made, then providing the same level of care in the future will require a new 600 hospital bed every three years, a new 50 bed care home every two weeks for 20 years and most school leavers would need to work in the care sector (Martin, 2010).

It is important to note that currently most older people (89.5%) do not receive formal care in the form of NHS services, care home or home care organised by social services, although many will receive care via friends and family or purchase it privately (COSLA/Scottish Government/NHS Scotland, 2011). In relation to giving and receiving care, far more people over 65 provide 20 or more hours of informal care per week than receive 20 hours of paid care (*op. cit.*).

Patient hotels in Scandinavia

Patient hotels, the concept of which was first developed in Scandinavia, are designed to offer accommodation for low dependency patients who do not need the full services of a hospital ward, but need to be close by just in case (Pillar Land Securities, 2011a). The cost of accommodating a person in a patient hotel is considerably lower than placing them in hospital (*op. cit.*). Pillar Land Securities (2011b) explain that patient hotels require a specific design features including being easy to clean (for infection control purposes), suitable for people with limited mobility and be appropriately wired to allow direct monitoring and video communication with nurses.

Patient hotels are a form of intermediate care (Pillar Land Securities, 2011a; Skane, 2011). Intermediate care is designed for a patient who is recovering from illness or recuperating after a medical procedure and needs ongoing support, but not the level of medical care provided in a hospital (Stevenson and Spencer, 2002). The NHS defines intermediate care as that which is designed to maximise the independence of a person enabling them to return home following a hospital stay, while the Audit Commission states that its primary function is to build up people’s confidence in coping with daily life (Stevenson and Spencer, 2002).

In Scandinavia, patient hotels already exist, for example the one at Skane University Hospital in Lund and the one at Odense University Hospital in Denmark (Skane, 2011; OUH, 2009) In Skane, doctors in the hospital can refer patients for recuperation to the patient hotel, which is also available for hospital visitors and people attending training courses or conferences (Skane, 2011). In Denmark, Odense University Hospital opened its patient hotel in 1997 in the grounds of the hospital and it is still in operation today (OUH, 2009).

The largest patient hotel company in Scandinavia is Norlandia Care, which operates patient hotels in Norway, Sweden and Finland (Norlandia Care, 2011). Norlandia Care’s hotels are available to hospital patients needing minimal nursing care and non-patients (*op. cit.*).

Several companies are bringing the concept of patient hotels to the United Kingdom including Well-Tel, which markets its services at NHS and private sector clients as a “cost-effective, patient centred solution to bed-blocking” designed for patients who need minimal or no clinical supervision (Well-Tel, 2011).

Financing care

Case study: refunding health care in Canada

In Canada, the idea of prefunding of health care has been around for some years, being developed in the early 2000s by Robson (2002), who based his ideas on a prefunding system adopted for Canadian pension plans in some provinces such as Quebec. Prefunding is presented as a solution to increased higher costs due to demographic change and the "uneven intergenerational contract" which could see young Canadians being asked to pay a far higher price to sustain publicly-funded health care than the older generation contributed (Robson, 2002; Stabile and Greenblatt, 2010). Prefunding would oblige today's economically active workers to prepay some of the costs of the care they will need after they retire and could spread the cost of public programmes more equitably across the population and across generations (Robson, 2002; Stabile and Greenblatt, 2010).

For pre-funding of health care to work, Canadians would have to trust that the money they pay in will be use for the designated purpose, projections of future health care costs would have to be as accurate as possible, and a robust tax base is needed (Robson, 2002). Robson (2002) prefers consumption taxes to income tax or payroll tax as being more robust in the face of demographic change and less harmful to economic growth.

Stabile and Greenblatt (2010) propose using prefunding for prescription drugs for Canadians over 65 using a payroll deduction, which would be scaled to income and capped. Prefunding is a partial insurance solution as risks are pooled across the cohort; individual savings accounts are not created (*op. cit*.). Stabile and Greenblatt (2010) simulate their model using the Ontario Drug Benefit for the over 65s based on a payroll tax. The advantages of this model in addition to savings being set aside today to manage anticipated future budget pressures, are that it could help older people faced with high out of pocket prescription drug costs, could help freeze a fast growing part of the health budget, and provide assurance to the current working population that they will not have to pay for the health care costs of the generation that preceded them (*op. cit.*).

Case study: Japan's long-term care insurance system

Japan introduced mandatory long-term care insurance (known as "Kaigo Hoken") in 2000, which made long-term care an entitlement for all older people over 65 or those who are 40-65 and have been disabled by Alzheimer's or stroke (Tsutsui and Muramatsu, 2007; Imai *et al*., 2008). The system has an inbuilt review mechanism that requires review and if necessary revision every five years (Tsutsui and Muramatsu, 2007).

The system is funded from a variety of sources, including 10% co-payments from service users and the remaining 90% of costs being split between insurance premiums paid by all Japanese people over 40 and local and regional taxes (Tsutsui and Muramatsu, 2007). The long-term care insurance (LTCI) is managed by municipal authorities according to national guidelines (*op. cit.*).

The first review occurred in 2005 and aimed to reduce escalating costs as well as improve services to older people (Tsutsui and Muramatsu, 2007; Imai *et al.*, 2008). The overarching aim was to refocus the LTCI system from institutional to community-based care in recognition of the fact that it originally incentivised people to go into more costly long-term care facilities rather than stay at home and receive community-based services, as the cost of long-term care facilities was highly subsidised for care home residents (*op. cit.*). The key measures of the 2005 reform were to implement "hotel costs" for long-term care facilities and introduce more preventative services for older people living in their own homes (*op. cit.*).

The introduction of "hotel costs" *i.e.* room and board expenses for long-term care residents, was designed to remove the incentive to move into long-term care that had existed before when the cost of long-term care facilities to residents was often less than the cost of rent and utilities for the average apartment (Tsutsui and Muramatsu, 2007). The cost of long-term care facilities to residents rose by around 50% as a result of these "hotel costs" (*op. cit.*).

The expansion of preventative services has the main goal of "maintaining or enhancing the ability to perform daily activities and preventing people from becoming dependent" (Tsutsui and Muramatsu, 2007). Preventative services had existed before but in a more piecemeal fashion and are now particularly targeted towards people with low care needs in order to help them remain healthy and active (*op. cit.*). The preventive services are designed to improve motor skills, maintain mobility and physical strength, and improve nutritional status (*op. cit.*). The services provided include strength training, other physical activities, nutritional management and advice and oral health screening and treatment (*op. cit.*).

The LTCI services are led from community-based support centres established by municipalities which bring public health nurses, social workers and social care managers under one roof in an easily accessible facility (Tsutsui and Muramatsu, 2007). The community-based support centres undertake care needs assessments, implement older people's rights and protect people from elder abuse, as well as co-ordinating and providing care and prevention services (*op. cit.*).

Pilot projects to evaluate the changes to the LTCI system in terms of costs, the effectiveness of preventative services and whether the system meets the needs of older Japanese residents, are currently underway (Tsutsui and Muramatsu, 2007). One longitudinal study published in 2009 found that 82% of participants with low to moderate care needs who received LTCI assistance in the community or in their own home (home help services) were still living in their own homes one year later (Ohwaki *et al.*, 2009). The study found that having friends was a significant predictor of continuity in home care *i.e.* remaining in one's own home while receiving home-based care, and the authors suggest that the promotion of social engagement may contribute to preventing institutionalisation (*op. cit.*).

Technology

Case study: telecare to support dementia in England

Tunstall health care installed equipment into St Cecilia's a residential care home in North Yorkshire that cares for people with dementia (Lucas, 2010). The telecare system was designed to help staff monitor residents for incontinence and falls and to manage security in the building including access to the garden (*op. cit.*). The main aims were to increase the independence of residents and reduce staff time spent on "just in case" checks of residents, to allow them to spend more quality time with residents (*op. cit.*).

The telecare applications included enuresis sensors for incontinence, bed occupancy sensors to detect falls and wandering, fall detectors (worn by residents) and door exit sensors (Lucas, 2010). The incontinence sensors worked very well as they alerted staff immediately to bed wetting, which improved skin integrity of residents with incontinence problems and avoided the need for staff to disrupt residents' sleep by waking them up to check for incontinence during the night (*op. cit.*). The bed occupancy sensors also worked very well as they could alert staff immediately to residents getting out of bed and allowed residents to choose their own sleeping patterns *i.e.* not having to follow institutional timeframes (*op. cit.*). The falls detection sensors experienced some success, but did not work as well and there were problems with residents being able to remove them (*op. cit.*).

Overall, the telecare tools used in the care home were found to enable residents to be more independent, alerted staff more quickly to problems to which they could then react, thus improving care and resulted in a more efficient use of staff time (Lucas, 2010).

Case study: using Smartphones and Wii to manage chronic diseases in older people – the CAALYX project

The EU-funded Complete Ambient Assisted Living Experiment (CAALYX) project has developed a prototype home-monitoring system using smartphones, television and an adapted version of the Nintendo Wii (*eHealthnews.eu*, 2010). The system is aimed at older people living alone and people with multiple chronic conditions (*op. cit.*).

While mobile phones have been used in health care for some time, for example the use of text message reminders to help improve anti-viral medication compliance for HIV patients in developing countries, the arrival of smartphones with GPS technology has further enlarged possibilities (Boulos *et al.*, 2011). Smartphones have the advantage of having intuitive and tactile user interfaces, portability, continuous uninterrupted data streaming and the capability to support multimedia software applications (Free *et al.*, 2010).

The eCAALYX platform allows the health professional to receive regular reports on the older person's health via the internet (Boulos *et al.*, 2011). The platform has four main components:

1. *Caretaker system*: application that links all users (older people, clinicians, relatives) and all components;
2. *Mobile system*: controls a Body Area Network (BAN) comprised of a set of well-being sensors in "smart" garments which determine well-being through selected physiological parameters and sends alerts when anomalies arise *e.g.* tachycardia or possible respiratory problems;
3. *Home system*: Older people can access the system via their smartphone and interact with their clinician/relatives via the adapted Wii system operated through the TV;
4. *Wearable Light Device* (WLD): a component combining an ECG instrument, an SpO2 meter, a temperature sensor and a fall and mobility sensor. Anomalies in data form alerts, so for example, the mobility sensor could potentially detect a fall (Rocha *et al.*, 2011; Boulos *et al.*, 2011).

Two main challenges of the eCAALYX platform were how to make the mobile device user friendly for older people and how to maintain and update it at a distance without requiring user input (Boulos *et al.*, 2011). The first was achieved by using a large touchscreen smart phone with virtual buttons as large as needed, navigation reduced to two easily accessible screens, the use of docking stations to recharge the battery and the ability of the device to run autonomously without mandatory user interaction (*op. cit.*). The last point is particularly important if one considers that in an emergency the older person may be incapacitated and unable to use the device (*op. cit.*). The second challenge was answered through a system of maintenance actions performed remotely, transparently and locally (*op. cit.*).

The eCAALYX prototype technological platform for the user interface is Google Nexus on an Android 2.1 smartphone, the health sensors in the smart garments use Bluetooth technology and the caretaker/clinician interface is a W3C web service (Boulos *et al.*, 2011). Evaluation results of the project are expected after project completion in July 2012.

In relation to further and larger scale use of the eCAALYX platform, a number of issues have been identified including the security and safety of patient data and interoperability with electronic patient records and whether the system could enable on-line consultations with clinicians (Rocha *et al.*, 2011).

Organisation of health care

Case study: establishment of medical care centres and telemedicine care models in Germany

The ageing of the population in the German state (land) of Mecklenburg Pomerania is more advanced than in other German states and thus is already reacting to demographic change in the provision of health care services (Fendrich *et al.*, 2010).

Two examples of adapting health care systems to an older multimorbid population are already underway (Fendrich *et al.*, 2010). The first is the establishment of medical care centres (similar to the polyclinics that existed in the German Democratic Republic), which bring together GPs, specialists and other health care professionals such as pharmacists, physiotherapists and chiropodists under one roof (*op. cit.*). The precise mix of services and professionals should be tailored to the needs of the local population; however the practice of having GPs and specialists working together is a fundamental one (*op. cit.*). In addition, the medical centre can choose its own opening hours, so can open for example in the evening and at weekends in order to better serve the community (*op. cit.*).

A telemedicine supported care model is also under development in Mecklenburg Pomerania. It is designed to target multimorbid patients with limited mobility (Fendrich *et al.*, 2010). The "Integrated Functional Telemedicine" (IFT – Intergrierte Funktionsbereich Telemedezin) is run according to the AGnES (Arztentlastende, Gemeindenahe, E-Healthgestützte, Systemische Intervention, or doctor-based, community-based, e-health supported, systematic intervention) concept (*op. cit.*). The project is being undertaken by the Community Medicine Institute and partially funded by the Regional Ministry of Health and Social Affairs (*op. cit.*). The idea is to link up clinics with each other and with stand-alone GPs as well as using telemedicine tools to monitor people with chronic conditions in their own homes (*op. cit.*).

Improving innovation

European innovation partnership on active and healthy ageing

Within the framework of the Europe 2020 initiative, the European Commission has introduced the concept of European Innovation Partnerships (EIP), the first of which will be on active and healthy ageing (European Commission, 2010).

The aim is to develop a collaborative approach to research and innovation in the area of active and healthy ageing in order to close the gap between research and the market and accelerate the uptake of innovation (European Commission, 2010). The overall goal is to enable citizens to live longer independently in good health by increasing the average number of healthy life years by two (*op. cit.*).

The EIP should:

- Enable citizens to lead healthy active independent lives while ageing;
- Improve the sustainability of health and social care systems;
- Create new opportunities for business.

The European Commission has already suggested three areas for action:

- Innovation in support of people's health and well-being, *e.g.* prevention, diagnostic and treatment of ageing-related chronic diseases;
- Innovation in collaborate care systems for older people;
- Innovation in products and services for active and independent ageing.

The EIP steering group will draw up a strategic implementation plan (SIP) by autumn 2011.

Conclusions

While all OECD countries are experiencing unprecedented demographic change, which has the potential to unravel health and social care systems, a negative outcome is not inevitable. There are policies and measures that can be implemented to support and facilitate healthy and active ageing and this chapter has presented just some of them. These policies have the potential to mitigate the impact of demographic change on society as well as helping older people to continue to be active and productive citizens whether as workers, consumers, volunteers or care givers.

While many of the policies presented in this chapter relate to health care, other issues such as flexible working, gradual retirement and decent housing can have a significant impact on health and well-being greatly and merit consideration as part of a broad approach to demographic change. In addition, although an ageing population does mean more chronic disease, better prevention through public health actions to reduce risks and better treatment through innovation in medical science can both work to keep functional limitations and disability at lower levels than for previous generations.

Three priority areas for reforming health systems deserve particular attention.

First, health systems do not always promote innovation, and even when they do, the gap between development and widespread implementation can be intolerably long.

Second, with funding of health care and long-term care becoming an issue in many countries, new approaches to funding care need to be developed, which seek to ensure long-term sustainable funding solutions that maintain solidarity between generations.

Third, a change in focus in the organisation and delivery of health and social care is needed. A stronger emphasis on promoting healthy but also independent living is needed, with an explicite objective of avoiding or at least delaying the need for resource-intensive institutional care.

Notes

1. Despite current plans to undertake major reform in the NHS in England including the abolition of primary care trusts, no changes have been announced in the planned implementation of the NHS Health Checks programme.

2. Working lunch on "Time for a new adult immunisation strategy", 24 March 2011, London.

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Chapter 3

The challenge of financing care for individuals with multimorbidities

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All OECD countries will face a growing population of older people with complex needs but despite this common challenge they have taken different approaches to financing services. The main thesis of this chapter is that we are at a crossroads in thinking about financing care for older people with multimorbidity and multiple needs. One path leads to detailed care plans, bundling payments, transferring risk and traditional market competition. The other path leads to whole system targets with minimum specification, pooled budgets and innovative market models. Demographic and epidemiological realities will force governments to chose and they need to think carefully about which direction to go.

Introduction

The purpose of this chapter is to describe how governments can think about policies for financing health and social care for populations with multimorbidity. It assumes that financing and financing systems are tools for delivering care that will produce desired outcomes. The chapter first provides a broad overview of what we know and do not know about the demographic and epidemiological forces that drive this challenge. From there the chapter goes on to suggest a way that we can look at this challenge and to point out that the way we view the nature of the problem in many ways dictates what we see as the solution.

The chapter focuses on health and social care for older people with multimorbidity and multiple needs as a way to define the problem and to think about solutions. A review of demographic and epidemiological evidence suggests that all OECD countries will face a growing population of older people with complex needs. An overview of health expenditure data suggests that despite this common challenge countries have taken different approaches to financing services.

A more detailed overview of the problem suggests that providing health and social care to older people with multiple needs requires integrating a number of providers to meet broadly defined outcomes that include both disease treatment and provision of support services. It is argued that it is important to determine if the delivery of care for this population is a complicated or a complex problem. A complicated problem can be solved by planning and co-ordinating a set of well defined processes. Putting a satellite in orbit is a useful analogy. On the other hand a complex problem, although it has a definable outcome, can be solved through focusing more on relationships than process and often involves extensive variation that reflects local initiative and context. Raising a child is a useful analogy

The main thesis of this chapter is that we are at a crossroads in thinking about financing of care for older people with multimorbidity and multiple needs. One path is based on seeing the challenge as a complicated problem. This path points to bundling payments, transferring risk and traditional market competition. Along that path, we create a system with standardised and widely disseminated care planning for a wide range of medical conditions. We assess performance against a wide range of clearly defined outcomes. The other path is based on seeing the problem as complex. This path points to whole system targets and minimum specification, pooled budgets and innovative market models. Along this path, we create a system that values relationships over processes, that is locally based and that lets change develop from within. On this path it is understood that risk cannot be eliminated and variation is valued.

There is no assurance which path is best. However, the demographic and epidemiological realities will force governments to move and they need to think carefully about which direction to go.

Overview

Purpose and scope

The purpose of this chapter is to describe how governments can think about policies for financing health and social care for populations with multimorbidity. More specifically, the chapter attempts to address the challenge identified by Gerard Anderson in Chapter 1 of this publication.

> *"The major challenge in most OECD countries in the coming decade is how to integrate the medical and social services that are critical to people with chronic conditions. People with multiple chronic conditions are more likely to also have disabilities and the combination of disabilities and multiple chronic conditions complicates the care of their chronic illness and their disability. They also may need help with transportation or activities of daily living. Traditionally, these services were not part of the medical care system. This is beginning to change in most OECD countries."*

The chapter first provides a broad overview of what we know and do not know about the demographic and epidemiological forces that drive this challenge. From there the chapter goes on to suggest a way that we can look at this challenge and to point out that the way we view the nature of the problem in many ways dictates what we see as the solution. Finally, the chapter identifies some key next steps in thinking about financing systems that can integrate health and social care for individuals with multimorbidity.

Assumptions

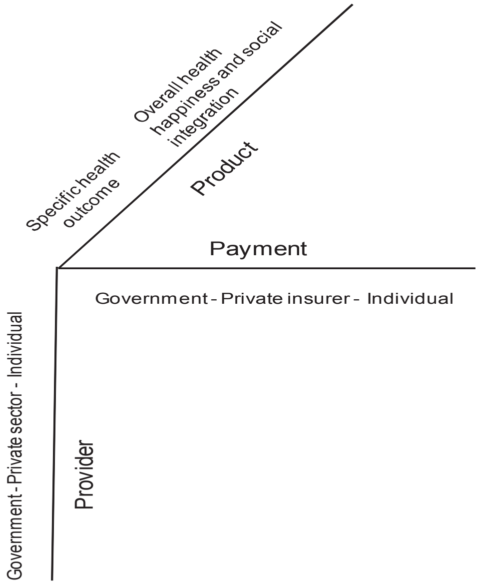
1. Financing is the way in which payments for care are made, and financing systems are the set of rules or activities that are in place to provide payment. Financing includes who pays, how much is being paid, what is being paid for and who is being paid.
2. There is a distinction between morbidity, which is the state of having a disease or condition, and need, which is the extent to which a service can reduce the impact of the disease or condition. As will be discussed in more detail in the chapter, multimorbidity translates into multiple needs for services that span both health and social care.

3. Financing and financing systems are policy tools that are used to ensure safe, effective, efficient and equitable outcomes of health and social care services for individuals with defined needs.

Conceptual framework

The links between financing, services and outcomes can be conceptualised in a health and social care system that has three dimensions – payment (*i.e.*, who pays), provider (*i.e.*, who delivers the services) and product (*i.e.*, what is produced) (Figure 3.1)

Figure 3.1. Three dimensions of health and social care



Historically we have thought of health and social care systems as clusters of services and providers, but more recently we are moving toward the idea of systems as producers of desired outcomes. This view builds on the classic structure-process-outcome model of Donnabedian and more recently on Michael Porter's work on value in health care. Inherent is the notion that there are a set of services and tasks that can be directed or controlled to produce the desired outcome or the thing we value.

One axis of the cube deals with outcomes, or what is produced, and can be seen as going from very specific health outcomes, for example better eye sight, to broader health outcomes, such as functional status, and ultimately to more encompassing notions of the human condition such as healthy, secure productive and integrated members of society. There is also a sense that as we move across this spectrum, more services of different sorts are required. For example, once specific strategy for improving vision is cataract surgery. A broader view around preserving function might involve a set of acute and rehabilitation services for stroke victims. In the broadest context, the integration of individuals with mental illness and addictions as productive members of society may involve a range of medical and other services including social care, employment and housing as well as activities within the criminal justice system.

Another axis of the cube deals with who is responsible for delivering the services or achieving the outcomes. This can be thought of at one level as specific types of providers, for example doctors or nurses. However, for the purposes of this conceptual model, this axis deals with broad organisational attributes of the providers and is divided in the categories government, private sector and individuals. There are countries where governments organise and directly deliver services, whereas other countries embody a predominant model of provision of services by private sector or non-government organisations. There are still other aspects of care that are provided by individuals. Of course, for complex interventions where skill and training is essential we do not expect individuals to be providers – patients do not perform cataract surgery on themselves. However, there is increasing interest in models of self-care for health conditions. The provision of services by individuals, their families and friends is becoming more common, in particular as these services relate to activities of daily living. However, not all of these "social" services need to be delivered by individuals. For example, adult day programmes for frail older people may be provided by private sector retirement homes or by governments.

The final axis is who pays for what is delivered, whether it is a service or the outcome for that service. In health and social care there is a spectrum of sources of payment. Governments can pay, they can create public insurance or security systems that pay, there can be private insurance companies that pay, or employers can pay directly. Finally, individuals can pay for services directly out of their own pockets.

There are two important interactions between the payment axis and the other two axes of the cube that help us to think about financing policies or strategies. One of these interactions is between payment and product. As mentioned earlier, you can pay for service or you can pay for outcome. This can apply to very specific health outcomes – you can pay for cataract surgery or you can pay for improved vision after cataract surgery. As care gets more complicated you can pay for an aggregation of services rather than paying for individual services. A classic example of this is the introduction of Diagnostic Related Groups (DRG) and prospective payment systems (PPS) in the United

States. This policy change both defined an aggregation of goods and services (*e.g.*, all the acute care hospital services both labour and goods for a specific DRG) and a payment mechanism – a fixed price with some adjustments for region and teaching status (*i.e.*, PPS). In health and social care the term bundled payment is used to describe this process of aggregating a set of services for the purpose of defining something that can be purchased or paid for. Porter describes this as the total package price for a care cycle and it can also be thought of as "medical condition capitation". Paying for outcomes can be thought of as an extension of paying for a bundle of services. For example, it would be possible to bundle both acute and rehabilitation services for a stroke into a single package, something like a DRG. However, it is possible to think of a system where payment might be related to the extent to which the stoke patient returned to their pre-stroke level of function. The notion is that you are paying for a bundled set of services that will produce the outcome. Payment or financing systems are defined in terms of the product being purchased – individual services (fee-for-service), bundled services (DRG or primary care capitation) or outcomes (pay for performance).

Another important interaction is between payment and provision or delivery. A key issue here for health and social care systems is the extent to which risk is transferred in the financing system. Risk transfer is a key element in many of the efforts to create a payer-provider split. There are two parts to the process of transferring risk. The first is separating the payer from the provider, in essence identifying from whom and to whom the risk is being transferred. The second is creating a contract so that it is the provider who is at risk for financial loss. Inherent in this is the ability to establish a financial risk. It is important to remember that splitting who pays for the care from who delivers it is necessary but not sufficient for risk transfer. For example, in Canada physician services are paid for by provincial governments. Physicians are not government employees and there is a clear split between who pays and who provides. Historically physicians were paid on a fee-for-service basis. Governments were able to set price for individual services but had no control over volume. As a consequence the system was open-ended in terms of expenditures and financial risk. Government simply paid the bills and physicians were never at risk of not getting paid. Government had no way to control or even estimate total costs.

However, if government or other payers can enter into agreements with providers around overall costs for care or for specific bundles or services or outcomes they can transfer risk. Risk can be transferred to organisations – either public or private for-profit or not-for-profit. It is possible to imagine transferring risk to individuals through creation of medical savings accounts or providing fixed amounts of funds to individuals to buy or provide services themselves.

In summary, the conceptual framework posits that financing is an integral component of health and social care systems and that it provides a tool linking what providers of care do with what the funders of care want or value. Inherent in this model in the current context is the notion that governments are interested in financing systems that meet specific goals in terms of outcomes. An accepted strategic model is to define what you value or want to produce, and to use that to drive financing. In other words, you start with what you want to achieve for a specific population, and then you design a financing system that allows you to achieve it. Bundled payments and risk transfer are policies or characteristics of financing systems. The feasibility and potential impact of these and other policies depends on the nature of what you want to achieve.

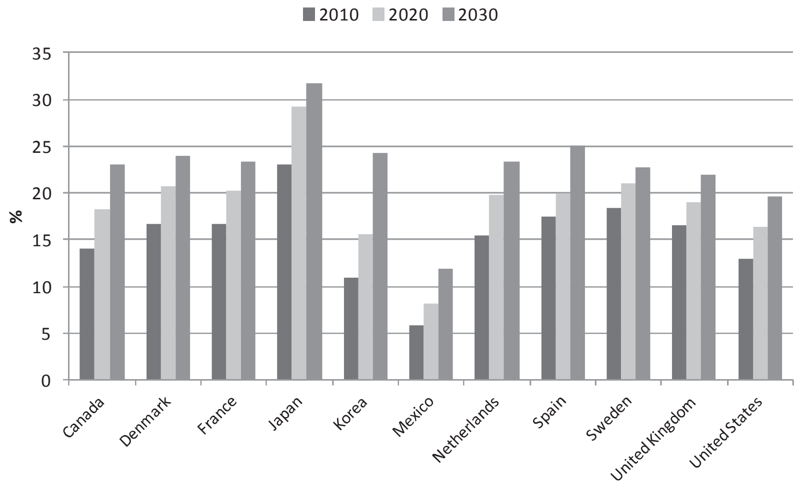
Gerard Anderson makes it clear in his quote that begins this chapter that the challenge governments face is providing health and social care to populations with multimorbidity and functional impairment. High income countries can have many different populations who have multiple chronic conditions and functional disabilities. These populations can span the life course. At one end of the age spectrum, there are growing populations of young children with congenital or acquired brain injury that require complex health and social care. Decades ago many of these children would have died at birth or shortly after, but now they survive through childhood and into their teens and twenties. In terms of middle-aged populations, many countries face a growing challenge from adults with chronic and severe mental health problems who have also developed addictions. These "dual diagnosed" individuals need health and social care. They have impacts on public safety and on the criminal justice systems. Perhaps the most common concern around multimorbidity and functional impairment deals with older people: the "silver tsunami" that will overwhelm our health and social care systems. This chapter focuses on this group, although the many of the principles and implications discussed are relevant to these other groups.

Older people with multiple needs

The demographic challenge

The first and most obvious fact is that the number of older people is increasing. Perhaps more important in the context of financing and sustainability of health and social care systems is that the proportion of older people as a total of the population is growing. Not only are there more older people but, because the size of the younger population is not growing as fast, the proportion of older people is increasing in all countries. The social transfer dynamic is a simple one – productive younger people provide the resources to care for older people. Figure 3.2 provides OECD data from several countries on the proportion of the population that is 65 or older currently and what that proportion is projected to be over the next two decades. There are some countries with lower proportions of older people such as Mexico and some with larger proportions such as Japan. However, all see an increasing proportion of citizens that are over 65. In the not too distant future, many countries will have one quarter of their citizens aged 65 and over.

Figure 3.2. Ratio of the population aged 65 and over to the total population

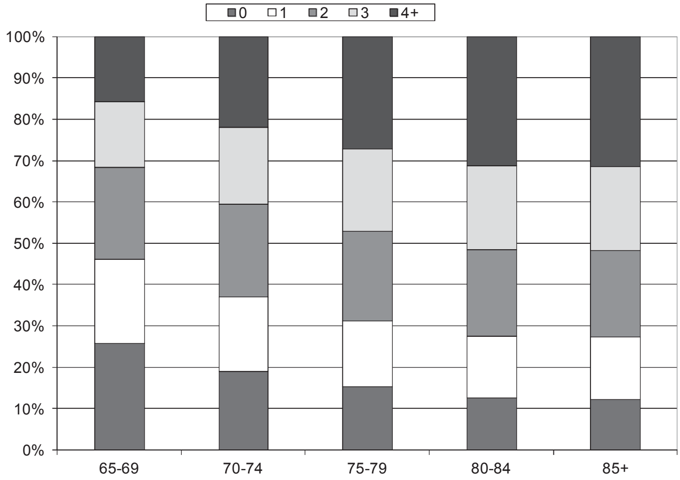


Source: *OECD Factbook 2009* (*http://dx.doi.org/10.1787/540452278720*).

Turning 65 is often taken as the point at which individuals become old but of course this is an over-simplification. Aging is a spectrum and there are "younger" and "older" old people. The average life expectancy for 65-year-old people has increased over the last decade, and the average life expectancy for a male citizen of many OECD countries who was 65 in 2007 is around 18 years – on average they will live until they are 83. For women the average life expectancy for those who are 65 is close to close to 86. All countries well see an increase in the oldest old.

We know that some older people are healthy. A US study showed that about a quarter of people aged 65 to 69 had no chronic conditions and that even among those 85 and older just over 10% had no chronic conditions. However, the same survey showed that almost half of individuals 65-69 had two or more chronic conditions and this increased to almost three quarters in those older than 85 (Figure 3.3).

Figure 3.3. Proportion of US older adults with chronic conditions



Source: Wolff *et al*. (2002).

What do we know about disability or loss of function as older people get older? The international standard for assessing loss of function is to look at activities of daily living (ADL) and instrumental activities of daily living (IADL). The assessment of ADL looks at abilities such as bathing, dressing, eating and toileting. People are assessed in terms of the number of ADL activities on which they are limited. The assessment of IADL examines ability to do everyday household chores, shopping and banking. People are assessed in terms of their loss of these functions. In a US study of older people who were not in institutions showed that both ADL and IADL disabilities increase rapidly as individual over 65 get older. Individuals are six times more likely to have two or more, or three or more ADL limitations when they are older than 85 than when they are 65 to 69. Individuals are six times more likely to have at least one IADL disability when they are over 85 than when they are 65 to 69 (Table 3.1)

Table 3.1. ADL and IADL limitations in US older people

Age group	With two ADL (%)	With three or more ADL (%)	With IADL (%)
65-74	0.6	1.6	6.2

75-84	1.2	3.5	13.8
85+	3.4	9.7	35.3

ADL: activities of daily living; IADE: Instrumental activities of daily living.

Source: National Health Interview Survey 2003-2007.

Some OECD countries are in different stages of this population aging process, but many face a very similar future – a rapid increase in older people with multiple chronic conditions and disabilities. Although we understand the basic demographics, we have little information on the overlap between multimorbidity and functional loss. Furthermore, we are starting to understand that frailty – a lack of resilience, reserve or increased vulnerability to adverse health outcomes – is both quantifiable, and a strong risk factor for future health and social care needs. Along with frailty we now see that social isolation is not only as an undesired state, but also as a risk factor for poor health.

In summary, we know that there are strong links between multimorbidity and loss of function, and that as older people get older more of them become frail and have both multiple chronic conditions and loss of function. However, we need to know more about how these interact and overlap with each other to drive health and social care needs.

The impact of multimorbidity and functional loss on services and costs

A key aspect of understanding the challenges around financing care deals with the relationship between multimorbidity and disability, and service use and costs. Understanding this requires understanding the distinctions and similarities between curative care and supportive or social care. Curative care focuses on treating symptoms and conditions and returning individuals to health and function. In a broad sense, this can include both traditional acute health care services – doctor visits, emergency room visits, acute care hospital stays – and visits to occupational and physio-therapists, and stays in rehabilitation hospitals. These latter services are specifically designed to improve function and reduce disability. This is distinct from supportive or social care services whose goal is not to return function to the individual but to provide on a long-term basis services that replace or substitute these functions. These are provided often provided by personal service workers.

In most countries there are accepted tools for translating assessments of functional disability into some form of service need or level-of-care requirement. For example in Ontario, provincially-funded agencies use various functional assessment tools that look at both ADL and IADL functions to determine eligibility for home care or long-term care services. In this context the relationship to functional disability and service use tends to be step-wise. At the lowest level, in those individuals with little or no disability there tends to be no service provision. The next step up is provision of services in the home. After that is the step to care that is provided in supportive institutional settings. These institutional settings can range from sheltered housing to nursing homes, and ultimately to complex continuing care hospitals.

There is growing interest in and research on the relationship between the number of chronic conditions and health care use and expenditures. Anderson and Horvath (2004) used survey data to look at this relationship in the United States and found that average per capita expenditures measured from medical claims and other records almost tripled as you moved from one chronic condition to three and then doubled again as you moved from three to five or more conditions. A more recent study in Canada looked specifically at older people and showed a rapid rise in service use as the number of chronic conditions increased (Table 3.2). The authors of that report concluded that in older people the amount of health care services used is largely driven by the number of chronic conditions not by age.

Table 3.2. Yearly visit rates per 1 000 older people in Canada

Type of visit	Number of chronic conditions			
	0	1	2	3 or more
Family doctor	1 496	2 346	3 357	5 234
Non-physician provider	1 598	2 977	3 260	5 363
Emergency department	193	240	382	696

Source: CIHI (2011), “Seniors and the Health Care System: What is the Impact of Multiple Chronic Conditions?”.

International comparison of curative and long-term care costs

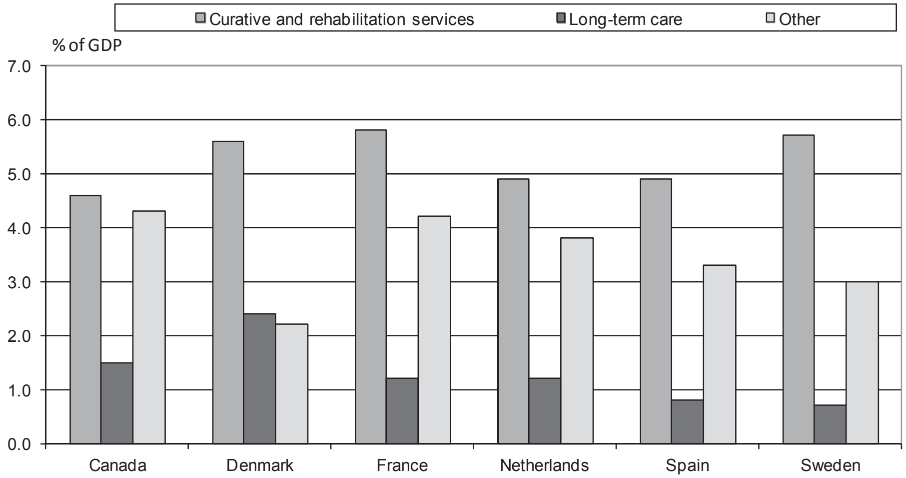
We know that health and social care systems in all OECD countries are already dealing with the challenge of providing services to these older people with multimorbidity and multiple needs. A comprehensive examination of the international patterns of expenditures and financing of these services for older people with chronic conditions and functional disability population is beyond the scope of this chapter, and frankly may be beyond the scope of current data in most countries. However, it is possible to use the existing health expenditure data to provide a broad overview that can help to identify some key facts.

The International Classification for Health Accounts (ICHA) defines curative services as those used to primarily to relieve symptoms of illness and injury and rehabilitative services as those used primarily to improve function. This is distinct from long-term care (LTC) nursing services that are given to patients who need assistance on a long-term basis due to chronic impairment and a reduced degree of independence in activities of daily living. It is important to note that these long-term care costs specifically exclude social care services. The ICHA explicitly recognise that there may be different borderlines between health care and social care across countries. Even with this caveat, the data reveal some interesting patterns.

Figure 3.4 provides data on the percentage of GDP spent on curative and rehabilitative services and expenditures on long-term nursing services in six OECD countries. These six countries are all predicted to have between 22% and 25% of their citizens aged 65 or over by 2030. For our purposes, we can say that they face very similar demographic and epidemiological challenges in terms of caring for older people with complex needs. All six of these countries have a commitment to universal health and social care and governments that play a leading role in defining financing systems either through direct financing or legislation that creates non-for-profit financing.

In 2008, all six countries have overall health care expenditures that are between 9% and 11% of GDP. On a relative basis there is much more variation in LTC expenditure than in the expenditures for curative and rehabilitative care. Two countries that are neighbours – Denmark and Sweden – have virtually the same percentage GDP expenditures on curative and rehabilitative services but a threefold difference in LTC nursing spending.

Figure 3.4. Percentage of GDP spent on health care



Source: OECD.StatExtracts.

The health accounts let us examine the sources of financing across these areas of care. Table 3.3 provides data on sources of financing for curative and rehabilitative care as compared to LTC. For curative and rehabilitative services all six countries have a substantial but limited amount of private payment for services. For LTC nursing services there seems to be a clear split: some countries have virtually no private expenditures, while others have substantial but limited private expenditures either through out-of-pocket or through private insurance.

Table 3.3. Source of payment as a percentage from various sources, 2008

Panel A. Curative and rehabilitative care

	Government	Social security	Private insurance	Out-of-pocket	Other
Canada	74.3	1.1	11.0	11.2	2.4
Denmark	86.6	0.0	2.1	11.3	0.0
France	1.5	81.0	10.9	6.6	0.0
Netherlands	1.7	85.5	9.3	3.2	0.4
Spain	69.0	4.4	6.7	19.0	0.9
Sweden	87.0	0.0	0.0	13.0	0.0

Source: OECD.StatExtracts.

Table 3.3. Source of payment as a percentage from various sources, 2008 *(cont'd)*

Panel B. Long-term care

	Government	Social security	Private insurance	Out-of-pocket
Canada	81.1	0.7	0.7	17.6
Denmark	90.7	0.0	0.0	9.3
France	25.4	72.8	0.9	0.9
Netherlands	0.0	100.0	0.0	0.0
Spain	61.5	9.9	0.0	28.6
Sweden	24.8	73.5	0.9	0.9

Source: OECD.StatExtracts.

Though once again it is important to note these expenditure data are limited in terms of understanding social care, in the context of LTC nursing care, it seems that countries have taken very different paths in both the total expenditure and source of payment for these services. In the face of a common challenge in terms of the demography and epidemiology of populations of older people with needs for health and social care, countries have developed very different financing models.

The next sections of this chapter provide a more detail on challenge of caring for older people with multiple needs.

What really is the common challenge?

As outlined earlier in this chapter, it is possible to use demographic data and some information we have on the epidemiology of multimorbidity and functional disability and it implications for services to broadly outline the challenge. But it is also clear that we lack a great deal of crucial information. One response to this is to ask for better data and better evidence. That will take time and in the interim we need to find a way to think about this problem in a way that can provide some guidance.

This section of the chapter builds on the notion that if we can provide an archetype or example of the challenge then we can identify some important themes. With these themes in hand we can start to understand the nature of the problem we face.

The demographic and epidemiological evidence we have tells us that the typical person that symbolises this problem we face is an older person, most likely a woman, who has two or more chronic diseases. She starts off well and independent but as she grows older she becomes less able and eventually her health deteriorates and her needs increase dramatically. The vignette in Box 3.1 outlines the story of Joan Carter as she ages.

Box 3.1. Joan Carter grows old

Multimorbidity but able to function

Mrs. Joan Carter is a 74-years old retired nurse. She lives in a single storey four bedroom house that has a 14-step staircase to the front door. Her husband died five years previously. She is independent and does her own shopping and cleaning. Currently her medical conditions are hypertension and diabetes. She takes x2 oral hypoglycaemic agents, x2 antihypertensives, x1 diuretic and a statin.

Signs of trouble

Mrs. Joan Carter is now 77-years old. In the past three years she has had a number of non-injurious falls both inside and outside her home. She has had two minor car accidents which have not involved other cars or pedestrians. Her Mini–Mental State Examination (MMSE) is 27/30. Her hypertension and diabetes are well controlled. However, she finds climbing stairs an effort and is often out of breath. She continues to be independent in cooking and cleaning her home. Her only daughter who visits from a distance is concerned about her mother's ability to care for herself and her increasing social isolation. She is concerned that her mother is at risk of falling down the stairs.

Loss of independence

Mrs. Joan Carter is now 82-years old. She has become frailer and is having some difficulty with all the basic activities of daily living. She has a MMSE of 20/30 and can no longer independently take care of her finances. Her diabetes and hypertension are still well controlled. She is willing to leave her house but both she and her daughter want her to move into supported but independent sheltered care accommodation.

Catastrophic event

Mrs. Joan Carter is now 86-years old. She develops rapid atrial fibrillation and over a few hours loses her power of speech, has an evolving right hemi paresis and heart failure. She is admitted to an acute care hospital and treated for heart failure and stroke. After acute treatment she is transferred to a rehabilitation bed. After six weeks of rehabilitation she can feed herself but needs assistance with dressing, toileting, bathing, walking and transfers. Although alert and pleasant her MMSE has dropped to 12/30.

This vignette highlights many of the challenges around caring for older people with multimorbidity and functional decline. One is the overlapping and independent roles of chronic disease and functional decline. Mrs. Carter's hypertension and diabetes are well controlled for long periods but she still continues to decline. Are her growing cognitive impairment and lack of independence in activities of daily living related to these conditions? Certainly the stoke she has when she is 86 can be linked to diabetes and hypertension and in that sense they have a devastating impact on function.

Another issue to consider is the distinction between clearly defined health care interventions such as drugs for diabetes and hypertension or acute and rehabilitative care for her stroke and less clear social care needs. When does she need home care? Who decides if she should stay in her home or go to some form of sheltered housing should? What can be done about her social isolation? Clearly after her stroke she needs some sort of long-term care, but up until then what social care services could she use and what evidence do we have about their benefit?

Another challenge deals with the role of prevention. In terms of her "medical history" she seemed to have the best drug therapy available for her diabetes and hypertension, and it is possible there is nothing more that could be done to prevent her stroke. However, perhaps there are some preventive strategies that could be used. Even though she did not fracture her hip, given her history, would a fall prevention programme been useful? There is a history of frailty and social isolation. Are those two risk factors for her stroke? Is there something that could be done to keep her fit and engaged?

A further challenge relates to how we think about the basis for her needs. Can we think of her needs in terms of a set of related medical conditions and how applicable are simple disease models relevant to defining her needs? How much of the decrease in her health and loss in function is due to her local environment rather than to the pathophysiology of her multimorbidity? Are the number of steps to her house and how many floors she lives on important in allowing her to function? Does she really need to drive a car? Should we have a process for taking her driving license away and if we do what about paying for her transportation?

There are a host of questions of this sort. The goal of this section of the chapter is not to be exhaustive in defining the challenges. Rather the goal is to make a point that challenges and difficulties we see in the case of Mrs. Carter provide insights into the nature of the challenges seen by families and providers every day in every OECD country. This is a vignette about an individual, and while the specifics of the story vary from individual to individual, the nature of the problem is the same everywhere. This is our common challenge.

How would we describe the problem of caring for populations of individuals like Mrs. Carter? Is it a complex problem or a complicated one? Current thinking suggests that distinction is more than semantics. It turns out that it may be very important to know if the problem is complex or complicated. The next section of the chapter explores that idea in more detail.

Complex or complicated – Why does it matter?

Complexity science or the study of complex adaptive systems provides an approach to thinking about the nature of problems. This science has its roots in prediction of things such as weather or the performance of stock markets. In recent years it has been described in the context of health care systems.

A key facet of complexity science is making the distinction between different types of problems. Glouberman and Zimmerman (2002) provide a nice set of analogies that can help us to understand the distinctions. They describe three types of problems – simple, complicated and complex. A simple problem is one with a solution that has a limited number of steps that can be well described. The analogy they use is a recipe. There is a list of ingredients, a set of steps and a consistent outcome. A complicated problem involves a large number of steps that can be mapped out, but that involves co-ordination and experience. It involves a process that is understood and that can be tinkered with to yield improvement. The analogy is putting a satellite in orbit.

A complex problem cannot be described in linear terms and tinkering can have massive and unintended effects. It cannot be reduced easily to its constituent parts. In more technical terms these are problems or systems that are dynamic, massively entangled, emergent or self-organising and robust, in the sense that they can alter themselves in response to feedback. The analogy is raising a child. Just because child rearing is complex does not mean that it is not done and enjoyed. The same should be said for complex problems – they should not be avoided. But importantly complex problems should not be treated like complicated problems.

We can think of examples of simple, complicated and complex problems in health care. A simple problem might be provision of cataract surgery. There are clear steps, patients are very similar, and the process can be standardised. A complicated problem might be the provision of acute and rehabilitation care for a stroke patient. You can think of this a very large care map with several sections that look like simple problems that have been linked together. However, the care takes co-ordination and expertise and the system is always under some form of quality improvement. You could write a national care plan but you would not be surprised if it took a little while for it to get implemented in different regions. A health care example of a complex problem might be trying to roll out a national strategy for investing in imaging technology in order to improve outcomes. There are a lot of stakeholders and complex interactions. Local factors are very important. There is limited certainty about success and concerns over unintended consequences.

There is a link between how the problems are seen – complicated or complex – and how they are solved. Inherent in the approach to solving complicated problems is the notion that it is possible to plan in minute detail a solution that can tinkered with and standardised. You may not get it right the first time but if you plan and practice and build the process up bit by bit you can get the answer. The ideal system has little variation and if a part fails to perform you can simply change that part. If you did it once, you are pretty sure you can do it again, and if it works in one setting it will work in another. It is all about rules and standard operating practices. In the context of the of the satellite analogy, you can think of the evolution from a high risk cutting edge problem that historically could only be solved by a few countries that were willing to provide the huge investment and oversight to the current situation where it can done by many countries and is now a product of the private sector economy.

On the other hand a complex system is so massively entangled with internal and external factors that it defies detailed planning. Getting it right once is no clear sign of continued success. Given the complexity, variation is expected. There is no clear expectation that what works in one setting will work in another. Small changes can have huge impacts – the famous analogy from chaos theory where the beat of a butterfly's wing in Brazil causes a hurricane in Texas. Despite this complexity, we know what we want. In terms of the childrearing analogy all of this rings true. We cannot imagine imposing a plan on every family but we understand that we have expectations about what defines success. We do not think about individuals or institutions as being completely responsible for success of failure. Communities are important. The saying "it takes a village to raise a child" resonates with families and governments alike.

Although the two views of the problem are distinct, some important elements are common to both complicated and complex perspectives. From both perspectives there is an identifiable outcome – a satellite in orbit in the complicated example and a healthy, happy young adult who is well integrated into society in the complex example. Both perspectives recognise that many tasks have to be completed and many things have to happen for that outcome to be achieved. Both perspectives see that success depends on interaction across many providers and decision makers. They differ fundamental on how to think about producing the outcome and therefore about organising and financing the system.

This chapter will use these two different perspectives to help to clarify the options for financing health and social care systems for older people with multiple needs. Before doing that, it is worthwhile to look at what we know about the relationship between organisation and outcomes in health care systems.

Evidence on organising care for older people with multiple needs

There is extensive research on the link between delivery system organisation and health outcomes. Recently Natasha Curry and Chris Ham from the King's Fund published a useful overview of this issue that has specific relevance to care for individuals with multimorbidity (Curry and Ham, 2010). They argue that integration is the key to producing better outcomes, and that integration can be looked at as occurring at three levels. Each level of organisation has its own value and role. At one end is macro-level integration. The goal at this level is to provide care to large and diverse populations by bringing together health plans or commissioners with physicians and institutions. A classic example would be Kaiser Permanente in the United States. At the other end of the spectrum is micro-level integration which includes diverse approaches such as case management or virtual wards to deal with individual patients. In between is meso-level integration where the focus is on the needs of particular groups of patients.

Interestingly, in their chapter Curry and Ham look specifically at older people with multiple long-term conditions as targets for meso-level organisation. They provide a nice review of the evidence and conclude that integrated health and social care systems for older people with multiple needs demonstrate positive impacts on many important outcomes. In this review they provide descriptions and analysis of the impacts of programmes like the Programme for All-Inclusive Care for the Elderly (PACE) in the United States, the System of Integrated Services for Aged Persons (SIPA) in Canada and similar efforts in Italy and England. It is argued that each of these efforts has had positive effects on health outcomes and that they probably reduce health care costs.

They identify some key common features of these programmes. First is that these programmes target individuals in the community that are at high risk. For example, PACE targets individuals who live in the community but who are eligible for admission to long-term care. The typical PACE enrolee is 80-years old has eight medical conditions and several limits in ADL. In each programme, care is provided by a multidisciplinary care team and includes delivery of social care services. Individuals consistently go to one place to get access to a full range of services. A key to the cost savings that can be generated by these programmes is incentives and opportunities for providing lower costs services (*e.g.*, adult day care) rather than higher costs substitutes (*e.g.*, long-term care admission). This notion of providing the least costly service appropriate for need is an idea that is applicable to both health and social care. In the context of social care services where there discrete jumps in the level of care and costs – from community living with no support, to community living with home care, to supported housing, to long-term care, to chronic hospital – this process is often referred to as downward substitution of services. A classic application of this is keeping older people in the community rather than moving them to a nursing home. Once they are in a nursing home it can be hard to get them back into the community, and the consequence is a long-term stream of social care costs. Increased investment in home care that prevents admission to long-term care can result in cost savings. If community home care can be integrated with other health and social care services then health outcomes can be optimised. Thus the programmes end up with both cost savings and better outcomes.

This work and other studies come to similar conclusions – care for individuals with multimorbidity and multiple needs across health and social care is best delivered by integrated systems that involve a single entry point, multiple providers and incentives to match care to needs. The problem is one of providing integrated care to a defined population; the question is how to finance this care.

This is the specific financing challenge that Gerard Anderson identified Chapter 1 of this publication.

> *"For a person with multiple chronic conditions, the challenge is to find a way to encourage providers to manage all chronic conditions collectively instead of each one individually. The payment system needs to foster interaction across multiple providers."*

The next section of this chapter describes how thinking about this challenge as complicated or complex can help identify financing options.

Options for financing integrated health and social care

There is a large literature around the options for management and financing of health and social care. A detailed review of this literature is beyond the scope of this chapter. This chapter focuses on two broad alternatives. One alternative is based on the premise that the problem faced in providing health and social care to older people with multiple needs can be viewed as a complicated problem. This alternative draws on the principles espoused by Michael Porter, a current thought leader in health care management and financing. The other alternative starts with the premise that the problem is complex and draws on the principles from complexity science.

Porter's work builds around the notion that health care system delivery should be value based. Value, he states, should always be defined by the customer, and value depends on results not processes or inputs. Patients do not put value on the number of doctors in the system or the rate at which guidelines are followed, they want and value outcomes. He argues that outcomes are condition specific. A summary of what he outlines as being required to achieve a value-based delivery system is provided in Box 3.2.

Box 3.2. Principles for achieving a value-based health care delivery system

- Mandatory measurement and dissemination of health outcomes for every provider and condition
- Radical re-organisation of prevention and routine health maintenance
- Organise care delivery around medical conditions
- Payment system that aligns everyone's interests around improving value
- Require providers to compete for patients
- Electronic medical records that support integrated care
- Consumers become more involved in their health and health care

Source: Porter, M.E. (2009), "A Strategy for Health Care Reform – Toward a Value-based System", *New England Journal of Medicine*, Vol. 361, pp. 109-112.

Porter focuses on breaking down health care for individuals or populations into health care for specific conditions. It is assumed that for individuals with multiple conditions it is straightforward to adjust outcomes for these multiple conditions. These core ideas are very consistent with the notion that we are looking at a set of simple problems that together make a complicated problem. There is some recognition that there needs to be integration. But integration can be easily brought about by focusing on common goals, creating new delivery systems and bundling payment. Porter understands that care for conditions is distinct from prevention and includes in his model the idea of creating bundles of preventive services for distinct populations such as frail older people and patients with multimorbidity.

In Porter's view markets and competition are central to the success of the value-based system and inherent in this is the idea of transferring risk to those who compete for patients. Excellent providers will grow bigger and those that perform poorly will be driven from the market. If you work out the way to provide highly-valued care at a good price to one population you can scale that process up and take more and more patients into the same delivery model.

The Porter financing model rests on bundled payment and market mechanisms for transferring risk. Governments set some broad conditions for creating a market, focus on disease specific outcomes, and transfer risk.

Providers learn the best way to provide care for specific conditions; they develop detailed care maps and plans. Those that do this well survive and gain market share. Those that do poorly learn from those that do well or they do not survive.

As an alternative, Plsek and Wilson look at financing and management of health care by starting with the acceptance of health care as a complex problem (Plsek and Wilson, 2001). They argue that complexity science suggests treating health delivery systems as complex adaptive mechanisms allows an innovative way to manage and finance health care. In their view complexity thinking identifies that the relationships between actors in the system is key and that creativity and variation in care should be valued. They outline a set of principles for applying complexity science to health care (Box 3.3).

Their model talks about whole system targets and pooled budgets. Inherent in their vision is the notion that variation is expected and valued both as sign of innovation but also as a consequence of the effect of local factors and relationships. The way care is provided may vary from region to region and setting to setting. Change is not mandated by evolves, often incrementally, by building on existing relationships and recognising local factors. In this view you cannot get rid of risk. It is inherent in the problem. For example, it is possible to get better at predicting stock markets or the weather but no one believes that you eventually you will be able to predict either perfectly. In this model governments do not transfer risk but rather they transfer responsibility and ownership of the problem and accept risk of failure and embrace local variation.

This model does preclude market mechanisms for financing. In fact, this view is consistent with newer ideas about organisation and financing that fall under the broad term of social enterprise. In this model an entity is created in the market that has social aims and social ownership. In health and social care this builds in the long tradition of community involvement in these sectors. In the United States this idea of creating businesses or financial entities that are interested in broad social benefit has led to the creation of low-profit limited liability companies (L3C).

Box 3.3. Complexity science principles for health care

- Interaction within the health care system are often more important than the discrete actions of individual providers;
- Minimum specifications should replace complicated plans;
- Understand what attracts people to change rather than forcing change and battling resistance;
- Value variation.

Source: Adapted from Plsek, P.E. and T. Wilson T. (2001), “Complexity, Leadership and Management in Health Care Organizations”, *British Medical Journal*, Vol. 323, pp. 746-749.

The role of private payment in financing health and social care

The conceptual model that provides the framework for this chapter (Figure 3.1) includes individuals and private insurers as potential payers for care. The extent to which individual out-of-pocket or private insurance is used to pay for care has implications for equity but is also related to societal goals and norms. Most, if not all governments in the OECD see that there is a central role for government in providing comprehensive medical care services. They may have co-payments or may allow private insurance for some medical services that governments finance but universal access to comprehensive medical is seen as an accepted standard. There is growing acceptance of the notion of access to health care as a right not a privilege. However, as pointed out earlier in this chapter (Table 3.3) even in the restricted context of long-term care nursing services there is international variation in government versus private financing for supportive or social care. If there is variation in this specific service aimed at dealing with long-term disability, then surely variation in financing of other support services required to deal with functional disability is even wider.

Some of this variation is embedded in ideology and social norms or values. If Mrs. Carter is having trouble making her own meals and is getting socially isolated is that something that should be dealt with by her neighbours or her daughter or is that something that government should address? What does Mrs. Carter herself expect?

Part of the solution to this problem is based on how we see the value of these social care services. If services such meals on wheels to older people or adult day care programmes, which are focused on increasing fitness and reducing social isolation are not directly related to reducing the need for medical care services or, more broadly, outcomes that are produced by medical care services, then they have their own rationale for financing that is distinct from issues related to financing medical care services. However, if the opposite is true, if indeed these services are replacements for or alternatives to medical care services, then they are part of what we want to integrate into care. In fact including them provides a key option for downward substitution of services.

In essence, the answer to the question about private versus public funding of social care services depends on the extent to which we see these social care services as part of solution to the challenge of producing desired health outcomes for older people with multimorbidity and multiple needs. If they are seen as part of the solution, then we need to integrate health and social care. If the desired outcome is not only Mrs. Carter's health but also her happiness, her feeling of security and the extent to which she, her daughter and her community feel that she is well cared for, then the problem is far more complex than managing her diabetes or even treating her stroke.

Conclusions: What are the next steps?

The main thesis of this chapter is that we are at a crossroads in thinking about financing of care for older people with multimorbidity and multiple needs. One path is based on seeing the challenge as a complicated problem. This path points to bundled payments, transferring risk and traditional market competition. We create a system with standardised and widely disseminated care planning for a wide range of medical conditions. We assess performance against a wide range of clearly defined outcomes. The other path is based on seeing the problem as complex. This path points to whole system targets and minimum specifications, pooled budgets and innovative market models. We create a system that values relationships over processes, that is locally based and that lets change develop from within. Governments understand that risk cannot be eliminated and value ongoing variation and creativity.

There are three broad ways to think of the next step. One is to make as much of the problem complicated as possible and go down that financing path. Another is to accept that it is a complex problem and go down that financing path. A final option is to treat medical care as complicated and social care as complex and split financing paths along those lines. Each of those options is discussed briefly below.

Inherent in making a problem complicated rather than complex is breaking the problem down into a set of clearly defined pieces where there are direct lines between the care that is provided and the outcomes that are achieved. This is a model that has been successfully used to develop care plans for a range of medical conditions and situations. At a broad level this approach is based on research that provides evidence about what works and what does not, and at the detailed level is based on continuous quality improvement techniques that are used to ensure the evidence is implemented. The key element is evidence, and the challenge is finding and implementing that evidence. An optimistic view of this would say that we have all kinds of strategies for providing integrated health that have been tried in different countries, and if we evaluated those and shared what we learned, then we would have the evidence we need. Once we have agreed on what works we simply implement. A more pessimistic view is that we know very little about multimorbidity and multiple needs and how to deliver care for those populations. Even if we did know what works, say something like the PACE programme, we are not sure how generalisable that solution would be to other countries, much less how to implement it in different regions. Learning more and sharing evidence is a valuable strategy for moving forward but there are limits to what we know and concerns about how to implement what we know.

So if we cannot reduce this to complicated problem, then we accept that it is complex and move on from there. The complexity model has some conceptual appeal but the details are hard to understand. It is unclear where it has been tested and shown to work better than alternatives. Perhaps complexity is more useful for describing a problem than for solving it. The complexity science approach accepts that failures will occur and that there will be wide variation in how things are done. Neither the acceptance of failure nor a willingness to allow local variation are appealing to central governments or elected officials. If this path were chosen, then it might best be limited to a population that was small enough and that had a problem that was so poorly dealt with now that failure would not be catastrophic and experimentation would be tolerated. The key here is defining the target population and then having the patience to deal with some ups and downs in performance until hopefully the complex system begins to stabilise.

The last option is to look at the problem of providing health and social care for older people with multimorbidity and multiple needs as having some parts that are complicated and some that are complex. The best solution is to decide which is which and split up the financing along those lines. One broad approach to this would be to say that main stream medical care delivery is complicated and the social care part is complex. This leads to a Porter value-based system for medical care. A system where governments can transfer risk and use markets to achieve desired outcomes. On the social care side they can decide to play a role in finance or not. If they do want to invest public funds, they can use new mechanisms such as social enterprise to support community-based initiatives or they can pool budgets across government and non-government agencies. The problem is that there is nothing here to promote integration between health and social care, and in fact it may make it impossible to integrate these two. This is fine if they produce different and unrelated outcomes. However, if they do overlap then we have lost important opportunities for positive synergy and downward substitution of services between the two sectors.

There is no assurance which path is best. However, the demographic and epidemiological realities will force governments to move and they need to think carefully about which direction to go.

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Chapter 4

Reconfiguring health professions in times of multimorbidity: Eight recommendations for change

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The professional organisation of health provision no longer reflects the changing patient and population health needs caused by the growing number of complex illnesses. Health reforms in certain countries have tended to enforce co-ordination and remove some of the power from the health professions in order to respond to these changes. However, it may be better to rethink the nature and type of professionals and to initiate basic changes to their way of working.

Reconfiguring health professions requires a comprehensive approach including the redistribution and sharing of tasks and establishment of new roles for physicians, non-physicians, and nursing occupations.

Professional leaders, supported by health policy makers, can consciously activate the self-regulatory capacity of health professionalism in order to reconfigure the way in which health professionals work to better adapt to changing health needs.

Introduction

There is a growing awareness that the way in which health professionals work needs to be more responsive to population health needs and problems. Improving the responsiveness of health systems to changing population needs has more to do with rethinking the nature and type of the professionals, rather than merely increasing or decreasing their number. Three challenges are key:

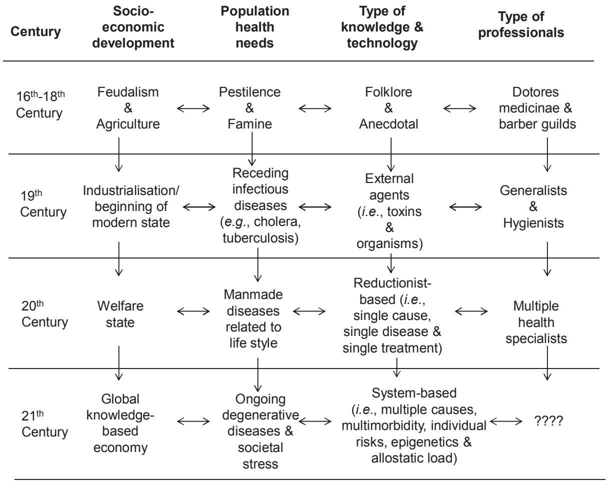
First, the health workforce is insufficiently responsive and accountable to patients, when their problems and illnesses should shape the workforce.[1] This has gradually become apparent in aging populations as well as with the increase of multimorbidity (Anderson, 2011a; Taylor, 2011). New conditions modify the standard formulation of diseases that health professionals traditionally use (Wade and Halligan, 2004). Diseases are professionally constructed entities: they do not exist in isolation from each other and therefore they are not an independent representation of illness. Moreover, they are but one manifestation of ill health among others, including (but not limited to) discomfort, disability, and limitation of normal activity (Starfield, 2010): the impact of health conditions based on lost economic productivity leads to a different ranking than considering the impact based on medical costs (Loeppke *et al*., 2007). For example, the top five high impact diagnoses based on productivity loss are fatigue, depression, back or neck pain, sleeping problems, and other chronic pain whereas the top five high impact conditions based on health care costs are relatively rare cancers, back or neck pain, coronary heart disease, other chronic pain, and high cholesterol levels.

Second, the health workforce insufficiently recognises the full potential of new knowledge and technologies. Innovations emerging from current R&D activities are locked in the path dependencies of partnerships amongst industry and academia. They drive the further specialisation of health provision, rather than reconfiguring the health workforce to become focused on patients and the way in which illness manifests itself in populations (Ferlie *et al*., 2008). New system-based knowledge (*e.g*. individual risk factors; epigenetics;[2] allostatic loads[3]) and the miniaturisation and mobilisation of health technologies, including modern information technology, makes it increasingly less necessary to bring professionals and patients together in one place to discuss treatment options. The future health workforce will increasingly work in stand-alone units and community settings rather than in institutions such as hospitals or even health centres in most OECD countries.

Third, economic realities pressure the health workforce to change. Health spending continues to rise inexorably, growing faster than the economy in most OECD countries. Given the recent economic downturn, countries are looking for ways to improve the efficiency of health spending (OECD, 2010a). The health workforce is critical in this respect as health professionals are the key producers of health services and their functioning directly impacts on health care expenditure.

OECD governments must put policies in place that not only plan the number of health professionals, but also reconfigure their nature and type to better meet patient and population health needs and problems, *i.e.* the challenges of multimorbidity. Figure 4.1 presents a framework to analyse schematically the long-term evolution of population health needs and the predominant responses in health professional organisation. As initially described by Omran (1971), these so-called epidemiologic transitions have paralleled the demographic and technologic transitions in the now developed countries of the world in four stages. Although epidemiologic transitions within (sub)populations are often more complex and varied, the figure points out that professionals have continuously adapted to changing morbidity patterns, but there is a need now for another transformation. The key issue is what nature and type of health professionals would best reflect the health needs of populations entering the fourth stage of epidemiological transition suffering from multimorbidity (Anderson, 2011a), using the full potential of new knowledge and technologies, in the new global knowledge-based economy.

Figure 4.1. Analytical framework



Century	Socio-economic development	Population health needs	Type of knowledge & technology	Type of professionals
16th-18th Century	Feudalism & Agriculture	Pestilence & Famine	Folklore & Anecdotal	Dotores medicinae & barber guilds
19th Century	Industrialisation/ beginning of modern state	Receding infectious diseases (*e.g.*, cholera, tuberculosis)	External agents (*i.e.*, toxins & organisms)	Generalists & Hygienists
20th Century	Welfare state	Manmade diseases related to life style	Reductionist-based (*i.e.*, single cause, single disease & single treatment)	Multiple health specialists
21th Century	Global knowledge-based economy	Ongoing degenerative diseases & societal stress	System-based (*i.e.*, multiple causes, multimorbidity, individual risks, epigenetics & allostatic load)	????

Source: Thomas Plochg, Niek Klazinga, Michael Schoenstein and Barbara Starfield for the OECD.

Systems adapt slowly or minimally to changing health needs: physicians and nurses essentially work and organise their labour in the same way as they did 50 years ago. The movement from generalism to specialism (*i.e.* specialisation) that was set in motion a hundred years ago is still moving in the same direction although the nature of the burden of disease has changed (Rutkow, 2011). Newer professional occupations (*e.g.* geriatric medicine, intensive care medicine, emergency medicine) have emerged but are struggling to gain a foothold. And these new professions do not appear to be leading a charge for broader system reform and probably cannot do so given the vested structures of health care institutions and academia.

This chapter provides a long-term vision on the reconfiguration of health professionalism in the light of the rise of multimorbidity. Based on the sociology of professions (*e.g.* Freidson, 2001; Abbott, 1988; Evetts, 2003), it suggests using levers to trigger effective professional self-regulation. It makes eight recommendations to encourage self-regulation of health professions to foster a reconfiguration of their organisation and work to deal more effectively with changing health needs, to use new technologies more effectively, and to contain cost pressures by using labour more efficiently.

Health professionalism and professionalisation

In sociology, professions are defined as groups of institutions that permit the members of an occupation to make a living while controlling their own work (Freidson, 2001). Internal control is a basic characteristic of professions, as they perform non-routine tasks requiring expertise based on abstract knowledge and practical apprenticeship that is inaccessible to those lacking the required training and experience. In other words, being fit to meet the status of a profession is linked to work that is controlled by members of the profession themselves. Therefore, professional autonomy and strongly developed ethical codes are inherent attributes of a profession (Adler *et al*., 2008).

Professionalisation is not only linked to the pursuit of internal control over health provision, but also to outperforming other ("rival") occupational groups. Health professions have to demonstrate the superiority, exclusiveness and discretionary nature of the knowledge which underpins their work. Meeting this requirement is a huge endeavour, as jurisdiction over knowledge cannot be claimed by decree alone, particularly in an era of evidence-based medicine. It must be established alongside, or at the expense of other professions with a vested interest. Thus, turf battles are inherent to the professionalisation processes even when all health professions are interdependent and form a configuration or so-called "system of professions" (Abbott, 1988).

Thus far, the professionalisation of health professions has become synonymous for specialisation. When knowledge becomes very complex, specialisation in just one segment of it makes the work more manageable by limiting breadth while permitting depth and innovation. In health care, this traditional way of reducing complexity is based on the assumption that the human body can be reduced to smaller and simpler components, and that understanding each component separately leads to an understanding of the entire health problem – that is, that the whole is the sum of the components (Ahn *et al*., 2006a; Wilson *et al*., 2001). Under this reductionist assumption, innovation in medical science results in knowledge on smaller and smaller bodily parts reflected by an ever growing number of deeper and narrower (sub)specialties.

An alternative assumption is that the whole is more than the sum of its parts. Fields such as geriatrics, critical care medicine and family medicine build upon the recognition that diagnosis and treatment require a generalist focus on "bodily systems" rather than a specialty focus on "bodily organs" – a notion consistent with the upsurge of "systems thinking" in medical science: human beings are viewed as composed of and operating within multiple interacting and self-adjusting systems (including biochemical, cellular, physiological, psychological, and social systems) (Ahn *et al*., 2006b; Wilson *et al*., 2001; Sturmberg, 2007). In a systems approach, a complex health problem is made manageable by observing the overall pattern in the behaviour of the variety and interactions of bodily systems. Medical innovations based on "systems thinking" result in more generalist knowledge reflected by stronger primary care infrastructures and/or more generalist specialty domains in secondary and tertiary care.

This chapter does not draw a hard definitional line between clinicians and other health occupations, such as nursing, non-clinicians and the allied health professions. Instead, it emphasises that professions and occupations share many common characteristics and processes (Evetts, 2003). Professions are essentially the service and knowledge-based category of occupations at the high-end of the spectrum, which usually follow a period of tertiary education and professional training and experience. Noticeably, having the status of a profession (or professionalism) is appealing to many occupations such as nurses, care assistants, and physiotherapists, as it provides more independence for exercising normative and social control over their work.

Drivers for change

The process of change has three drivers: health needs, scientific knowledge and technology, and economic realities (Figure 4.1). Patient and population needs change over time (Omran, 1971). Burdens of morbidity are shifting from the third stage of epidemiology (*i.e.* man-made diseases related to lifestyle) towards a fourth stage. It is characterised by multiple co-existing conditions brought about by improved survival with concomitant degeneration resulting from biological, environmental, and social stresses of current-day living.

Increased effectiveness of health service interventions that delay death by managing (although not necessarily curing) diseases, has been the impetus for this transition. It led to a marked increase in the coexistence of separate diseases in the same persons. Epidemiological data shows that people with at least one chronic condition represent 80% of the burden of disease, and people with multiple chronic conditions 50% of the burden of disease in most OECD countries (Anderson, 2011a). Older literature expressed the same notion by the term "co-morbidity": the co-occurrence of unrelated diseases.

Morbidity is not randomly distributed in populations. People and populations differ in their overall vulnerability to illness and resistance to threats to their health; some have more than their share of illness and some have less. Clustering of diseases is therefore a result of a complex pattern of interacting influences between the human body (biology) and life experiences (biography) in the broadest sense (Sturmberg, 2007; Getz *et al.*, 2011). It is more common in socially deprived populations and more common in children as compared with its expected frequency based on frequency of individual diseases in populations (despite lower overall frequencies of morbidity in childhood). This morbidity mix is often called multimorbidity.

Over time the frequency of diagnosed morbidity has increased, at least partly as a result of lowered thresholds for diagnosis, inclusion of new diagnoses (including some risk factors, such as obesity) and perhaps also as a result of true increases in some diseases (such as those resulting from environmental exposures over time) (Howard and Busch, 2010). Increasing multimorbidity is straining the ability of quality assessment mechanisms which now have to confront the inadequacy of existing "guidelines" based on management of single conditions (Starfield, 2010).

It is not necessarily the case that increased diagnosed multimorbidity would be associated with poorer health but it increased the demand for health services. For example, among the elderly in the United States, the percentage of people with five or more diagnosed conditions who reported being in excellent or good health increased from 10% to 30% between 1987 and 2002 (Thorpe and Howard, 2007). Thus, ill health has decreased (by self-reports), but physicians are generating more interventions for the diagnosed conditions and, hence, greater burden on the health system. The increasing imperative for earlier diagnosis and management alone mandates a rethinking of the relative roles of various health professionals in a context where "preventing illness" is becoming more of a priority.

The second set of drivers are advances in scientific knowledge and technologies which are the *perpetuum mobile* of professionalisation processes. Health professions pursue control over knowledge creation and diffusion, because they thrive on new diagnostics, pharmaceuticals, and medical devices to maintain and strengthen their professional jurisdictions. These professional imperatives generally work against the adoption of new approaches to health service delivery because they threaten existing power structures; innovations in thinking about illness genesis and progression are acceptable only to the extent that they are compatible with existing power bases. If new knowledge and or technologies are perceived as threatening, change is resisted (Abbott, 1988; Ferlie *et al*., 2005; Adler *et al*., 2008). This countervailing power is notoriously strong. It provides a good explanation why professionalisation in health care has become synonymous for sub-specialisation, the entrenchment of interests vested in individual diseases and organ systems, and – in extreme cases – a reluctance to recognise new knowledge about how diseases are generated and manifested in patients and populations.

In this perspective, the upsurge of "systems theory" in health sciences will not automatically become the imperative for substituting generalisation for specialisation. A quick search of PubMed, the main literature indexing system in medicine reveals that the MeSH-term "systems theory" was introduced to the database in 1980 and used in the titles of 545, 529 and 1 236 articles in the periods 1971-90, 1991-2000, 2001-11, respectively. This represents only a modest increase even at a time when the utility of system-based knowledge for dealing with multimorbidity is increasingly recognised and promoted (*e.g.* Wilson *et al*., 2001; Ahn *et al*., 2006b; Sturmberg, 2007).

In theory, the use of information and communication technologies (ICTs) in clinical care should promote more systems thinking. But exploiting its potential has proven to be a difficult undertaking. The significant public investments have resulted in both notable successes and some highly publicised costly delays and failures (OECD, 2010b).

At some point, however, advances both in knowledge (about the interrelationships among risk factors; epigenetics; and allostatic loads) and information system technology will become sufficiently compelling to force a re-evaluation, as a result of a growing recognition that the health care system will become dysfunctional without it.

Economic realities constitute the third driver. Health spending continues to rise, growing faster than the economy in most OECD states. This leads to increased pressure on already strained public finances. There is a growing need to control health care expenditure at a time when more, better and safer health services are demanded. The case is even more compelling given the significant costs associated with people with multiple chronic conditions (Anderson, 2011b). In the United States, for example, two-thirds of all spending in the Medicare programme is for people with five or more chronic conditions (Robert John Woods Foundation and the Johns Hopkins Bloomberg School of Public Health, 2010).

Governments are striving to increase value for money in health spending (OECD, 2010a). The health workforce is a critical imperative in this respect as health expenditures derive directly from how the workforce operates and what its work costs. Human resource planning policies that focus on increasing labour productivity by changing their qualifications and expertise, could potentially lead to costs savings.

However, attempts to adjust the health workforce in order to increase labour productivity have often been unsuccessful. Experiences of some OECD countries, *e.g.* Canada, United Kingdom and Denmark, showed that easing the budget constraint contributed to higher wages of health professionals rather than the hoped-for increase in health productivity (Rapoport *et al.*, 2009). Not surprisingly, governments generally focus on other policies to achieve better value for money [*e.g.* evidence-based medicine (EBM) and health technology assessment (HTA) to rationalise resource allocation, pay-for-performance models, improving co-ordination of care for chronic diseases, drawing the benefits from pharmaceutical spending, and redesigning health systems with support of ICT] with varying success to stem the tide of spiralling costs (OECD, 2010a).

Dysfunctional configuration of health professions

The three “drivers” are interrelated: changing morbidity patterns make existing professional prerogatives obsolete and demand adjustments in conventional provision of health services by health professionals. Health care provision as we know it today is overly specialised and fragmented, as it is divided into numerous “single-condition” professions (Stange, 2009). This made sense when patients primarily suffered from single diseases that were treatable within the boundaries of one profession. However, it is dysfunctional when a growing number of patients suffer from multimorbidity.

Having multiple, complex and overlapping health problems is associated with poor outcomes in terms of quality of life, psychological distress, longer hospital stays, more postoperative complications, higher mortality and higher costs of care (*e.g.* WHO, 2002; Nolte and McKee, 2008; McGlynn *et al*., 2003; Hofmarcher *et al*., 2007). These are, at least in part, attributable to the splintered and overly specialised health professions that are still configured to manage single diseases with "main" causes and of relatively short duration. Patients with multimorbidity consult on average eight physicians in a given year across different settings whose inputs are poorly co-ordinated (Pham *et al*., 2007; Schoen *et al*., 2009).

Primary care professionals should have the expertise, knowledge and competence to consistently co-ordinate all the inputs from various doctors and navigate patients through the system. Countries with a strong primary care infrastructure have better outcomes in terms of population health, costs, access and co-ordination experiences (Starfield *et al*., 2005; Wennberg *et al*., 2005). Logically, the strengthening of primary care is widely considered to be an indispensible feature of well performing health care systems in the twenty first century (WHO, 2008). However, it may well be the case that in some countries, primary care physicians are explicitly prohibited (generally through the influence of specialty lobbies) from providing certain types of care that they might be well able to provide. Although no data are available to quantify the magnitudes of such prohibitions, there is anecdotal evidence that in countries with weaker primary health care systems may have more restrictions on what is permitted to be provided in primary care settings.

Strengthening of primary care alone is unlikely to change the balance between the power of specialists and primary care physicians in adapting to changing health needs. Primary care physicians would still encounter problems in performing their tasks and the configuration of health professions would remain fundamentally fragmented and overly specialised (Bodenheimer, 2008).

Although considerable progress has been made in making health settings more accessible to patients and fostering control over them by non-physician managers, the complexity of work still requires a considerable degree of tacit, discretionary and experiential expertise, an inherent aspect of professional work. This is the central thrust of Eliot Freidson (2001), who postulated the superiority of professionalism for fostering human endeavours requiring specialised knowledge and skill, significant discretion and judgment in the handling of individual cases, and special faithfulness to the interests of those being treated. There is no conclusive evidence that current proposals for care, such as the Chronic Care Model, are measurably improving patient care (Solberg *et al*., 2006; Nolte and McKee, 2008). Where it has proven useful it has been in facilities that already have achieved high levels of primary care performance, and the benefits are likely to be from that rather than from the new "model" (Starfield, 2010).

Well-performing health care systems in the twenty first century need health professionals who retain their professional roles and also remain the key guardians of quality. The route to improving health care delivery is not by-passing and curtailing health professionalism but, rather, to establishing more "integrative" professions alongside the existing ones. The development of greater integrative capacity within the health system, when accompanied by a devolution of single condition tasks now provided by specialists whose talents could be redirected to tasks more in tune with their high-level training would go a long way to making care less costly and better co-ordinated.

Towards a new configuration of health professions

Reconfiguring health professions requires a comprehensive approach including redistribution and sharing of tasks and new roles for physicians, non-physicians, and nursing occupations. Rationalisation of the relative roles of health professionals has been hindered by a failure to appreciate the distinction between tasks and functions in health care. For example, only recently have the functions of primary care been defined and accepted: first contact, person-focused care over time, comprehensive in scope of services available and provided in primary care settings, and co-ordination with care when it has to be provided elsewhere.

Yet, there continues to be controversy about whether non-physician professionals are equally able to serve as primary care providers because the literature on the utility and acceptability of these practitioners is based on studies that confuse functions with tasks. Providing health services involves tasks such as addressing the processes of problem or needs recognition, diagnosis, management, and reassessment across a range of preventive, curative, rehabilitative, and palliative activities. The skills necessary to fulfil these tasks can be taught to intelligent and thoughtful individuals whatever their professional backgrounds, but achieving the functions of primary care requires an organisation of professional work that transcends these specific tasks.

Little is known about the functions of specialist care and the extent to which it is short term, primarily for advice and guidance, shared with primary care providers, or substituting for primary care providers over the long-term. Explicitly enhancing the "integrative" function of primary care should prompt a re-thinking of the role of specialists and other health professionals, with the goal of better rationalising their different functions. To achieve such a reconfiguration three interrelated steps are proposed.

The first step entails defining and categorising patient and populations according to their burdens of morbidity. New categories are needed in order to classify patients with multimorbidity that provide the basis for gathering and organising health expertise (Fortin, 2007; Starfield, 2010). For example, what expertise is needed to deliver optimal medical care to patients with multi organ disorders or a frail elderly person with multiple diseases? Some categorisations explicitly aim to characterise the overall morbidity burden from a clinical and epidemiological perspective (see for instance *www.acg.jhsph.edu*).

Moreover, primary care, public health, intensive care medicine, paediatrics, occupational medicine, emergency medicine and geriatrics mark fields in medicine where more "integrative" health professions would be advantageous. Nevertheless, which categories will ultimately be used to categorise populations will depend on a study of the potential of the different alternatives to deal with multimorbidity. Research on this theme and related issues is still in its infancy (Fortin, 2007).

The second step requires that the professional work of doctors, nurses and allied health professionals be organised around the newly defined categories of health needs. This essentially means merging or rearranging specialty domains or establishing new domains and roles. For example, geriatrics might be established more generally as a fully approved medical specialty, thus making geriatricians the frontline staff for frail elderly patients in all countries (Grimly, 1997; Barton and Mulley, 2003; Boult *et al*., 2008). Existing medical specialists (such as internists, cardiologists, and neurologists) would then be aligned to better support the "integrative" function of geriatricians.

But a rearrangement of specialty domains and non-physician roles is unlikely to occur by decree; it has to be established from within, strategically supported and stimulated from the outside and based on a vision of health system design with special reference to the blurring of the interfaces between primary, secondary and tertiary care for people with multimorbidity. Focusing on tasks to be provided by the different professionals and how they best support the integrative function is a critical first step in the process of re-aligning skills to better meet new health needs.

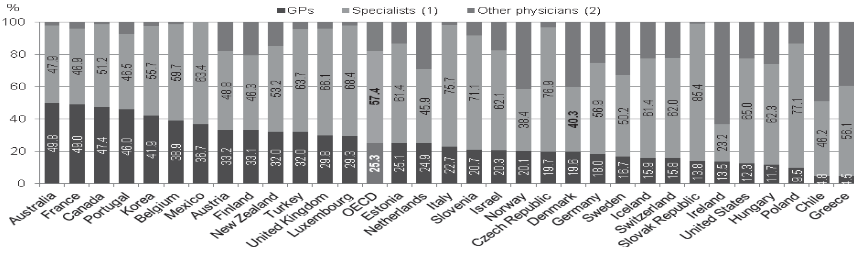
The third step is then to reorganise the work of doctors, nurses and allied health professionals practicing in these integrative knowledge domains. A major challenge will be to devolve tasks and responsibilities to the type of health worker most accessible to patients and consistent with the achievement of excellent quality and outcomes. This will require a careful reconsideration of sharing or redistributing tasks between different occupations, in particular between doctors and nurses in more advanced roles.

Advanced nursing roles have been implemented in a number of countries in response to calls for better access to services. Experiences with these new roles have largely been positive. Evaluations show that using advanced practice nurses can improve access to services and reduce waiting times. Advanced practice nurses are able to deliver the same quality of care for a defined range of problems, especially those involving various aspects of prevention and follow-up care (Delamaire and Lafortune, 2010).

Furthermore, professional work that is non-discretionary in nature and which therefore can be standardised or managerially organised should be devolved to allied health professionals or less highly educated health personnel. There is a well-established literature that illustrates the potential and feasibility of transferring tasks to non-physicians (Laurant *et al*., 2005). Developing these new roles for nurses could therefore improve access to care in the face of a changing medical workforce, and release time for physicians to expand their work into new areas involving the understanding and management of multimorbidity.

Moreover, tasks can also be left to the patients themselves - with support and guidance from health professionals – as illustrated by the developments in telemedicine and eHealth. The shift from office-based care is rapidly changing to new venues to provide and receive care; e-health plays a major role in these developments (Davidoff and Miglus, 2011)

Figure 4.2. General practitioners, specialists and other physicians as a share of total physicians, 2009 (or nearest year available)



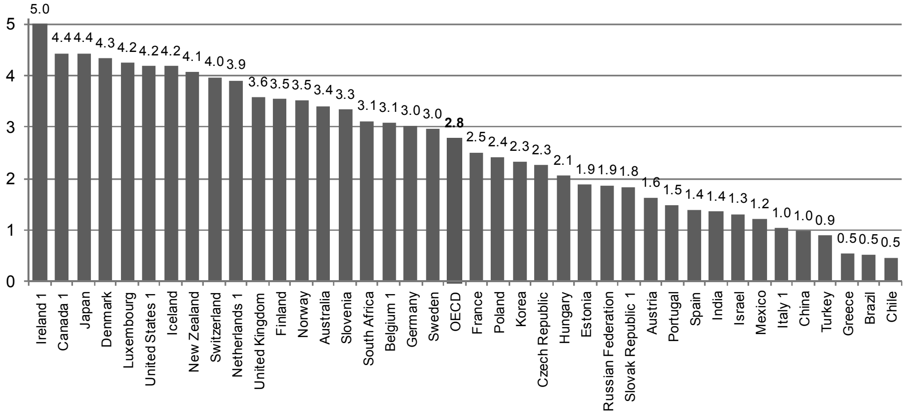
1. Specialists include paediatricians, obstetricians/gynaecologists, psychiatrists, medical specialists and surgical specialists. 2. Other physicians include interns/residents if not reported in the field in which they are training, and doctors not elsewhere classified.

Source: OECD Health Data 2011.

However, there is little evidence that the shift towards more system-based health professions is taking place. On average across OECD countries, GPs made up only a quarter of all physicians in 2009 and there were more than two specialists for every GP. This ratio was only one-and-a-half in 1990. Specialists greatly outnumber generalists particularly in central and eastern European countries and in Greece. However, some countries have maintained a more equal balance between specialists and generalists, such as Australia, Canada, France, and Portugal, where generalists still made up for nearly half of all doctors in 2009.

Countries also make very different use of the services provided by nurses, educational backgrounds and tasks differ. (On average, 2.8 nurses practiced for each one practising physician but variability extends from five nurses per physician in Ireland to only 0.5 per physician in Chile.) This may be indicative of the wide range of specific tasks that are devolved and suggests that considerable change may be possible.

Figure 4.3. Ratio of nurses to physicians, 2009 (or nearest year available)



1. For those countries which have not provided data for practising nurses and/or practising physicians, the numbers relate to the same concept ("professionally active" or "licensed to practice") for both nurses and physicians, for the sake of consistency.

Source: OECD Health Data 2011.

Triggering professional self-regulation

The challenge of achieving a new configuration of health professions is daunting. It will run counter to the existing *status quo*, as it rearranges professional domains, resources and incomes. This creates winners and losers and one can expect prospective losers to oppose such change.

Nevertheless, the basic idea for change is straightforward: substitute a person- and population- health focused view for an organ or disease-focused one. Categorisation of people according to their burdens of morbidity will allow not only a more rational way of stratifying the population according to the degree of need; it will also facilitate the identification of population subgroups (*e.g.* those suffering from multimorbidity) that are especially vulnerable and may profit from more system-based and integrative domains, and related professional processes of care.

The critical challenge for policy makers is to promote such an orientation in practice by moderating the negatives of professionalism (*e.g.* unconstrained self-interests, distancing from the client, limited client accountability/responsiveness, professionalism tribalism) while strengthening the positives of professionalism (*e.g.* a strong educational base, certified expertise/expertise, evidence-based practice, ethical codes) (Kuhlman and Saks, 2008).

The health workforce itself is largely responsible for the way in which health expertise is organised and it has the powerbase to lead the change. This requires leadership from within the health workforce. Health professions, must recognise that the proposed long-term vision is a more promising route towards improving performance in health care and that it better serves to protect the values and principles of health professionalism against the countervailing forces of the free market and bureaucracy that predominate in decisions about current health reforms and show little promise of reversing the dysfunctionality that risks bankrupting health systems everywhere (Freidson, 2001; Plochg *et al.*, 2009).

Furthermore, policy makers can increase the likelihood that professionals will accept by targeting eight key assets of health professionalism (Table 4.1). If appropriately, timely and systematically governed, initiatives could trigger self-regulation amongst the health professions adapting to the proposed agenda for reconfiguration.

Empirical evidence shows that health professions follow a common pattern when it comes to professional self-regulation. Profession-owned instruments are developed and implemented to ease the pressures and their underlying agenda's. For instance, the implementation of medical audit in the 1980's and peer review in the 1990s were profession-owned mechanisms to ease external quality and safety pressures (van Herk *et al.*, 2001; Lombarts and Klazinga, 2001).

Table 4.1. Strategies to reconfigure health professions

Strategy	Description
1) Elevating population health needs as a core professional value	Elevating a population health orientation as one of the core values of health professionalism.
2) Targeted research funding	Establishing an enhanced portfolio of health

		research that provides the credentials for more integrative health professions.
3)	Targeted technology funding	Investing in the development of integrative technologies that favour generalisation rather than (sub)specialisation.
4)	Targeted infrastructure investment	Investments in infrastructure (including real estate) should be health needs-based. Infrastructure investment decisions could also trigger workforce adaptation.
5)	More flexible professional bodies	Easing the requirements that emerging integrative professions need to satisfy in order to become a fully approved health profession
6)	System and multimorbidity-based health curricula	Including expert decision making based on the principles of systems thinking and multimorbidity in medical education.
7)	Balanced performance assessment and management	Developing performance-based instruments related to the health outcomes of the patient groups that are served rather than for individual diseases.
8)	Supportive payment models	Developing pay-for-population health performance schemes that reward health professionals for maximising population health outcomes.

Elevating population health as a core professional value

A key asset of a health profession is its ethical foundation and related value system. These provide the basis for taking legal and ethical responsibility for their practices. Recently, much has been accomplished in renewing the inculcation of core professional values, especially within medicine but also in other health professions such as nursing and public health (ICN, 2006; and PHLS, 2002). Table 4.2 highlights various manifestos that are the result of these efforts. Noticeably, these values systems implicitly include population health as a value, because there is a focus on social justice (which is a population concept).

Table 4.2. Manifestos on core professional values

Title	Professional values	Reference
WMA International Code of Medical Ethics	A physician shall always exercise his/her independent professional judgment and maintain the highest standards of professional conduct.	World Medical Association General Assembly 1949. Last amended in 2006.
	A physician shall respect a competent patient's right to accept or refuse treatment.	
	A physician shall not allow his/her judgment to be influenced by personal profit or unfair discrimination.	
	A physician shall be dedicated to providing competent medical service in full professional and moral independence, with compassion and respect for human dignity.	
	A physician shall deal honestly with patients and colleagues, and report to the appropriate authorities those physicians who practice unethically or incompetently or who engage in fraud or deception.	
	A physician shall not receive any financial benefits or other incentives solely for referring patients or prescribing specific products.	
	A physician shall respect the rights and preferences of patients, colleagues, and other health professionals.	
	A physician shall recognise his/her important role in educating the public but should use due caution in divulging discoveries or new techniques or treatment through non-professional channels.	
	A physician shall certify only that which he/she has personally verified.	
	A physician shall strive to use health care resources in the best way to benefit patients and their community.	
	A physician shall seek appropriate care and attention if he/she suffers from mental or physical illness.	
	A physician shall respect the local and national codes of ethics.	
Physician charter	1. Primacy of patient welfare	ABIM Foundation, ACP-ASIM Foundation, European Federation of Internal Medicine (2002)
	2. Patient autonomy	
	3. Social justice	
Doctors in society. Medical professionalism in a changing world	Medicine is a vocation in which a doctor's knowledge, clinical skills, and judgment are put in the service of protecting and restoring human well-being. This purpose is realised through a partnership between patient and doctor, one based on mutual respect, individual responsibility, and appropriate accountability	Royal College of Physicians (2005)
The ICN code of ethics for nurses	1. Nurses and people: The nurse's primary professional responsibility is to people requiring nursing care.	International Council of Nurses (2006)
	2. Nurses and practice: The nurse carries personal responsibility and accountability for nursing practice, and for maintaining competence by continual learning.	
	3. Nurses and the profession: The nurse assumes the major role in determining and implementing acceptable standards of clinical nursing practice, management, research and education.	
	4. Nurses and co-workers: The nurse sustains a co-operative relationship with co-workers in nursing and other fields.	

Making population health as a core professional value even more explicit in these manifestos requires health professionals to agree to operate within the constraints of a vision that sets the conditions deriving from the health situation of the population or community it is designed to serve.

Elevating population health as a core value of health professionalism requires its incorporation in the bylaws and codes of all health professions, not just those relating to the public health ones. Health policy makers at national level could explore and monitor whether this is the case and if not, ask why not. Thereby, they can refer to the World Medical Association's statement on physicians and public health (WMA, 2006). In this statement, the World Medical Association explicitly underscores that physicians and their professional associations have an ethical and professional responsibility to the population's health.

Furthermore, the WMA statement could be further specified in the light of the contribution of physicians and their professional associations in terms of population health. For instance, the current attempts to integrate primary care and public health systems demonstrate that crisscrossing across the individual and the collective is already under experimentation (WHO, 2008; Martin-Misener and Valaitis, 2008). As such, professional practices are already heading towards a situation where professional performance towards population health is considered and rewarded.

A population health orientation requires moving from disease-oriented services to person-oriented services, based on a concept of morbidity and reflected in an organisation of health services that deals with multimorbidity rather than individual diseases. The concept of primary care is such an organisational strategy. It achieves a person-focus by health services that are accessible for first contact care, person-focused over time with interpersonal relationships that enhance knowledge of providers with patients (and the converse), that provide a sufficient but broad range of services within its own structure to deal with all of the common needs of the served population, and that co-ordinates care by facilitating the transfer and recognition when patients have to be seen elsewhere for uncommon needs.

Targeting research funding

Professions are built upon a knowledge base which can be created. Each profession is underpinned by a body of knowledge and skills (Abbott, 1988; Freidson, 2001). Since such a knowledge base is dynamic, health professions must continuously renew their knowledge to maintain jurisdiction over health work. Hence, research capacity is a key asset for health professions, especially in the era of evidence-based medicine.

The vested health professions, based in academic medical centres and/or universities, are equipped with a (scientific) knowledge-creation capacity that they can control to a considerable degree (Adler *et al*., 2008). Consequently, the scientific knowledge emerging from health research pipelines is often not widely available and is thus "siloed" (Ferlie *et al*., 2005). As such, the research therefore fails to stimulate the proposed reconfiguration of the health professions.

OECD governments can use public money to set up national research programmes to foster scientific research findings that support the proposed system-based health professions. Such programmes can also help to un-freeze the existing structures of health care professions and promote the development of new ones. Examples of such programmes can be found in the Netherlands for Rehabilitation Medicine, Nursing Home Medicine and Medical Care for Mentally Handicapped as organised by the Netherlands Organisation for Health Research and Development (see *www.zonmw.nl/en/programmes/*).

In designing targeted research programmes, governments must address at least the following issues. First, the programmes should be labelled in such a way that research proposals address one or more of the following three generic themes: 1) classifying of multimorbidity; 2) characterising of patients' problems both for initial assessment and outcome; and 3) classifying the impact of services on health of patients' problems including adverse events. These three themes would support the knowledge base of any "integrative" health profession but in particular integrating professions such as primary care, public health, geriatrics, intensive care medicine and nursing, and community nursing that are already transforming in the proposed direction. In fact, the natural accumulation of new information and of new knowledge in these areas could constitute the basic technology of the integrating professions.

Second, funding criteria must include "integrative research": research projects that should be multidisciplinary and conducted from a "system thinking" paradigm instead of the dominating reductionist one (see Table 4.3). This would lead to knowledge that is concerned with understanding interrelationships that better explain the dynamics of illness and consequent variability manifestations of illness in patients and populations instead of phenomena that related to diseases (*e.g.* blood pressure, weight, number of cigarettes and grams of alcohol) but (Sturmberg, 2007; Getz *et al.*, 2011). This would result in a research agenda that focuses less on trials (which artificially reduce complexity in well-defined variables) and more on effectiveness research (studying multiple outcomes in real-life populations).

Last, the membership of the research councils deciding on the granting of research proposals should be carefully considered: experts from vested health professions generally dominate the discussion within committees and may sometimes distort their mission, thus increasing the likelihood that the most fertile research proposals which do not fit into traditional specialist categories are rejected.

Table 4.3. Comparing the traditional reductionist and systemic world views

Analytic/reductionist approach	Systemic/holistic approach
Isolates, then concentrates on the elements	Unifies and concentrates on the interaction between elements
Studies the nature of interaction	Studies the effects of interactions
Emphasises the precision of details	Emphasises global perception
Modifies one variable at a time	Modifies groups of variables simultaneously
Remains independent of duration of time; the phenomena considered are reversible	Integrates duration of time and irreversibility
Validates facts by means of experimental proof within the body of a theory	Validates facts through comparison of the behaviour of the model with reality
Has an efficient approach when interactions are linear and weak	Has an efficient approach when interactions are nonlinear and strong
Leads to discipline oriented (juxtadisciplinary) education	Leads to multidisciplinary education
Leads to action programmed in detail	Leads to action through objectives
Possesses knowledge of details, poorly defined goals	Possesses knowledge of goals, fuzzy details

Source: de Rosnay, J. (1997), “Analytic Vs Systematic Approaches”, in F. Heylighen, C. Joslyn and V. Turchin (eds.), *Principia Cybernetica*, available at *http://cleamc11.vub.ac.be/analsyst.html.*

Targeted technology development

Professions can also be built upon (new) technologies. Control over technology development is therefore another key asset of health professionalism. Health professions traditionally co-partner with commercial industries, *e.g.* the pharmaceutical and medical device industries, to develop technological innovations. Since national governments are often at arm’s length, those technological innovations are *pushed* by the vested health professions and the industry rather than *pulled* by policy makers and consumers.

Thus, health technology developments tend to focus on particular diseases rather than dealing with multimorbidity.

At present, the development of these technologies is predicated on existing modes and not necessarily on newer ones based on managing multimorbidity. Therefore, a technology agenda should be geared towards the development of more "integrative" technologies that support professionals in understanding, unifying and concentrating on interactions between biological and biographical factors, between individual and community health and disease, and between the biomedical and psychosocial elements of a patient illness. A field such as home care technology for example, asks for partnering of industry with quite different partners than the classical medical specialties represented in academia in most countries (Rathenau Institute, 2009).

It is important and relevant that OECD governments put health policies in place to target integrative health technology developments. They can facilitate the creation of consortia between appropriate partners in industry and health professions/occupations. Foremost, the demand side is often economically not powerful enough to pull technological developments from the industry, as new needs may not have sufficiently powerful advocate to wrest technological development from vested interests in existing professional groups.

Targeted infrastructure investments

Infrastructure must facilitate rather than hinder the envisioned reconfiguration of health professionalism. Arguably, health care infrastructure will become more diverse and less dominated by hospitals. Hospitals became the dominant feature of OECD health systems, as professional expertise (*i.e.* human resources) and technology were brought together in one place for health services provision. For instance, the invention of narcosis and X-rays made the hospital a place for therapy, surgery and diagnoses.

This rationale no longer is persuasive. Miniaturisation and mobilisation of health technologies, including modern information technology, eliminates the need for hospitals to be the dominant setting for health provision. Patients and health professionals do not necessarily need to be in the same place as shown by developments in E-health and telemedicine. And where they do, health professionals can often come to the patient, rather than the other way around (Healy and McKee, 2002).

In this perspective, capital investments in real estate should be carefully considered in order to avoid locking in path dependencies (Rechel *et al.*, 2009). Investing now in the construction of new hospital buildings will freeze the hospital setting as the dominant feature of OECD health systems for yet another generation, and thus dictate the pace with which the reconfiguration of health professionalism to alternative settings of care provision can be achieved.

The strengthening of primary care in Denmark has led to a significant decrease in traditional hospital settings, while expanding more ambulatory focussed care facilities (Strandberg-Larsen, 2007). Over the past 20 years, the number of classical hospitals declined by half, consistent with international experience showing that hospitals can change to become more flexible in delivering high-quality medicine, while ensuring high levels of access and close collaboration with primary care and other services located outside hospitals (Black and Gruen, 2005).

The Danish experience could provide fertile ground for reconfiguring health professionalism in the directions as pointed out in this chapter. There is more flexibility built in the infrastructure, allowing for more experiments and innovation, as well as limiting the financial risks run by investors. In contrast, capital investments in classic hospital settings must be earned back, which limit flexibility and enforce health professions to work as envisioned when the initial capital investment was done.

Against this background, infrastructure investments should integrate the agenda for reconfiguration of health professions, so that decisions remain flexible and suitable to the objectives of health professions landscape in times of multimorbidity. That landscape should not be limited to the classical hospital settings but should incorporate the various health care delivery functions that need to be in community settings where multimorbid patients and populations are: primary care facilities and the numerous forms of facilities for care for the elderly and end-of-life care.

More flexible professional bodies

Existing bylaws and procedures of professional bodies constrain the formation of new health professions. They currently favour specialisation rather than generalisation. Emerging professions have to demonstrate that they represent a well-defined field of health practice in their own right. This requirement will be especially hard to satisfy for the proposed “integrative” health professions. Their jurisdictional claims are broad and multidisciplinary, which restricts their ability to define a new practice domain and claim individual autonomy within it.

But bylaws evolved in the past and continue to evolve, as happened in the Dutch College of Medical Specialties (see Box 4.1). The introduction of so called “profile registrations” implied more flexibility and the easing of procedural barriers to demarcate new health professions. To modernise the procedures and create more flexibility is foremost the responsibility of the health professions themselves, and thus a question of self-regulation and health leadership.

Box 4.1. More flexibility in procedures of the Dutch College of Medical Specialties

In the Netherlands, the Dutch College of Medical Specialties (a recent merger of the previous separate colleges of clinical specialties, general practice, and social medicine) is responsible for recognising new medical specialties. Per 1 July 2010 the bylaws and procedures are officially revised. The college has approved eight so called "profile registrations" alongside the 33 registrations of medical specialties, including general practice and social medicine. These "profile registrations" are the recognition of sub-specialities within and across existing medical specialties.

Thus far, the following eight profile registrations are formally recognised: 1) Emergency medicine; 2) youth care; 3) forensic medicine; 4) physician for fighting tuberculosis; 5) physician for policy and advice; 6) physician for indication and advice; 7) physician for environment and health; 8) physician infectious diseases.

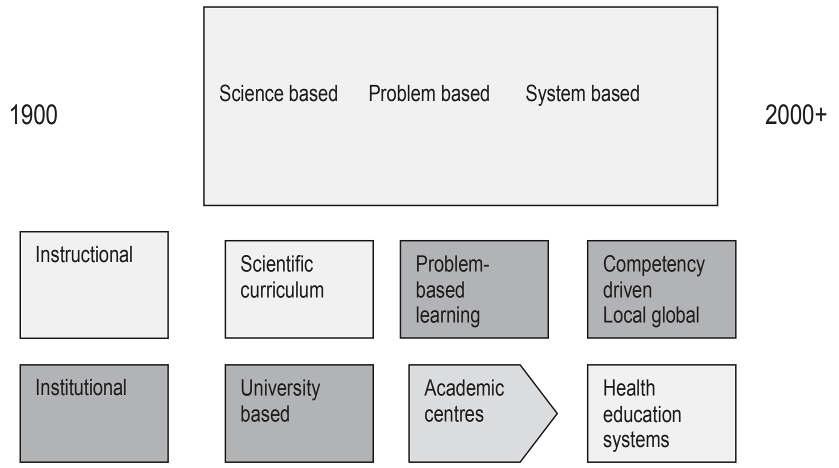
In addition, the college also started to experiment with the formal recognition of previously acquired competencies as a mechanism to reduce formal training periods, and enhance the mobility of residents as well as create more career opportunities. Thus, the bylaws of the College of Medical Specialties have created more flexibility in responding to changing professional fields.

System and multimorbidity-based health curricula

Despite tremendous modernisation efforts over the last decade, education is still geared to providing high-quality care in the context of specific diseases rather than in the context of patients and populations. Most learning is carried out by teacher-researchers with expertise in one particular disease or, at best, teachers with special knowledge in one type of disease or an intervention to treat or manage one type of health problem. Frenk *et al.* (2010) point out how out-dated this approach is, with its static curricula producing ill-equipped graduates given the challenges to be faced.

The educational reforms that are needed can be labelled as third generation reforms. Figure 4.4 shows the three generations of educational reform. The first generation taught a science-based curriculum, while the second generation could be characterised as problem-based instructional innovations. The proposed third generation of reforms should be systems-based and have a stronger focus on population health. Future health professionals should be able to improve the performance of health systems by adapting their core professional competencies to specific contexts, thereby drawing on global knowledge.

Figure 4.4. Three generations of educational reform



Source: Frenk *et al*. (2010).

The suggested third generation of educational reform mirrors the proposals that can be inferred from the arguments in this chapter. First, education of health professionals must involve learning expert decision-making based on the principles of systems thinking, including multimorbidity. These new competencies should be applied to the care of all people, not only those with specific chronic conditions, working across the interface of individual and population health, across biology and biography (Sturmberg, 2007; Arah, 2009; Getz *et al*., 2010).

Second, the focus of educational reform should be on learning new skills for integrative health instead of extra, non-clinical competencies. The non-clinical competencies such as teamwork, assigning specific tasks across team members, and application of quality instruments and management) represent competencies that better suit more procedural and/or managerial approaches to deliver health care.

Balanced performance assessment and management

The basic idea is that more generalist or "integrative" health professionals would perform better than letting the existing overly specialised and "disease oriented" ones work together in bureaucratic health care settings and institutions. The advantages of professional self-regulation (*e.g.* a strong educational base, certified knowledge/expertise, evidence-based practice, codes of ethics, limited overhead and bureaucracy needed) counterbalances the need for more regulation, external accountability and bureaucracy.

However, performance assessment of professionals through self-regulation can also freeze the existing nature and boundaries of specialties when focussing too much on specialty specific characteristics rather than general professional performance characteristics. Therefore specialty-owned methods for performance assessment should address also more general professional aspects and be related to organisational quality assurance mechanisms such as accreditation used for the organisations in which the professionals practice. The frameworks for health care services should be reconciled with profession-owned instruments to strengthen the desired reconfiguration of professions. Reconciliation in at least two areas seems warranted.

First, quality instruments need to be updated and/or newly developed to support "integrative" health professions. These instruments must become performance-based and related to health (rather than the disease) outcomes of the patient groups they serve. For instance, existing practice guidelines based on the management of single conditions must be replaced by new broader oriented guidance and measures.

Second, rather than assessing the performance of individual professionals against a narrow set of profession specific process criteria, performance measurement should be levelled-up to groups of professionals and the way in which they together achieve population-based health outcomes. This system approach has consequences for the indicator development agenda but could prove more feasible than trying to develop valid and meaningful indicators to assess professional performance within disciplines.

Triggering self-regulation should not only be a matter of sticks but also of carrots. An important gain for health professions to embark in reconfiguring their practices and related processes of care would be the restoring of public trust in their professional expertise, more professional autonomy, and decreasing the bureaucratic burden.

Supportive payment models

Reformed payment systems are a final strategy to stimulate the proposed reconfiguration of health professionalism. Many OECD countries are currently experimenting with new methods of providing incentives to providers to improve the quality of health care, often known as "pay for performance" (P4P). Yet it remains unclear whether these new ways of paying providers significantly improve the quality of care and increase value for money in health (OECD, 2010a).

But to stimulate the reconfiguration of health professionalism, payment models need to go beyond controlling costs and rewarding providers who achieve professionally defined performance benchmarks. Rewarding improvements in the quality of specialty related health care alone will be inadequate to make professionals responsive to patient problems and population health needs. Proposals to move pay-for-performance towards pay-for-population-health-performance have already been suggested (Kindig, 2006). "Bundled payments" and "accountable health care organisations" are illustrations of models that seem to move in this direction (Struys and Baan, 2011; Berwick, 2011). Health professionals are likely to have a stronger interest in reorganising their work in the proposed direction, if rewards are linked to their performance in terms of population health outcomes. Such a pay-for-population-health-performance scheme has potential, as it essentially aligns the interests of society and those of the professionals.

Geoff Anderson (2011b) points out that the abovementioned solutions implicitly define the challenge of multimorbidity as a "complicated" problem. This type of problem is seen to leads towards the creation of a system with standardised and widely disseminated care planning for a wide range of conditions assessed against a wide range of clearly defined outcomes. This would be at odds with the central thrust of this chapter. Instead, the reconfiguration of health professionalism might be better stimulated by seeing the problem as complex, resulting in an accompanying financing system setting whole system targets and minimum specification, pooled budgets and innovative market models. Such a system values relationships over processes, it is locally based and lets change develop from within.

Conclusions

Health professions have not kept pace with changing patient and population health needs and problems, *i.e.* multimorbidity. Few promote the reconfiguration of the health professions as a potential solution to new and emerging needs. Rather, the on-going (sub) specialisation within health professions and its splintering effect on health care delivery continues. This OECD chapter challenges this idea. It argues that health professionalism can, and should, be reoriented in the face of populations increasingly suffering from multimorbidity, the opportunities new technologies and knowledge offer, and the costs pressures urging for increases in labour productivity of the health workforce.

By instilling in the health professions the belief that patient and population health needs and problems should be the leading principle for the professionalisation processes within health systems, professional models of care could be reconfigured in such a way that multimorbid patient populations are better served.

This reconfiguration features three consecutive steps: 1) defining and categorising the patient and population health needs and problems; 2) reorganising professional domains around the needs of populations with specific needs; and 3) reorganising professional domains by eliminating work that could be done in primary care or by the patients themselves. The eight recommendations provided in this chapter mainly address strategies that could help channel professionalisation in the desired direction rather than further consolidating the existing 20th century configuration of health professions.

Taking this alternative road towards health care improvement will not be easy. It calls for strong leadership in all the health professions with thorough support of their respective governments. But it proposes better individual and population health in the longer term.

Notes

1. An illness can be defined as the perceived condition of poor health as felt by an individual.

2. Epigenetics is the study of heritable changes in phenotype (appearance) or gene expression caused by mechanisms other than changes in the underlying DNA sequence, hence the name *epi-* (Greek: *επί-* over, above) *-genetics*.

3. Allostatic load is defined as the physiological consequences of chronic exposure to fluctuating or heightened neural or neuroendocrine response that results from repeated or chronic stress.

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Chapter 5

Health sector innovation and partnership

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Health care systems in developed countries face a series of sustained structural challenges over the next decade. The demographic and technological dimensions of these systemic pressures are well documented. A third structural pressure is the long-term fundamental shift of wealth creation away from developed nations toward the emerging economies.

This chapter explores key organisational implications for health care systems that unfold from these three structural challenges. It emphasises that innovation in medicine requires a complex series of knowledge-based transformations, enabling basic research in a wide range of disciplines to move into clinical application and then to full scale diffusion and delivery. The chapter also assesses a number of new organisational initiatives that health care systems are taking to better serve their growing numbers of chronically ill patients.

Introduction

Health care systems in developed countries face a series of sustained structural challenges over the next decade. The demographic and technological dimensions of these systemic pressures are well documented (Comas-Herrara and Wittenberg, 2003; Eckholm, 2010). A third structural pressure is the long-term fundamental shift of wealth creation away from developed nations toward the emerging economies. This global economic shift has already increased fiscal challenges for health sector policy making, and may well present the most serious of the structural challenges.

This chapter explores key organisational implications for health care systems that unfold from these three structural challenges. After briefly reviewing the changed global economic context and the likely consequences it holds for future funding of health care services, we summarise major organisational responses by European health systems to date taken in response to this new environment. The chapter then explores strategies for implementing further organisational innovation and partnership in the health sector, and considers how new types of co-operation between actors in the systems can be helpful in improving clinical, organisational and financial outcomes in this changed structural climate. Finally, the chapter considers innovative examples of service delivery from the Netherlands, Sweden and the United States that suggest the direction that future health system development can be expected to take.

The changing economic context

Health systems are highly dependent on the broader economic context within which they operate**.** The personnel, institutions, and finances of health systems necessarily reflect the structural characteristics of the national economy they are embedded within (Granovetter, 1985; Saltman 1997). In particular, although they comprise one of the largest industrial sectors in developed economies, their sources of operating funds are not independently generated from customers, based on the volume and quality of their production. Instead, as a social welfare rather than a private industrial sector of European economies, health systems rely on predominantly publicly raised, regulated, and expended funds (either tax based or social health insurance based). In turn, this public sector reliance tightly ties the range and quality of services offered to the core financial carrying capacity of the overall national economy, which provides the financial foundation for all public sector revenues. Consequently, as is now well known, higher levels of per capita income are closely associated with higher levels of health care expenditure (Maxwell, 1981). Conversely, as became apparent in central and eastern Europe with the collapse in 1991 of the Soviet Union, rapidly falling economic productivity in the national economy as a whole is directly associated with a fall in the quantity and quality of publicly-funded health services (Preker *et al.*, 2002) and with a substantial rise in private and grey market payment for care (Lewis, 2002).

Falling rates of growth in developed countries

The centrality of the broader economic context to available health system revenues, and previous experience with falling public sector revenues in central and eastern Europe during the early 1990s, both highlight the potential risk for health systems presented by current fiscal and economic problems in western Europe, the United States, and also Japan. High levels of sovereign debt and/or unfunded financial obligations, producing slowing or declining levels of national economic growth, can be expected in turn to result in slower growth or even absolute reductions in publicly-funded health care expenditure. Ongoing European experience in Greece, Ireland, Portugal, Iceland, and Spain, as well as the drastic spending reductions necessary to balance public sector budgets in the United States, illustrate the seriousness of this second possible outcome.

Recent macroeconomic analysis confirms that the last two decades have witnessed a strong downward shift in the relative economic growth in most developed western countries (King, 2010). The 2008 economic crisis has made visible an ongoing re-distribution of global economic production away from western countries, and toward China and the Asian Rim. This continuing global economic reflects the effects of the Third Industrial Revolution, which began with the invention of the first commercially viable transistor in 1951 by William Schockley in – ironically – the United States. A key consequence of the ensuing, electronic computer-based revolution has been to transform the character, content, and flow of information, facilitating new forms of globalised economic competition, and encouraging substantial manufacturing and similar wealth-creating industrial activities to migrate away from developed toward developing economies (Wolf, 2004).

The implications of this computer-based revolution for developed western economies have been complex. While knowledge-based industries have grown, many traditional industrial activities have been transferred to emerging economies (Wolf, 2011). Core industrial activities that remain in western economies have increasingly been sold off to developing country companies (for example Volvo in Sweden sold to China 2010; Arcelor in France sold to Mittal of India). Natural resource suppliers in Africa and South America that are essential to maintain a manufacturing base are increasingly being bought by China and India, denying sources and raising the price of remaining supplies to western manufacturing companies

(*Financial Times*, 26-27 April 2011). As a consequence of slowing growth and reduced industrial production, long-term unemployment rates, especially among less well educated workers, rose substantially in the early 1990s and have stayed high (King, 2010). Long-term aggregate economic growth rates in developed countries – with some near-term exceptions – have slowed substantially (King, 2010).

Potential implications of economic decline for health systems

For health policy making, this shifting global economic picture generates three linked fiscal dilemmas. First, as noted above, countries with high sovereign debt and/or low growth rates will likely have increasing difficulty providing existing levels of public funds for health care services. Second, in developed countries that rely on national or regional governments to provide most or all funding for the health system and/or for specific health care programmes, the funding entity – the national or regional government – may no longer have the necessary funds to provide the expected volume, quality or range of services. Third, in countries that currently have good rates of economic growth (Germany, Sweden), pressures to maintain economic growth rates and to keep exports competitive internationally may reduce the government's ability to raise domestic taxes/social insurance contributions in order to provide needed additional funds for health care services.

The first two dilemmas are of crucial importance in countries where citizens in the past had trusted – or at a minimum expected – their government to provide adequate funds for health care. These citizens may now find that, regardless of political commitments, their governments may no longer have the financial capacity to maintain existing levels of services, and likely will not have the financial capacity to pay for additional, expanded, or new technologically-based services. In Greece, there are reports that the national government has greatly reduced funds available to public hospitals to pay suppliers of pharmaceuticals and medical equipment, endangering quality of care (Jack and Hope, 2011). In Spain, some of the regional governments that provide health care services are severely indebted, and others are believed to have hidden off-budget sizeable unpaid health sector obligations (Ross-Thomas, 2011). Similar concerns about fiscal solvency and the inability of the national government to meet its health-related financial obligations lie at the heart of the increasingly heated debate in the United States about the need to fundamentally re-structure the federally-funded Medicare programme for the elderly, which currently has USD 24.6 trillion (thousand billions) of unfunded liabilities (Annual Report of Medicare Trustees, 2011). Other peripheral euro-zone countries (Portugal, Ireland), central European countries (Latvia), and also England, where there are “unprecedented plans to cut public health spending in real term to reduce public sector debt/borrowing” (Appleby, 2011), all face severe fiscal stress that could potentially reduce citizen trust in the capability and eventually the legitimacy of publicly financed health services.

Social implications of computer revolution for health systems

Further altering the policy making environment, the growth of one key dimension of the computer revolution – the worldwide web – and its migration to multiple portable and hand-held devices, has also altered the social context within which health systems function. Technology-savvy “digital natives” among younger populations in western countries are increasingly disinclined to join or support traditional social institutions (churches, charitable associations, social organisations) in favour of personally-focused on-line social networks and other computer rather than civil society oriented activities (Bennett, 1998). These younger citizens increasingly choose to meet on line, not inside existing social institutions. This different value set creates additional challenges to national health policy makers seeking to sustain collective institution-based funding models for welfare state services such as health care when the practical effects of this changed social behaviour is combined with an era of reduced economic growth.

New emphasis on individual responsibility in health care

In response to these social and economic challenges, several European researchers have begun to conceptualise a different set of philosophical approaches to the design of health care funding and service delivery. They seek new organisational mechanisms to integrate individual responsibility for some defined subset of health-related activities and, in some cases, individual responsibility for funding those services, into what would remain overall as a socially responsible, collectively-funded health system (Tinghogg *et al*., 2010; Schmidt, 2007).

Additionally, senior national policy makers in countries with extensive welfare states have begun to worry publicly about the sustainability of their present publicly-funded and civil servant-based health care arrangements. As one example, a senior Norwegian health official stated in a 2009 public meeting that “the present system of complete public funding of health care in Norway is unsustainable” (Bjorn-Inge Larsen, Norway, 2009). At the same meeting, a senior advisor to the Finnish Minister of Health – Taina Mantyranta – concluded that in the future “citizens will have duties as well as rights” and that there will have to be a new balance between collective and individual responsibility for health care services (Ministerial Advisor, Finland, 2009). Triggered, then, by the unrelenting growth of globalisation-generated financial cross-pressures, in combination with unfavourable demographic trends and the rapid expansion of new health technology as well as expensive bio-engineered and (soon) genetically customised pharmacology, this national political search for re-structured service delivery and, potentially, funding arrangements, perhaps in combination with a new social contract between the individual citizen and the state, is likely to grow more intense over the next years.

Health sector responses to the changing economic context

The financial pressure that European health systems face began in the early 1980s. The initial impact of the demographic changes, and the aging of the population, began to appear in the early 1990s, as did the increasing pace of development in medical technology and in pharmaceuticals.

Responding to these pressures, systematic policy efforts to improve health sector efficiency date from the late 1980s (Saltman and von Otter, 1992). The introduction of patient choice for maternity and primary health centers in Stockholm County in Sweden in January 1988, as well as the April 1991 introduction in the United Kingdom of the first self-governing hospital trusts and a public sector purchaser-provider split, signaled the beginning of two decades of provider-side organisational re-structuring in tax-funded health systems. Tax-funded systems also began efforts to shift hospital budgets to primary care actors (private GPs in the United Kingdom, sub-county districts in Sweden, municipal health and social boards in Finland), as a way both to strengthen the role of primary as against hospital care and also to stimulate competition among public hospitals for contracts and/or patient referrals. In Social Health Insurance (SHI) systems, the March 1987 publication in the Netherlands of the Dekker report, followed by the 1992 structural reforms agreed in Germany, initiated a similarly long-term effort to introduce more market-style competition among not-for-profit sickness funds on the funding side of these SHI health systems.

Other efficiency-oriented measures have been adopted, especially in the more institutionally rigid tax-funded health systems. Traditional hard boundaries between public and private sector institutions began to melt (Saltman, 2003). Diversity of provider (public, private not-for-profit, private co-operative, private for-profit, international) was encouraged by reducing provider payment regulations. Longstanding clinical and hospital clinic boundaries between medical specialties and, importantly, between primary and specialist medicine also began to melt, replaced by a variety of integrated care and disease management strategies. Patient choice, integral to many of the competitive re-structuring strategies, grew in importance, creating more individually oriented, consumerist pressure in what has been heretofore been predominantly collectivist health systems (true for both tax-funded and SHI systems alike) (Coulter and Magee, 2003). Consolidation of local health-related public sector governments have occurred (Norway, Denmark, Finland, Sweden) (Magnussen *et al*., 2009), as well as re-centralisation of fiscal and key policy dimensions to the national government (Norway, Denmark, Ireland) (Saltman, 2008). Similar consolidation of private sector funding organisations (Netherlands, Germany) also has taken place (Kutzin, 2010). Pharmaceutical usage (inpatient and outpatient) has been constrained through a diverse range of financial and efficacy-based restrictions (Mossialos *et al*., 2004).

Beyond these organisational changes, a wide range of incentive-based financial mechanisms were also adopted. These included (depending on the country) introducing case-based payment (particularly adapted DRG or DRG-like models), linking different public budgets to stimulate cross-budget efficiencies (for example the 1992 ADEL Reform in Sweden), a wide number of different co-payment strategies (Robinson, 2002), new co-insurance strategies (Saltman and DuBois, 2005), and, most recently, efforts to develop and implement performance measurement and pay-for-performance, especially for medical staff (Smith *et al*., 2009).

All these efficiency-oriented measures have sought to improve the access and quality of existing health systems while reducing the rate of growth of overall health system expenditures. In some countries (Germany), the rate of increase in health sector funding has been explicitly tied to the average rate of growth of wages, as another device to reduce the growth of health sector expenditures (Carrera *et al*., 2008).

Innovation in the health sector

As the above reform strategies demonstrate, European policy makers have already introduced a considerable range of institutional reforms in response to the financial and organisational pressures that their health systems confront. As the changing global economy generates further fiscal and social pressures, additional reform approaches will be necessary. This section explores recent thinking about new conceptual strategies upon which to develop future health care institutions and relationships. The conceptual framework is derived from recent thinking about how to combine "best practices" clinically with more efficient organisational arrangements managerially. The core observation, drawn from experience in private sector industry, is that innovation necessarily must focus on and harness the central driving forces in the health sector that can produce high quality outcomes.

A complex knowledge system

Viewed organisationally, health services can be characterised as modern society´s most complex knowledge system. In terms of the complexity of actors, range of different "products" and activities, and the multiple ways that services need to meet expectations from patients as well as serve the broader population, few other economic sectors compare. There is, further, the reality that many characteristics of most countries' health services are of substantial interest to elected politicians and senior civil servants, and thus health-related decisions typically must reflect political as well as health service logics (Calltorp and Maathz, 2009).

A further aspect of this "knowledge system" perspective is the rapid pace of innovation linked to basic biomedical research. Present-day biomedical research extends into a number of neighbouring arenas (often called life sciences) and interacts with technological innovation in a multidisciplinary manner. Further, this is an innovation model in which biomedical laboratory research must be transformed into clinical innovation, which in turn requires biomedical innovation to be incorporated into the behaviour of key actors within medical schools and health provider institutions. There are currently concerns that this model may be weakening due to changes in the incentives of the different participating actors. From the opposite side of the policy spectrum, there also are concerns that the existing biomedical research system is too powerful, establishing too rapid a pace of innovation that is too costly for publicly-funded health systems to support (technology assessment has traditionally been an attempt to ameliorate this problem).

The central question about how to prioritise and steer biomedical innovations towards more valuable and less costly interventions has recently been discussed by Victor Fuchs (Fuchs, 2010). Fuchs underlines the distinction between three types of biomedical interventions, regarding their effects:

- The effect on quality of care (reductions in mortality and morbidity rates, relief of pain and improvements of other types of care that patients desire);
- The effect on the cost of care (the resources used to develop it and provide it to patients, relative to those used for current practice);
- The effect on the value of care (changes in quality relative to change in cost).

Fuchs, like other economists, worries that cost is often viewed as less important than quality, meaning that value in this specific sense is not prioritised. Of course, there are examples of innovations that result in unambiguously positive value such as antibiotics and diuretics. However many clinical innovations tend to increase both quality of care and cost of care. Following along from, among others, Alan Williams' concept of QUALYS (Williams, 1994) and Lewis Thomas' notions of "half-way technologies" (Thomas, 1995), Fuchs calls for a renewed emphasis on value rather than quality alone.

Overall, the key point is that innovation in medicine requires a complex series of connections, enabling basic research to move into clinical applications and then to full scale diffusion and delivery. The model for diffusion of medical technologies is often linked to Rogers' general model of diffusion of innovation (Rogers, 1995), with early attempts around technology assessment in medicine being first shaped in the United States (Banta *et al.*, 1981).

Innovation in service delivery – a weaker process

Some observers argue that a weak point in the system of biomedical innovation remains how biomedical outputs are adopted into practice. A particular concern is the rigidity of current-day delivery systems and their inability to adapt existing organisational arrangements to fit new needs and procedures.

The delivery system has to match, on the one hand, the possibilities that are developed from biomedical research, however it also has to adapt to changes on the patient or consumer side, particularly changing need due to demography and the age composition of the population, changing disease patterns, and changing attitudes and requests for specific services. This becomes a formidable task.

The architecture of the health system forms the basic framework for understanding change and the factors that facilitate and enforce change as well as those that hinder it. The so-called "iron triangle" (Reinhardt, 2001) defines dimensions that can be linked to most health care system to identify ways to influence the process of innovation: *who pays (*structure of financing in the system), *who delivers* (the organisation and structure of payers, uniformity or multiplicity, private/public, etc.) and *who judges quality* (actors and measures to define and measure outcome and quality). To steer a health systems requires handling these contradictory perspectives, balancing strongly conflicting forces and (at least on the surface) conflicting goals as well.

The "typology" of different health systems also usually includes dimensions of how they are organised on macro, meso- and micro-levels. Generally depending on how well integrated they are (*e.g.* how well connected the three levels are and what "tools" are developed to enforce policies throughout the system, *e.g.* to "integrate" between the levels) possibilities are shaped to handle innovation, balancing costs and outcome and reaching basic goals including patient satisfaction, safety and equity.

Modes of management have been changing over time – as reflected in the earlier sections of this chapter. Health systems that have had a uniform, integrated and tax financed structure have been moving towards more flexible methods of functioning (purchaser-provider models, etc.). On the other side of the spectrum, strongly disaggregated systems (such as the United States) have recently shown some tendencies to develop stronger integration between different levels of the system, as important management functions aimed at reaching overall goals seem to benefit from stronger integration (see example below of Intermountain health care).

Of great importance for the effort to speed up organisational innovation in different health systems is the development of techniques to measure outcomes, results, and patient satisfaction, as well as new techniques to link those measurements to the costs that the system incurs for different activities. This new clinical data makes it possible to balance costs and medical outcomes overall, as well as to link those parameters to organisation, structure and management of different types of health service providers.

Taken together, all of these technology and innovation tied areas of research and development form the basis for what could be called knowledge informed – or more knowledge based – health management. This evolution can be understood as representing an organisational management parallel to the evolution of "evidence-based medicine" for clinical practice (Calltorp and Maathz, 2009). While this area of expertise has yet to be fully developed, it has the potential to create health systems that can better reach ambitious new organisational goals by mobilising new knowledge components and linking them to practice.

The evaluation and quality agenda

A central operational element of this new knowledge-based framework for managing health care organisations is the monitoring and evaluation of service quality. There are four general "movements" or main lines of research that, together, form the basis for stronger evaluation of medical care services:

- Technology assessment (TA): first developed in the United States by the federal government's Office of Technology Assessment in the 1980s, now active internationally in a series of strong research networks aimed at defining the value of medical "procedures" (Garido *et al*., 2008). A new variant in the United States now focuses on "comparative effectiveness", where the basic biomedical value component builds on technology assessment (TA) principles, however utilising a comparison of alternative models for organising and delivery. This can be viewed as a response to criticism of TA's earlier slowness to address innovation and to change daily medical practice;

- Outcomes research: aimed at capturing and measuring clinical and patient outcomes from medical procedures (cites). This development is closely linked to the advancement of measuring techniques regarding health outcome in a wide sense, both regarding length of life and quality of life (Institute of Medicine, 2005);
- Quality assessment/quality assurance/quality improvement: principally the agenda developed to measure and assess different parts of the care process, and to understand how to link its different elements together to produce the best possible result. Thinking here reflects areas of process development in other societal areas like "lean techniques" developed for industrial production. Also techniques like "process re-engineering" and other similar production methods are moving into medicine (Institute of Medicine, 2001);
- Patient safety: recently emerged in the first decade of the 2000s as a critical aspect of delivering efficient and effective medical care. Rapidly growing efforts are being made to reduce medical errors (from wrong-site surgery to incorrect medicines) in order to minimise both the human and also the financial consequences of poor quality medical care (Kohn *et al*., 2000).

The "evidence movement"/evidence-based practice/evidence-informed policy and management

The search for evidence-based medical practice has become a popular "concept" in medicine (relating to medical professional work) reflecting the four areas of quality and evaluation-related activity just sketched above. The general challenge is implementation – getting scientifically-based knowledge into practice. This in turn has given rise to focusing on implementation and changing professional practice protocols. Powerful international movements developing the scientific basis of medical interventions, like the Cochrane Collaboration, link together a range of national attempts to build guidelines and protocols (UK NICE, Sweden Socialstyrelsen-SBU). However, as implied earlier, debate has arisen in some quarters as to whether this approach may in some cases lead to a slower pace of medical innovation at the micro/practice level. The parallel concept to "evidence-based medicine" – "knowledge-informed management" – seeks to address some of these issues and, by building on other relevant areas of research knowledge and specific informed knowledge about health system structure and organisation, define appropriate techniques for management and steering. The key challenge is to use appropriate tools to integrate the many dimensions (actors) that build a modern health system – and to let them work on incentives, yet to co-work for high patient outcome and satisfaction. New sets of "tools" are developing for this, which is the meaning of evidence informed health policy and management. Since multiple chronic conditions make up at least half of the care volume in most industrialised countries – the application of these new principles are of key concern for handling the challenges in front of us (Calltorp and Maathz, 2009).

Organisational responses to increasing numbers of patients with multiple chronic conditions

The combination of a shifting structural context for health policy making, in combination with a growing understanding of the knowledge-based processes that stimulate innovation in the delivery of health services, have stimulated the emergence in a number of health systems of a variety of new organisational partnerships and configurations. As would be expected, the specific mechanisms may differ in order to fit the particular organisational and financial criteria of individual health care systems. However a general pattern can be discerned which provides important indications of the types of new organisational arrangements that the combined impact of current structural pressures (demographic, technological, and economic) in combination with greatly increased numbers of patients with multiple chronic conditions will require from health systems generally.

This section examines new organisational configurations emerging in the Netherlands and Sweden, as well as one example of innovative cross-sector arrangements in the United States. All three country examples provide a practical lens through which to view the potential responses of health systems in developed countries to the structural pressures they confront, and to assess the ability to date of advanced health systems to adopt new knowledge-based organisational arrangements.

Organisational challenges and responses in the Netherlands social health insurance-based system

The Netherlands introduced a new structural and financial architecture for its health care system in 2006 (Schafer *et al*., 2010). Responsibility for purchasing private health insurance was shifted to the individual, however collective payment of a risk-adjusted premium was also incorporated to ensure that sicker individuals, and those with chronic conditions, would be properly covered (van de Ven, 2011). This structural reform has generated considerable organisational innovation, particularly in such partnership forms as mergers and acquisitions, and also existing companies expanding and/or re-designing their business models in order to provide the complex mix of services that elderly patients with multiple chronic conditions require, and for which the newly re-designed financing system would now pay.

Recent Dutch experience suggests both the strengths and pitfalls of organisational innovation and partnership, especially as regards treating patients with multiple chronic conditions. Moreover, since this new Dutch health system structure encourages a wide range of differing organisational strategies, there are a considerable number of innovative Dutch examples that are worthy of discussion.

Growing demand for integrated services

Facilitated by demand that predominantly was single-morbidity driven, health systems over the years have developed a strong division of labour between providers as well as professionals. The resulting segmentation of organisational and professional markets is strongly institutionalised in public and private regulation, diverse payment structures and support systems (information systems, quality assurance systems, terms of labour conditions, etc) and a sophisticated professional status stratification. Within this context GPs, general surgeons and internists have a generalist outlook that facilitates their – predominantly *ad hoc*, case-specific – co-ordinating role on the operational level.

Emerging concern with multimorbidity has created new requirements to co-ordinate and integrate specialised health services, inside and between provider organisations. Diagnosis and treatment of multimorbidity requires complex health service processes, offered by a diversity of medical, paramedical and nursing professionals in different working environments. Frequently, this is not enough. Multimorbidity not only affects health status, it often brings needs in other areas such as mobility, housing, nutrition, social relations and income. Market-oriented health service providers respond to such needs by offering “full service” solutions that also cover social care, transportation, adaptation of the living environment etc. To meet these new client needs in an effective and efficient way, such solutions require planned interdisciplinary, interorganisational and intersectoral integration. Conventional co-ordination routines do not provide them as they refer back to an earlier, less complex supply reality.

Changing the supply of services

In the Netherlands, provider responses to the growing need for dealing with multiple morbidities can be observed in long-term care, primary care as well as hospital care. Often, but not in all cases these responses are supported by governmental and health insurer policies.

Long-term care

In long-term care, providers respond by stretching their portfolio of services. They prefer mergers with complementary providers rather than developing additional services on their own. As a result, mergers between complementary service providers have been prominent over the last decade. Stand alone long-term care organisations are rare now in the Netherlands. Most nursing homes, home care organisations, homes for the elderly and protected housing centers merged together into nursing and caring organisations. In several cases the new organisations diversified beyond care for the elderly, running portfolio's that also cover social welfare services, care for mentally disabled, psychiatric care and primary care. In this development, nursing home boards are in the lead, reflecting their core position within the long-term care sector.

Cordaan in Amsterdam is an example of this kind of full-service provider. It is a regional organisation that offers nursing home care, care for the elderly in independent living situations, homes for the elderly, household support, social welfare, care for mentally disabled, and protected living and day activities for psychiatric patients. These services are mainly paid for by the national public long-term care insurance (AWBZ). Social support and welfare services are responsibilities of Dutch local governments and are contracted by the city of Amsterdam.

Cordaan also operates in primary health care, by offering its originally intramural medical and paramedical capacities to the larger public. These professional services (nursing home medicine, physiotherapy, ergo therapy, music therapy, speech therapy, dieticians, etc.) in primary care are contracted by health insurers. They are covered by the acute care insurance (Zorg Verzekeringswet, ZVW) or by the supplementary care insurance. Other services are delivered on a private payment basis. In this way Cordaan runs a multisectoral business model, combining a multisectoral health and social services portfolio with a diversified set of payers.

Cordaan and other multisectoral long-term care providers have thus institutionalised the structural conditions necessary to realise full service concepts of care. Crucially, however, this organisational level of integration does not automatically result in integrated service delivery on the process level. Therefore, these providers also have to invest considerable resources in business process redesign, seeking to construct robust integrated care programmes and practices.

The obstacles to achieving this process-focused innovation are substantial. First there is professional resistance, as professionals are being asked to give up their familiar role design and control. In the integrated care programming format, the professional is simply one supplier to processes designed and controlled by a third party in the organisation. For professionals, it is difficult to accept that need assessment/triage is done elsewhere and that they are asked only to solve a pre-specified problem/situation as part of a larger process that they did not design, do not oversee and do not control. In the new, integrated process approaches, the professional does not deal with the complex process as a whole but only with a specific sub process. This runs counter to traditional and deeply-rooted professional values of overseeing the entire clinical care process, designing and adapting it on an individual case basis.

A second obstacle is that an integrated process-based response to multimorbidity is heavily dependent on an integrated information system. However differences in IT infrastructure typically create technical alignment problems inside and between organisations that aim for integrated processes. A related concern is cultural resistance, since on the departmental level in an organisation everybody tends to master and protect existing working routines (Crozier, 1971). Moreover, the strong orientation of professionals and managers toward their own domain makes it difficult to develop an attitude of “open book” sharing of information.

The development of shared standards for primary and support processes is a basic technical requirement for process integration within and between health organisations. This standardisation is something many health providers invest in by now. In the long term, this will result in better integrated organisations, offering integrated supply chain processes. Here too, solutions are available on the technical level, however on a cultural level effectively integrated service processes require managers and professionals to think and plan in network terms, with network partners (*e.g.* organisational parts) that are convinced of their complementary role in complex integrated chains of care. They must have a notion of interdependency and a willingness to work for added value for the end-user, the client. Progress is partly blocked by cultural inability of professionals to overcome their almost exclusive focus on their own clinical outcomes. In a parallel way, managers have difficulties overcoming the boundaries of their own organisations, as their supervisory boards hold them accountable for organisational results and not for results in a joint integrated care network.

In addition to professional, informational, and organisational culture issues, progress is also blocked by funding systems that do not cover co-ordination costs in the supply chain. In manufacturing industries, an upstream supplier in a business chain can deliver services to a downstream intermediary who adds value and subsequently delivers his services to the final user. The final user pays money to the intermediary who in turn pays the upstream supplier. This facilitates chain integration as financial incentives are part of the relations in the chain. However, in health care chains there is often no transfer of money from one provider to the next one in the chain. Instead, each separate organisation is paid independently by the funders.

In the Netherlands, health insurers are currently experimenting with new approaches to overcome this situation .The long-term health insurance system in the Netherlands (AWBZ) has recently changed its payment arrangements from budgets to output-based payment. For this purpose, a classification of ten output categories ("products") has been developed, based on intensity of care ("Zorg Zwaarte Programma's", care intensity programmes). Providers agree after the need assessment with the client on a care plan and get paid according to the product that resulted from the need assessment. This switch to output pricing, based on agreed integrated care plans, is a huge stimulus for long-term care providers to redesign their operations. At the same time, as price pressure grows, there is a strong incentive for providers to design integrated processes to realise efficiency gains. Basically, supply chain theory here promises improvement of service quality (in terms of less mistakes, high response times, etc) combined with efficiency gains (because of process simplification, optimal planned use of human resources in the processes, etc). To realise these gains, a health services planning system, a human resource planning system, a work flow system and a dynamic client/patient file has to be available and to be integrated. Long-term care providers in the Netherlands therefore are investing considerable resources in this kind of planning systems at the moment.

Integrated care at the neighbourhood level

The Dutch government seeks to keep elderly as long as possible in their local living environment. Two conditions are seen as crucial to realise this: a high level of social integration of elderly in their neighbourhoods and provision of easy-access integrated care and welfare for them. Currently twelve neighbourhood pilot projects are being run, distributed across the country, bringing together health insurers, local authorities, long-term care providers, welfare organisations and social housing associations. The starting point is to map client needs and then to design integrated health and welfare services, using a supply chain format that can be adapted to local circumstances in a flexible way.

Several practical obstacles exist in building effective and efficient supply chains. It is difficult to align funding formats of health insurers and local authorities. Insurers deal with entitlements, local authorities with subsidies. And both work under strong budgetary pressures that create incentives to roll off costs onto the other. In commissioning services from providers, they have different financial and quality-control routines that are difficult to align as well. Also there are different time horizons: local authorities deal with elections every four years, insurers re-set their premiums every year, social housing associations combine long-term investment periods with annual adaptations of rent. A major non-financial obstacle is the existing governance structure. Supervisory boards hold managers accountable for results of their organisation and not for supply chain results that are shared with others.

Additional obstacles are more cultural in nature. Supply chains require a high level understanding of interorganisational dependencies and collaboration. These requirements challenge traditional routines of protecting organisational autonomy. They require sharing of business information and acceptance that fruits of integrated services are not equally distributed over the network participants.

Finally, integrated supply chains at the neighbourhood level create tensions with formal policy rules of competition in the health and social welfare markets. In regional or larger markets, providers can participate in supply chains that compete with other chains. Neighbourhood markets however are very small and splitting them over competing chains does not contribute to the policy goal of strengthening local social infrastructure. Moreover, Dutch local authorities and health insurers have experienced that their efforts to introduce competition in long-term care and welfare markets frequently resulted in the breakdown of locally-based providers – damaging major pillars of their local social infrastructure instead of strengthening them.

Primary care

Organisational responses to multimorbidity are booming in primary care. GPs are under pressure as hospitals shorten their length of stay, which results in additional demand for GP home visits. GPs are also under pressure as psychiatric hospitals and mental health institutions seek to integrate their clients in the local community. These clients subscribe to a GP practice in a local area (in the Netherlands, everyone has a fixed relationship with a GP practice in one's neighbourhood). Thus GP's are confronted with multimorbidity of an aging client population, but also with a growing frequency of somatic and psychiatric problems. The range of competencies required to handle these problems on a high professional level is such that GPs in the Netherlands look for specialised support.

In the field of multimorbidity with psychiatric problems, the government and health insurers support partnerships between psychiatric care and GP practices. The organisational format is to attach nurse practitioners and other professionals, based in psychiatric institutions, to GP practices. The government and insurers also follow a policy to upscale GP practices. They do this by increasing technical requirements for contracting, like telephone response time, physical accessibility to the practice, administrative procedures, etc. The requirements are such that it gradually becomes difficult for GP's to meet them in a solo practice. In addition, GPs are only allowed to compete for contracts with insurers on transmural DBCs for diabetes, COPD, chronic heart failure and CVA if they meet strict professional and administrative conditions. Responding to this requirement, the GPs group together into regional co-operative structures and upscale their group practices.

These upscaled structures enable GP practices to become planners and controllers of integrated primary care services. The growing scale of group practices facilitates diversification of the GP portfolio by using nurse practitioners and attached workers from psychiatric care providers. Gradually hospitals become interested to place out-patient activities of their specialists in GP practices, as this can help secure referrals to the hospital. Somewhat conversely, some large scale group practices start to grow in the direction of community health centers, by attracting paramedical professionals and offering a local home for home care organisations.

The integrating role of GP's in primary care is reinforced by changes in the reimbursement for the treatment of important groups of chronic illness. The so-called transmural DRG's (in Dutch: DBC's, *Diagnose Behandel Combinaties*) that have been introduced in the Netherlands to cover the costs of treatment chains for diabetes, chronic heart failure, COPD and CVA, are instruments that create a payment situation that comes close to the typical industrial situation where services go down the chain and money goes up. Health insurers can contract GP's for the overall treatment process of patients in these categories. The GP receives the money and can subcontract other suppliers to the treatment process chain. So, for the diabetes DBC, GPs receive money to run a pre-specified process that includes – besides their own activities – a check by an eye specialist, consultation by a dietician, consultation by an internist, and so on.

The necessity to adapt to a complex new environment places severe strains on GPs who lack basic organisational and financial skills to run their practice as an integrated health business. While there is a booming regional GP organisation in Zoetermeer, for example, a regional GP health center in Delft has become insolvent due to inexperience in operating a complex organisation in a competitive environment.

The changing environment in primary care generates interest from private investors and health insurers. Arts&Zorg (*www.artsenzorg.nl*) is an example. This company have established ten health centers, mainly in the region around The Hague, that offer a GP practice, a pharmacy, physiotherapy, psychological consultation and dieticians.

There is a growing group of GP's that do not want to carry the organisational and administrative burden themselves and also a growing number who want to work part time. In the Netherlands, the majority of new GPs are women, who for family reasons often prefer not to work full time and are not willing to do complex organisational management. Arts en Zorg offers them a sophisticated business model for health centers that fits their professional and private demands.

In the northern part of the Netherlands, health insurer Menzis also invests in primary care centers, together with a private investor, under the name "Zorgpunt" (care point). This joint venture has 28 centers and 155 000 patients.

Both Zorgpunt and Arts&Zorg see their investment as something that will be profitable in the long run. At this moment, they aim at value creation for patients by co-ordination and integration of services present within the center. The next step is to develop integrated care processes funded by the integrated DBC's for diabetes etc. Here again, they see opportunities for value creation, for patients as well as for the company.

Hospitals

Dutch hospitals concentrate on treatment of acute patients, leaving integrated complex care to nursing homes and home care organisations. However, elderly that require complex care can only be discharged after a place in a nursing home or home care capacity is secured, which leads to delays (bed blockers). For a Dutch hospital, these patients are a financial problem as they generate less income than a patient in treatment – this is an implication of the DRG (in Dutch: DBC, *Diagnose Behandel Combinatie*) payment system. Where hospital specialists are working on a fee for service basis there is an additional problem, since they want beds with patients they can treat (and thus generate income for themselves). Since medical specialists have contracts that force them to restrict their practice to patients in one hospital, the physicians have no way to generate additional income by using hospital capacity elsewhere.

The institutional response is to establish formal partnerships between hospitals and nursing homes – and to a lesser degree with home care organisations. By using vertical integration methods, hospitals try to secure the availability of capacity in nursing home or home care for patients. This is a matter of creating a supply chain that starts functioning the very moment a patient is admitted to the hospital. A prognosis is made about the moment of dismissal and follow-up capacity in nursing homes/home care is secured at the same time. This requires integration of IT infrastructure, planning and operational management. It also requires a culture of information exchange and taking responsibility for the chain as a whole, as well as consciousness of one's own contribution to the chain process. In the Netherlands, such chains are well established for total hip operations and CVA. A financial barrier to this kind of partnership is the existence of independent payment systems for acute and long-term care, which creates no incentive for collaboration. It is clear that collaboration is essential for the quality of patient care and for restraining overall costs during the treatment period. However the financial profit from this kind of vertical integration goes to the hospital and the specialists, but neither is willing to pay for the investments that need to be made by long-term care institutions.

Some hospitals try to respond to growing numbers of patients with multiple chronic conditions by revising their business model. They in fact create a kind of matrix organisation by dividing patients in three subgroups: acute, elective and chronic. Specialist groups are organised in capacity groups and sophisticated planning is used to allocate these groups to the care process. Examples are the hospitals of Breda, Deventer and the Onze LieveVrouwen Gasthuis in Amsterdam.

Organisational challenges and responses in Sweden tax-funded health system

Sweden has a predominantly publicly planned and structured health system (Glenngard *et al.*, 2005). Locally elected county and municipal governments are responsible for both financing and delivering services, while national government bodies set standards, regulate key processes, and (increasingly) evaluate outcomes. Entitlement to both health care and social services is linked to citizenship while financing is through taxation and minor user fees (Calltorp, 1999). Although Sweden's public structure of service planning and funding, as well as its predominately public service delivery, contrasts sharply to the Netherlands' mixed public-private approach, both countries share many of the same welfare ambitions and, interestingly, many of the resulting outcomes are fairly similar.

With regard to individuals with multiple chronic conditions, one might expect that in Sweden the integration of care issue could be readily resolved by administrative means, given its publicly-funded and planned system. This however has not been the case. A central obstacle in Sweden is in fact structural: clinical health care services are the responsibility of the regional-level county councils, while care for social needs – support in the home, nursing home, and/or other care and support defined as "non-medical" – is the responsibility of the local municipalities. Daily care for chronically ill patients thus cuts through two quite different public authorities, and commentators often describe the resulting situation as presenting a real challenge to get services working smoothly and with adequate quality from the patient's perspective (Johansson, 1997; Krasnik and Paulsen, 2009).

A second co-ordination challenge lies within the county council's area of clinical care responsibility. The county's medical services are divided between two quite separate sub-sectors within the public system, namely the primary care system (outpatient care) as against internal medicine, surgery and consulting subspecialties (in-patient care). In rural parts of the country where population is sparse and hospital care has had to be restructured to be able to meet needs in a sustainable way, integration between these two sub-sectors poses real challenges.

In more urban areas, structural reforms of the health delivery system have been developed according to a formula of "närsjukvård" ("near" care). This approach relies on a variety of instructions and incentives to convince the three main actors within the public structure (primary care, specialist care, and social care) to co-operate functionally and create "chains of care" (seamless care) for chronically ill patients.

Different "tools" on the clinical side help stimulate this integration, such as evidence-based care protocols and guidelines defining the most common diseases categories and their treatment. These patient management tools are nationally developed, however it is regarded to be important that they are molded into workable practical "aids" locally. The process of developing these aids becomes an important part of the process of getting different actors in a locality to work together to better integrate care. Different types of incentives including economic (payment structures) are also being used to a greater extent (Calltorp and Larivaara, 2009).

More generally, the national government has introduced financial incentives to the county councils to stimulate better and more rapid access (funding is allocated in accordance with targets for waiting times). This will be followed by similar financial incentives for integration in elderly chronic care and, potentially, to reduce care-induced accidents.

National government induced health reforms in recent years also include an emphasis on increased diversity of providers within the tax financed health system and under county council control. A mandatory "choice of care" (*vårdval*) for the citizens within primary care has been introduced whereby different actors (public and private) can provide services as long as certain quality criteria are met (a form of licensing system) (Calltorp, 2011) This reform has thus far resulted in major changes in primary care in the three large county councils that cover half of the Swedish population. In these three counties, primary care services are now provided by a mix of public and private actors, with approximately 20% of the private actors owned by foreign companies.

While this structural shift toward private provision of first contact primary care services is not innovative by the standards of social health insurance countries such as the Netherlands, or even tax-funded countries like Denmark, the United Kingdom, or Norway, it represents a major change of consciousness and structure in the Swedish context, by explicitly introducing market-style competition for patients inside what had originally been conceived as a catchment based, public health dispensary model of care (Magnussen *et al.*, 2009). Thus the Swedish example, while emphasising the introduction of structural change to generate better integrated care of the chronically ill, also highlights the growing role of competitive approaches to professional groups that deliver those health services as a strategy to potentially improve access to and the quality of integrated care services.

An organisational response from one not-for-profit provider in the United States private health insurance-based system

The health care system in the United States is a complex mix of public (national, state, county and municipal), private not-for-profit, private for-profit, and charitably run funding, delivery and planning systems. Within this complex framework, a number of defined public as well as private health delivery systems have sought to develop integrated care models to address the needs of individuals with multiple chronic conditions. The best known public sector model is the federally run Veterans Administration system, which is highly regarded for its implementation of the "medical home" model of integrated care (Oliver, 2007).

In the private sector, Intermountain health in Utah is a well regarded example of an integrated health delivery system, in which management focuses heavily on measuring and evaluation. This private not-for profit health care system achieves its results through co-ordination of care processes while operating within a broader market-oriented health care system in which funders and providers typically are not linked together.

Intermountain delivers health care to about half of the 2.6 million inhabitants in Utah. Intermountain patients are a cross-section of federally-funded Medicare and privately-insured patients. The system itself provides private health insurance for 600 000 people.

Physicians within Intermountain may be either employed by the system or self-employed – but generally this does not seem to be an important part of the explanation of Intermountain's achievements. Instead it is the advanced development of concrete "tools" for defining the content of medical practice, measuring outcome, and evaluating and comparing outcome for the individual patients as well as patient groups that seems to explain Intermountain's achievements. There is also a long history of determined work during at least the last 30 years, as well as a defined corporate and value-based culture within a system that belonged to the Mormon Church until 1976, when it became an independent non-profit organisation.

The key component to Intermountain's workings is a highly successful process orientation throughout the system's outpatient and inpatient settings. Intermountain defines eight clinical programmes (coronary care, pediatrics, behavioral care, etc.) that run through the system and which focus on the individual patient with specific diseases or conditions. The main work of the clinical programmes, led by a physician with support of analytical competence and management co-ordination, is to define system-wide concrete guidelines for the care in that specific programme. Evidence-based detailed care principles are formulated by searching the literature and then adapting general principles to the situation within Intermountain.

An important element is detailed goal setting and improvement targets to be reached for each year. Outcome is measured in accordance with set goals regarding both medical care and resource aspects. A key aspect of the clinical programme work is to measure outcome and resources, to evaluate results, and to then feed them back to clinicians. Intermountain has developed a step-wise sequence defining evidence-based practices – measuring quality and outcome – and feeding back outcome to physicians and other key actors further than most other health delivery organisations. It demonstrates the potential of concepts within the areas of technology assessment, quality improvement and management control as "tools" for achieving better and more cost-effective care (James and Savitz, 2011).

An additional dimension illustrated by Intermountain is the centrality of a sophisticated IT-based information system. To be able to measure, collect, evaluate and feed-back information to the extent that this system is doing, there is an absolute condition to have a fully digitalised medical record and information system. All relevant data are stored in an Electronic Data Warehouse – and the data are used and fed back in appropriate ways.

Other top private not-for-profit integrated health organisations in the United States have similar integrated care programmes. The Kaiser Permanente system may be best known in this respect. Also Group Health Cooperative of Puget Sound, where "The Chronic Care Model" was developed by Ed Wagner (Wagner *et al*., 1996) within the organisation's Group Health Research Institute, is another example of both integration and strong innovation on the private not-for-profit side of the US health system.

Conclusions

In the new economic context they face, developed country health systems will find themselves under a series of re-doubled structural and organisational pressures. While efforts by national policy makers to introduce structural reform, and to re-make their provider systems into more efficient as well a higher quality configurations have been ongoing since the onset of economic globalisation in the early 1990s, the scale of the stakes involved has escalated considerably in the aftermath of the 2008 global fiscal crises. These intensifying pressures for financial efficiencies, coupled with the simultaneous growth of patient demands for greater quality, the rapid increase in both the absolute and relative number of elderly with multiple chronic conditions, and the dramatic strides made by both clinical and information technology, all point toward the importance of new structural and organisational responses by health professionals and provider organisations.

Professionals and organisations alike can respond to these new challenges in two interconnected manners. One is to focus on the learning characteristics of health care networks. The second is to re-structure health provider organisations by adopting innovative new configurations of health professionals and provider institutions that facilitate the delivery of simultaneously more effective clinical and custodial care to chronically ill elderly and doing so in a financially integrated and fiscally less expensive manner. This involves moving beyond the much-discussed "hospital of the future" (Rechel *et al*., 2010) to the type of integrated cross-institutional and cross-sectoral networks that are essential to dealing with large numbers of elderly with multiple morbidities (Duran *et al*., 2011 forthcoming).

The three country examples highlight the complexity of implementing new organisational arrangements inside existing health systems. Inherent resistance against new organisational arrangements and – as noted in both the

Dutch and Swedish examples – the necessary re-distribution of professional responsibility and authority suggest the degree of managerial challenge involved in making this type of structural change work well in practice.

Recent experience in the Netherlands suggests that appropriate organisational responses potentially can emerge from a complex mix of structural health system reforms undertaken by national policy makers in combination with the careful harnessing and application of key market forces and incentives. In this regard, although the specific mechanisms utilised in the Netherlands are of course conditioned by the particular institutional context and culture found in that country (Hofstede, 1980, 1991), the conceptual strategy pursued by the Netherlands may well be adapted for use in different national contexts found in other developed countries. One key challenge for the future thus becomes finding useful ways to adapt the core Dutch strategy for use in additional national health system and policy making environments.

Ultimately, of course, these innovative organisational arrangements, by themselves, are not capable of resolving the compromised economic and financial posture that many developed countries now confront. Moreover, this type of organisational re-structuring to better provide integrated care is only one dimension of a wide variety of health sector reforms that are increasingly being discussed by national health policy makers in Europe and beyond. The new organisational configurations presented above do, however, have the ability to make existing revenue sources work harder – to get, as the British like to say, "better value for money" – by improving the quality, safety, and patient satisfaction as well as the marginal cost of the services delivered.

Thus, although these innovative new organisational approaches cannot be expected to solve the entire fiscal problem in public sector-funded health systems, they may be able to help improve care in the near term while at the same time contributing to the delay of more serious financial cuts. Although innovation and partnership cannot by themselves provide the entire solution to present-day fiscal pressures on developed country health systems, they can serve as one important element in a near-term strategy to improve health system performance and outcomes.

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Chapter 6

Multimorbidity: The impact on health systems and their development[1]

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This chapter provides an overview of the descriptive epidemiology of multimorbidity in terms of its prevalence and distribution within the population and its associations with mortality, functional status and quality of life, and health services use and healthcare quality and safety. The analysis draws on both the published literature and on data about the prevalence of 40 long term conditions from 1.75 million primary care patients in Scotland. The implications for health service organisation and the measurement of health system performance for people with multimorbidity are discussed.

Introduction

It is well recognised that health services in all developed and most developing countries face increasing challenges as the epidemiological transition from acute to chronic conditions as the main cause of mortality continues to play out, and because of the accompanying demographic transition towards increasingly older populations. A key consequence is that the proportion of people who have multiple chronic conditions is expected to rise, although health services remain largely configured to the management of single diseases.

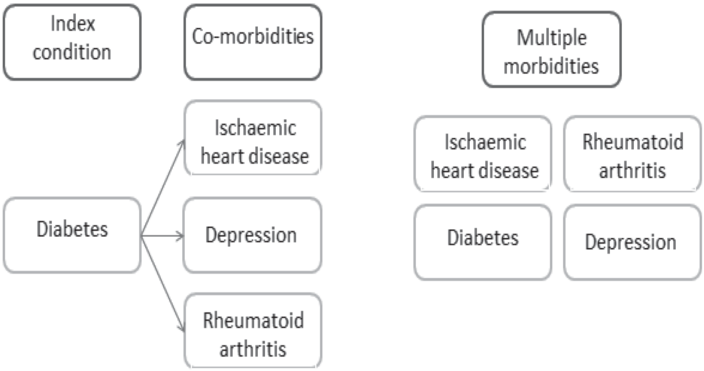
Although largely based on published literature, the descriptive epidemiology of multimorbidity is illustrated throughout the chapter using data on the presence of 40 long-term conditions in 1 754 133 Scottish patients registered with 310 Scottish general practices. This dataset includes approximately one-third of the Scottish population, and is representative of the whole population in terms of age, sex and socio-economic deprivation. The dataset is described in more detail in Annex 6.A1.

What is multimorbidity?

The practice of medicine relies on a system of diagnostic classification which is paralleled by the ways that professions and health services are organised into disease-focused silos. However, diseases or morbidities occur in individuals who may experience none, one or several simultaneously. On the face of it, multimorbidity is therefore an obvious concept, but as with other broad concepts like “quality” or “continuity”, defining it and making it useful is not so straightforward. Although both focus on people with more than one condition, a key distinction is between “co-morbidity” and “multimorbidity” (Valderas *et al.*, 2009; van den Akker *et al.*, 1996).

Co-morbidity is the existence of *other* conditions in people who have one condition that is of primary interest (Feinstein, 1976), whereas multimorbidity is “the co-occurrence of multiple chronic or acute diseases and medical conditions within one person” (van den Akker *et al.*, 2001). Figure 6.1 demonstrates this for one individual with four conditions. In a study of diabetes, this person would be considered to have three co-morbidities – ischaemic heart disease, depression and rheumatoid arthritis. In a study of multimorbidity, this person would be defined as being multimorbid by virtue of having four conditions, but none is the specific focus of interest.

Figure 6.1. Co-morbidity and multimorbidity



Source: Bruce Guthrie, Sally Wyke, Jane Gunn, Marjan van den Akker and Stewart Mercer for the OECD.

From a co-morbidity perspective, one disease is dominant and defined as the index condition. This usefully focuses researchers and health services on clearly defined populations of patients with disease X, who have additional needs because of other conditions they happen to have. It is useful where there are particular common needs that are not easily addressed within a single disease framework. An example is the identification and management of co-morbid depression in patients with physical health problems like diabetes. In this context, depression is defined as a co-morbidity of diabetes. Relevant research has included documenting the increasing prevalence of depression in people with diabetes, studies of the negative impact of depression on diabetes control (Lin *et al.*, 2004), and trials the effectiveness of complex interventions on both diabetes and depression outcomes (Katon *et al.*, 2010). Co-morbidity perspectives have usefully informed changes in health service organisation, such as the inclusion in the UK Quality and Outcomes Framework of financial incentives for general practitioners to screen people with ischaemic heart disease and diabetes for depression (depression as co-morbidity), and to provide an annual physical health review for people with serious mental illness (physical problems and especially cardiovascular disease as co-morbidity) (NHS England, 2009). This approach extends consideration beyond a single disease silo, and is useful for particularly common combinations of conditions. However, the index condition usually still dominates in the sense that the question being asked is of the form "how should depression in people with ischaemic heart disease be treated?" or "how should people with ischaemic heart disease and depression be treated?".

In considering co-morbidity, one disease is dominant and defined as the index condition. This effectively retains a disease-silo approach, but usefully focuses attention on other important needs within this population that care for a single disease might not routinely consider. An example is the identification and management of co-morbid depression in patients with physical health problems like ischaemic heart disease and diabetes. In this context, depression is defined as a co-morbidity of the physical condition. Relevant research has included showing an increased prevalence of depression in people with physical disease (Gunn *et al*., 2010; Mercer and Watt, 2007), studies of the negative impact of depression on disease control and outcomes (Lin *et al*., 2004), and trialling the effectiveness of complex interventions on both diabetes and depression outcomes (Katon *et al.*, 2010). A related co-morbidity approach sometimes underlies health service organisation or measurement, such as the inclusion in the UK Quality and Outcomes Framework of financial incentives for General Practitioners to screen people with ischaemic heart disease and diabetes for depression, and to provide an annual physical health review for people with serious mental illness (NHS England, 2009). This approach extends care beyond a single disease silo, and is useful for particularly common combinations of conditions. However, the index condition and therefore a disease-silo approach usually still dominates.

From a multimorbidity perspective, the person seeking health care is made central rather than the particular conditions they happen to have. Even in people with multimorbidity, some decisions will still be made within a single disease framework (should this person with ischaemic heart disease take aspirin?), but decision making will often require balancing competing considerations [should this person with ischaemic heart disease take aspirin, even though they require a non-steroidal anti-inflammatory drug (NSAID) for their rheumatoid arthritis? Is their obesity more of a problem than their inflammatory arthritis? Is it more important to start the aspirin now than manage their depression?]. At any one moment, there may be an single condition which dominates in the way that an’ index’ condition is central in a co-morbidity perspective, but over time what matters most to individuals will often change. Additionally, where a patient has many conditions, then single disease guideline recommendations are sometimes concordant in the sense that there is a single course of action recommended for multiple conditions. However, blindly following guidelines may also rapidly lead to patients taking large numbers of interacting and sometimes conflicting drugs (Boyd *et al*., 2005).

The distinction between co-morbidity and multimorbidity highlights the tension between disease and patient-centred conceptions of health and health care, which is mirrored by the distinction between specialist and generalist models of care. When patients have only one disease or when one disease dominates, then disease-focused specialist care will often be the most efficient and effective form of organisation. Examples include people with acute myocardial infarction and its immediate aftermath, and those having chemotherapy for cancer. However, for people with multiple, currently problematic conditions, then services based on disease silos may rapidly become duplicative and therefore inefficient in their use of resources (Starfield *et al*., 2005), and burdensome and unsafe for the patient because of poor co-ordination and integration (May *et al*., 2010; O'Brien *et al*., 2010). The correct balance between specialist and generalist care will depend on how common multimorbidity is, and its impact on people with multiple conditions. These issues are considered in the next two sections.

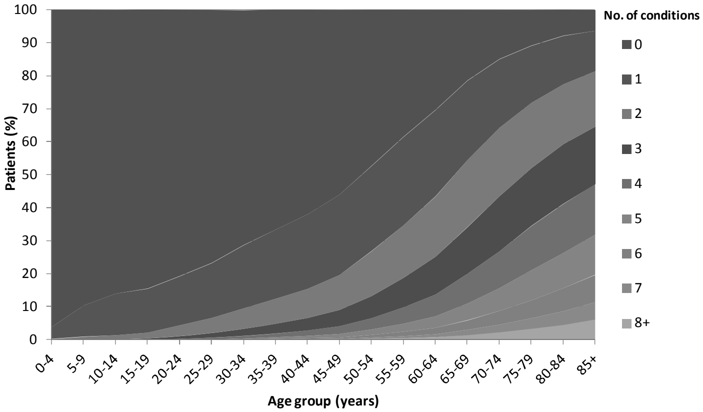
How common is multimorbidity?

There is no consensus on how to measure multimorbidity (van den Akker *et al*., 2001; Diederichs *et al*., 2010; Salisbury *et al*., 2011). Diederichs *et al.* conducted a systematic review which identified 39 different multimorbidity measures. These varied in a number of ways including the number of conditions counted (between 4 and 102), the data used to define if a condition was present (self-report, medical record review, routine electronic clinical data, and administrative data about hospital admission) and the population being measured (population samples, primary care users, hospital users; all ages or restricted to the elderly) (Diederichs *et al*., 2010).

Unsurprisingly, prevalence estimates vary considerably depending on the measure used and the population sampled. For example, Salisbury et al used electronic clinical data for patients aged 18 and over from a broadly representative sample of United Kingdom General Practices, and applied two indices to the same data – a count of 17 common and important conditions included in the UK Quality and Outcomes Framework primary care pay for performance programme, and a count of a 114 Expanded Diagnostic Clusters representing chronic conditions based on a US case-mix adjustment system (Salisbury *et al*., 2011; Johns Hopkins Adjusted Clinical Group, 2011). The crude prevalence of multimorbidity defined as the presence of two or more conditions was 16% with the former and 58% with the latter. Others have shown that the measured prevalence of multimorbidity is higher in samples drawn from primary medical care users than general population ones, and increases as the number of conditions included in the count increase (van den Akker *et al*., 2001; Fortin *et al*., 2010). As a result, comparison of prevalence across studies using different methods for measuring multimorbidity presence and sampling from different populations is not meaningful. A key implication for comparing health systems is to be sure that a single measurement method has been used and the same population is being sampled (Starfield *et al.*, 2005). However, despite the variation in methods and prevalence estimates, there are consistent findings across studies.

First, irrespective of how it is counted, multimorbidity is common, especially in older people of whom the majority have multimorbidity. Figure 6.2 shows the percentage of people with different numbers of conditions in Scotland (the dataset is described in Annex 6.A1). Of the 1 751 841 people in the dataset, 405 496 (23.1%) have at least two chronic conditions, and 237 798 (13.6%) have at least three. The number of chronic conditions that people have increases rapidly with age. From age 65, over half the population are multimorbid (defined as having two or more chronic conditions) and almost three-quarters by age 75. From age 50 onwards, the majority of people with any chronic condition are multimorbid, and from age 75 the majority of people with any chronic condition have three or more. Multimorbidity is more common in older people who also have more frailty and reduced functional status. However, multimorbidity is important in younger people since there are fewer older people in the population than the middle aged. Of the 405 496 people with at least two chronic conditions, 210 500 (51.9%) are aged under 65, as are 42% of those with three or more chronic conditions.

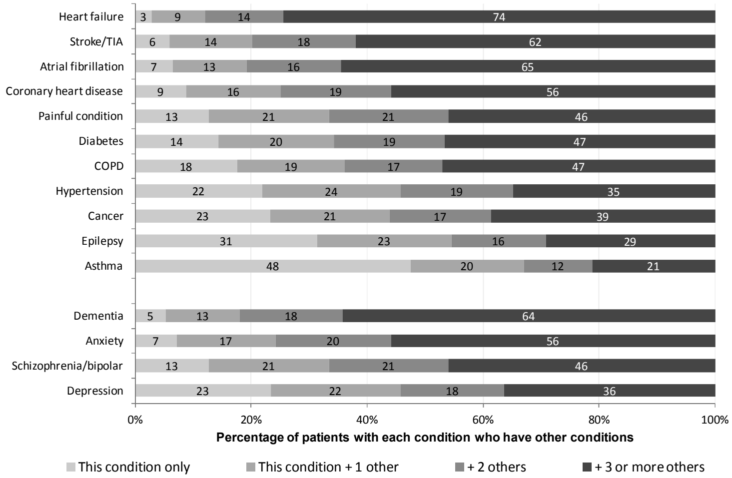
Figure 6.2. Number of chronic conditions by age in Scotland



Source: Bruce Guthrie, Sally Wyke, Jane Gunn, Marjan van den Akker and Stewart Mercer for the OECD.

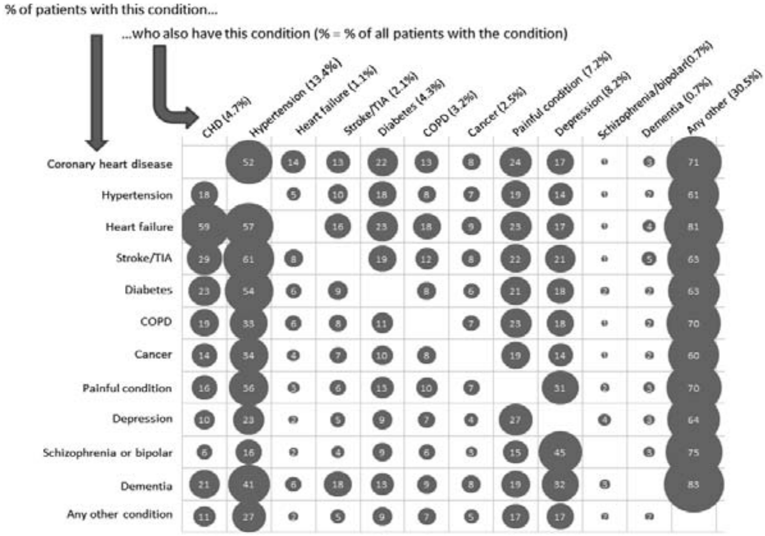
Figures 6.3 and 6.4 use the same data to show the proportion of people in Scotland with selected, common chronic conditions who have other diseases, and Figure 6.3 co-occurrence of selected conditions (Information Services Division, 2008). It is therefore clear that people with single chronic diseases are the minority, except in children and younger adults.

Figure 6.3. Proportion of patients with common long-term conditions who also have other diseases



Source: Bruce Guthrie, Sally Wyke, Jane Gunn, Marjan van den Akker and Stewart Mercer for the OECD.

Figure 6.4. Commonly occurring co-morbidity in a Scottish primary medical care population[1]



1. The figure should be read horizontally (52% of people with coronary heart disease have hypertension, 14% heart failure, 13% stroke and so on). TIA is transient ischaemic attack (‘mini-strokes’), COPD is chronic obstructive pulmonary disease. “Other” conditions are one or more of the remaining 29 long-term conditions included in the analysis.

Source: Bruce Guthrie, Sally Wyke, Jane Gunn, Marjan van den Akker and Stewart Mercer for the OECD.

Second, Figure 6.4 illustrates that different combinations of conditions may be more or less concordant. For example, coronary heart disease, hypertension, stroke/TIA and diabetes are significantly concordant in that management of cardiovascular risk is core to their chronic management. In contrast, other conditions are discordant in that treatment has no overlap or the management of one condition significantly complicates treatment of another. The most obvious example of that is where physical and mental health conditions co-exist. Depression is the most commonly occurring mental health co-morbidity of physical diseases, but people with depression, schizophrenia or bipolar disorder, and dementia all have relatively high rates of physical conditions. In total, 156 700 people had multimorbidity including at least one mental health problem (8.9% of the total population, 39.6% of people with multimorbidity). This is particularly important since physical and mental health care are typically less well co-ordinated than care for physical conditions alone, especially where physical conditions are relatively concordant. Although older people with multimorbidity are more likely to have a mental health problem recorded, 63.9% of multimorbidity that included mental health problems occurred in people age under 65 years (Table 6.1).

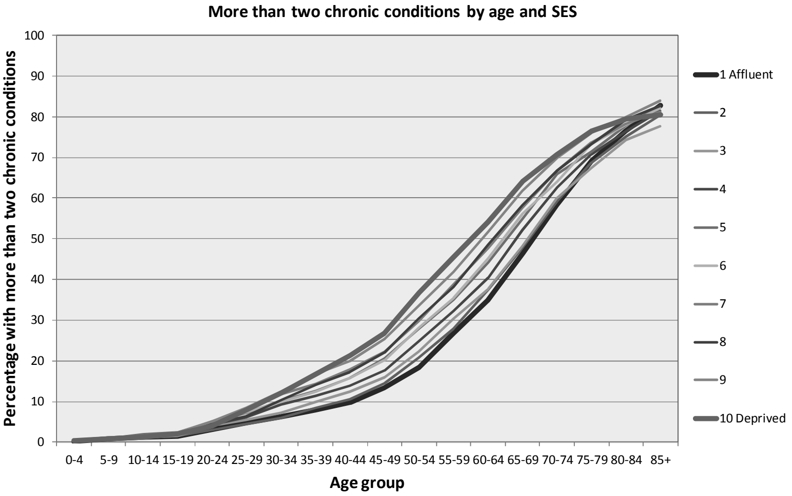
Table 6.1. Prevalence of physical and mental health co-morbidity by age in a Scottish primary care population

Age (years)	Number. (%) with multimorbidity	Number (%) with multimorbidity including at least one mental health condition
0-24 (n=479156)	8 460 (1.8)	3540 (0.7)
25-44 (n=508389)	53 953 (10.6)	35050 (6.9)
45-64 (n=473127)	140 512 (29.7)	61536 (13.0)
65+ (n=291169)	192 960 (66.3)	56574 (19.4)

Source: Bruce Guthrie, Sally Wyke, Jane Gunn, Marjan van den Akker and Stewart Mercer for the OECD.

Third, multimorbidity occurs at an earlier age in socioeconomically deprived populations compared to more affluent ones (although this is much less commonly studied than associations with age) (Mercer and Watt, 2007; Salisbury *et al.*, 2011; van den Akker *et al.*, 1998; Uijen and van de Lisdonk, 2008). Using the same Scottish dataset, Figure 6.5 shows that there is a socioeconomic gradient in the prevalence of multimorbidity in adults, which is greatest in middle age when those living in the most deprived postcodes are approximately twice as likely to have multimorbidity than the most affluent. Put another way, at age 55, the most deprived patients have the same rates of multimorbidity as the most affluent at age 65. To our knowledge, this has not been studied in any detail in other populations. However, although the size of the gradient may vary, we would expect to see similar socioeconomic gradients in other countries.

Figure 6.5. Prevalence of multimorbidity (two or more chronic conditions) by age and socioeconomic status in Scotland



Source: Bruce Guthrie, Sally Wyke, Jane Gunn, Marjan van den Akker and Stewart Mercer for the OECD.

Fourth, diseases and therefore multimorbidity are not randomly distributed in the population but are clustered in particular individuals (van den Akker *et al.*, 2001; van den Akker *et al.*, 1998). Using data from a Dutch primary medical care population study for 335 chronic and recurrent diseases, van den Akker *et al.* compared the actual distribution of multimorbidity to that if diseases were randomly distributed. They found that, compared to a random distribution, disease and multimorbidity was concentrated in a smaller than expected number of sicker people with a greater than expected number of conditions, and this was particularly the case in younger people (van den Akker *et al.*, 1998). This is at least partly due to some diseases having shared causes, with smoking for example being a cause of a wide range of cardiovascular and lung diseases, and is one explanation for the observation above that most people with chronic disease have more than one. However, even conditions without an obvious shared aetiology are associated. Depression is more common in people with increasing numbers of physical conditions, and this association is only partly explained by functional status and quality of life (Gunn *et al.*, 2010). How multimorbidity develops over time and the elucidation of causal mechanisms is an important area for future research (Valderas *et al.*, 2009). This is particularly relevant to preventing multimorbidity. Given current understanding, prevention is likely to be possible by taking steps known to prevent the development of individual conditions, or multiple conditions where there is a shared aetiology like smoking, obesity, poor diet, low rates of physical exertion or alcohol overuse. From that perspective, implementing effective population and individual health promotion programmes should reduce multimorbidity. However, understanding why conditions without a known aetiological pathway are associated would potentially create new methods of prevention.

Finally, there is one study that has examined changes in the prevalence of multimorbidity over time, using the same measurement method in a consistent primary care population. This found that the age-sex standardised proportion of people with four or more conditions increased from 2.6% in 1985 to 7.5% in 2005. The reasons for this are not clear, but the authors hypothesised that it was due to increasing diagnosis of asymptomatic disease due to changing diagnostic thresholds (for hypertension and diabetes in particular), and increased survival with chronic disease due to better treatment (Uijen and van de Lisdonk, 2008). Given aging populations and continued improvement in survival in people with heart disease, stroke, cancer and other conditions, it seems likely that the proportion of people with multiple chronic conditions will increase in the future, although measuring the extent of this will require use of the same measurement method in the same population over time. However, leaving aside changes in prevalence due to aging, it is important to recognise that it is not clear whether rising rates should be considered an indication of good health system performance (because of better survival with chronic disease, or increased diagnosis of asymptomatic diseases like hypertension where treatment reduces future risk of more serious conditions) or poor health system performance (because of inadequate population and individual disease prevention).

The impact of multimorbidity

Multimorbidity is common irrespective of how it is measured, so any impact on a range of outcomes will have significant population implications. This section describes how multimorbidity is associated with a range of broadly grouped outcomes:

- Mortality;
- Functional status and quality of life;
- Health services use, and health care quality and safety.

Mortality

Multimorbidity is associated with higher mortality (Gijsen *et al*., 2001). Much of the research in this area has taken a co-morbidity perspective, typically by examining how mortality varies by number of condition in people who have an index condition of particular interest (Gijsen *et al*., 2001; Satariano and Ragland, 1994; Yancik *et al*., 1998; Yancik *et al*., 2001). For example, Satariano and Ragland found that mortality in women with early breast cancer was largely driven by death from other causes in women with co-morbidity (Satariano and Ragland, 1994). The observed association with mortality underlies some of the most widely used multimorbidity measures such as the Charlson Index (Charlson *et al*., 1987). The Charlson index is essentially a weighted multimorbidity count of 19 conditions, where the weights are derived based on the observed association between conditions and mortality. It is well validated, with ten-year mortality rates in the original validation cohort being 8% for those with a score of zero, 25% with a score of one, 48% with a score of two and 59% for those scoring above three (Charlson *et al*., 1987; Librero *et al*., 1999). Many multimorbidity scores show similar associations with mortality, although the strength of association varies somewhat between scores (Perkins *et al*., 2004).

Two observations about the distribution of multimorbidity above are relevant in considering the implications. First, chronic disease is not randomly distributed in the population, with morbidities clustering in particular individuals, and this clustering being strongest in younger and middle-aged people (Gunn *et al*., 2010; van den Akker *et al*., 1998). Second, multimorbidity occurs at an earlier age in people with low socioeconomic status. Differences in the prevalence of multimorbidity are therefore likely to contribute to variations in potential years of life lost between countries, and between people of different socioeconomic status within countries (Gardner and Sanborn, 1990; Nolte and McKee, 2004).

Functional status and quality of life

Multimorbidity is associated with reduced functional status, usually measured in terms of ability to carry out activities of daily living (Boyd *et al*., 2007, Fuchs *et al*., 1998; Perrucio *et al*., 2007, Kadam *et al*., 2007; Yancik *et al*., 2007; Bayliss *et al*., 2004; Greenfield *et al*., 1993). Using primary medical care consultation data, Kadam *et al*. showed that poor functional status was associated with the overall burden of multimorbidity in terms of both the number of conditions and their severity (Kadam *et al*., 2007). Greenfield et al studied people having hip replacement and found that much of the variation in functional status after one year was explained by the degree of multimorbidity people had, and that differences in multimorbidity case-mix explained all variation between hospitals in functional outcomes (Greenfield *et al.*, 1993). The key implication is that case-mix adjustment for multimorbidity will be important if patient-reported outcome measures are used to assess the quality of health care.

Fortin *et al.* have systematically reviewed the literature on the association between multimorbidity and quality of life. Although the research reviewed varied in terms of how both multimorbidity and quality of life were defined and measured, there was consistent evidence that physical quality of life fell with increasing multimorbidity (Fortin *et al*., 2004). Associations between multimorbidity and quality of life were stronger for severity-adjusted multimorbidity measures, with more severe disease not unexpectedly having greater impact on quality of life (Fortin *et al*., 2005; Fortin *et al*., 2006). Although few studies have examined it directly, there is also some evidence that the impact of multiple conditions is greater than the sum of the impacts of individual conditions (*i.e.* that multimorbidity has an additional impact in itself) (Rijken *et al*., 2005). A weakness of existing research is that the majority of studies either excluded people with psychiatric illness or did not include mental health problems in morbidity counts (Fortin *et al*., 2004).

Clearly, multimorbidity has a significant impact in how people are able to lead their lives. A useful framework for understanding the impact of chronic illness was developed by Corbin and Strauss using qualitative interview data (Corbin and Strauss, 1985). They showed that people with chronic illnesses have three lines of "work": *illness work* refers to the tasks associated with medical regimens, crisis prevention and management, symptom management and diagnostic related work; e*veryday life work* refers to the essential round of daily tasks that keeps a household running, housework, personal care, childcare, earning money, cooking, eating; *biographical work* refers to the need for reconsideration of one's past in the light of current illness and to imagine a new future. Because outlook can be bleak, this often raises unwanted emotions and psychological distress, which in turn need to be managed. Each type of work has associated tasks and requires consideration about who does them, how, where, when, with what consequences and in the face of which challenges.

The work and the tasks required in managing multimorbidity clearly vary enormously between people in different circumstances but also over time as illnesses develop and as social environments change. Different types of task need to be sequenced and the resources available for each carefully balanced; using the offer of a ride from a neighbour for a trip to the hospital (illness work) means that it is harder to ask for a ride to visit a family member or to take children to school (everyday life work). Balancing out competing demand for resources, and especially of energy, can be a major drain on people with multimorbidity. Maintaining valued social roles – performing important everyday life work – is often prioritised at the expense of managing symptoms (Townsend *et al*., 2003). Managing complex drug regimens also creates tension between lines of work; in general people express an aversion to taking drugs and want to retain an idea of themselves as "drug free" (biographical work) whilst recognising that drugs are necessary to manage their conditions (illness work) and can help them perform social roles (everyday life work). People with multiple conditions face more barriers and find self-management more difficult because of the compound impact of their conditions, the difficulty and amount of work involved in managing medications, and because a single, dominant, often painful condition often interfered with an ability to undertake the illness work associated with other conditions (Bayliss *et al*., 2003). Treatment burden (May *et al*., 2010), discussed further below, is important because the greater demands placed by a medical regimen or the sequencing of medical visits (the extent of illness work) means that fewer resources are available for valued activities that most impact of quality of life. The trade-offs involved may particularly affect the most socio-economically disadvantaged who have fewer personal and community resources to call on, and who may therefore experience greater impact on their quality of life and greater difficulty in effectively managing their health problems.

Health service use and health care quality and safety

Health service use

Unsurprisingly, multimorbidity is associated with increased use of health services including inpatients and ambulatory care (Salisbury *et al*., 2011; Gijsen *et al*., 2011; Librero *et al*., 1999; Wolff *et al*., 2002). It is estimated that about two thirds of total US health care spending is devoted to the ~25% of people with multimorbidity. To some extent, this increase in health service use is exactly what would be expected because need is greater in people with multiple conditions (Salisbury *et al*., 2011), but at least some increased use is because of failures of co-ordination and complications of treatment including adverse drug events from complex prescribing regimes (Leendertse *et al*., 2008; Zhang *et al*., 2009). Much of the increase in health service use is concentrated in the final year or two of life, which at times will be inappropriate if palliative care approaches are more indicated than aggressive "curative" treatment (Wolff *et al*., 2002; Murray *et al*., 2005).

As an example of this, Wolff et al examined admissions for ambulatory care sensitive conditions (ACSCs) and preventable complications in

1.2 million people aged 65 and over in the US Medicare programme (Wolff *et al*., 2002). ACSCs are conditions where better ambulatory/primary care is expected to reduce the need for admission (hence their alternative name of "potentially preventable admissions"). Examples include admissions with exacerbations of asthma and chronic obstructive pulmonary disease, perforated appendicitis, and dehydration. Examples of preventable complications include post-operative infection and iatrogenic pneumonia. Multimorbidity was defined as a condition count using a proprietary case-mix adjustment software (the Ambulatory Care Group classification system) (Johns Hopkins Adjusted Clinical Group, 2011; Wolff *et al.*, 2002). Admissions with ACSCs and preventable complications are very significantly increased in people with more conditions (Table 6.2). After adjustment for age and sex, people with four or more chronic conditions have over 90 times the odds of either type of admission compared to those with none. Their mean annual mean expenditure is 60 times greater than those with none (and 12 times greater those with only one chronic condition) (Table 6.2).

Table 6.2. Odds ratios for admissions with ACSCs and preventable complications, and mean expenditure by number of chronic conditions

No. of chronic conditions	% of beneficiaries	Odds ratio (95% CI) for admission with an ACSC[1]	OR (95% CI) for admission with preventable complication[1]	Mean annual Medicare expenditure (USD)[2]
0	18.0	1	1	211
1	17.3	7.5 (6.5-8.6)	6.0 (5.0-7.2)	1 154
2	21.8	18.1 (15.8-20.8)	13.6 (11.4-16.2)	2 394
3	28.8	36.4 (31.8-41.7)	29.2 (24.5-34.8)	4 701
≥4	24.1	98.5 (86.1-112.7)	91.4 (76.8-108.6)	13 973

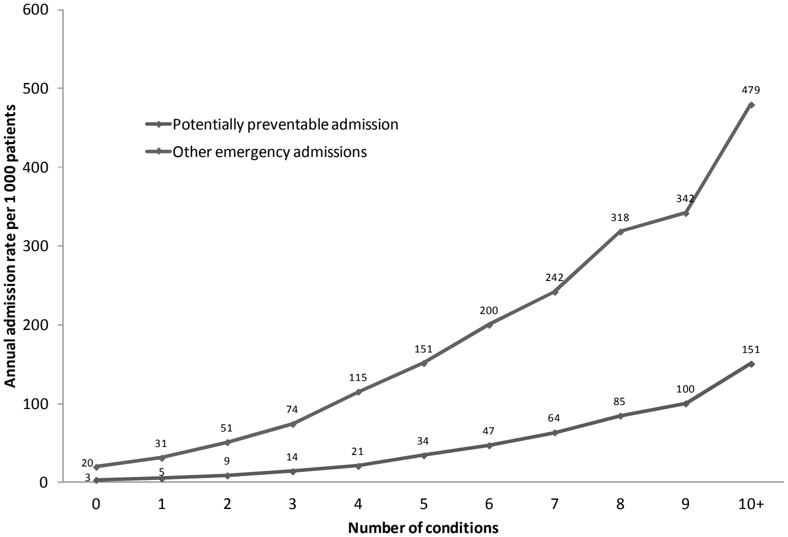
1. Adjusted for age and sex. Note that age has only small independent associations (for example, for ACSC, OR compared to 65-69 were 1.0 for 70-74, 1.2 for 75-79, 1.6 for 80-84 and 2.5 for 85 and over).

2. Age has only limited effect on expenditure after number of conditions is accounted for (for example, for people with 0 chronic conditions, mean expenditure is USD 195 in those aged 65-69 and USD 303 for those aged 85 and over; for people with more than four chronic conditions, mean expenditure is USD 14 109 for those aged 60-69 and USD 14 282 for those aged 85 and over).

Source: Adapted from Wolff *et al.* (2002).

Figure 6.6 shows admission rates with potentially preventable admissions and all other emergency admissions in Scotland by number of conditions, showing a similar relationship as found in the US Medicare study.

Figure 6.6. Potentially preventable[1] and other emergency admission rates in 226 593 patients in 40 Scottish practices with linked primary care and hospital admissions data



1. "Potentially preventable" admissions as defined by NHS Scotland use a very similar list of ICD codes as "ambulatory care sensitive admissions" as defined by Wolff *et al.* (2002).

Source: Bruce Guthrie, Sally Wyke, Jane Gunn, Marjan van den Akker and Stewart Mercer for the OECD.

Wolff *et al.*'s main conclusion was that strengthening US primary care was the intervention most likely to improve care for older people with multiple conditions in the United States, because specialist care would inevitably be fragmented for people with multiple conditions. This is illustrated by Pham *et al.*'s examination (Pham *et al.*, 2007) of US Medicare claims data for people aged 65 and over (Table 6.3), where the number of physicians seen increases steeply as the number of conditions a person has increases, for both primary care physicians and specialists. The one-third of older people with seven or more conditions saw a median of 11 physicians spread over seven different practice sites in the year studied.

This highlights the importance of someone taking clear responsibility for co-ordination and integration for peole with multiple conditions, although with increasing numbers of physicians involved, the risk of all providers assuming that someone else has this responsibility increases (a situation described by Balint in the 1950s as the "collusion of anonymity" (Balint, 1957) where all are responsible in theory allowing none to be in practice).

Table 6.3. Median number of physicians seen in the year 2000 by number of chronic conditions

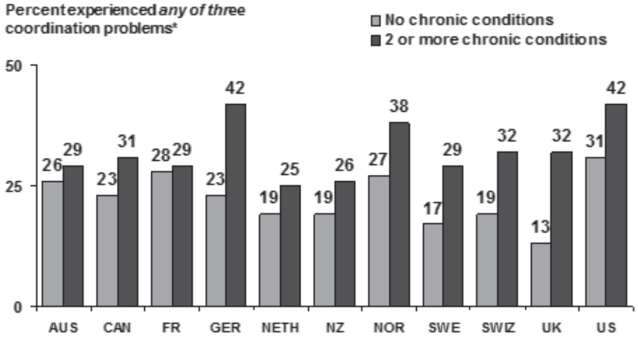
No. of conditions	No. (%) of patients	Median physicians seen in one year (interquartile range)	Median primary care physicians seen in one year (IQR)	Median specialists seen in one year (IQR)	Median practices attended (IQR)
0-2	257 471 (13)	3 (2-5)	1 (1-2)	2 (1-3)	2 (1-3)
3-4	451 774 (24)	5 (3-7)	2 (1-3)	3 (2-5)	3 (2-5)
5-6	448 855 (25)	7 (5-10)	2 (1-3)	4 (3-6)	4 (3-6)
≥7	629 354 (38)	11 (8-16)	3 (2-5)	8 (5-9)	7 (5-9)

Health care quality and safety

Measuring the quality and safety of care is not straightforward, since both are multi-faceted concepts. Studies examining the association between multimorbidity and quality of care are not wholly consistent with some finding lower quality in those with multiple conditions, and some higher quality (Gijsen *et al*., 2001). For people with cancer, there is evidence that people with co-morbidity are less likely to receive guideline recommended therapy, although in at least some cases this may be because the risks of aggressive therapy in people with other serious conditions may outweigh the benefits (Gijsen *et al*., 2001). Similar evidence exists for other conditions. In one study, control of blood pressure and treatment intensification to try to achieve control was worse in people with other conditions than those with hypertension alone (Turner *et al*., 2008). Although the reasons for this were unclear in this study, others have identified that care for depression may be squeezed out by the "competing demands" of physical condition care (Nutting *et al*., 2000). However, in contrast, other studies using large electronic databases to measure quality of care have fairly consistently found that quality of care is better overall for people with multiple conditions than those with only one (Higashi *et al*., 2007; Min *et al*., 2007). For example, Higashi *et al.* examined receipt of high-quality measured by multiple measures in three different populations. People with more conditions consistently received a higher percentage of recommended care. This was partly explained by their more frequent use of health services, which provides more opportunities for clinicians to optimise care (Higashi *et al*., 2007).

A difficulty is that most existing quality indicators are typically focused on individual conditions, and even those studies examining quality for multiple conditions simultaneously effectively only sum up these individual condition indicators. What this ignores is the way in which care is integrated, co-ordinated, personal or has high continuity, all of which are identified as important in qualitative studies of people with multimorbidity (Bayliss *et al.*, 2008). However, measurement of these is less straightforward than many quality indicators which can often be measured from electronic or paper medical records. Although there are no gold-standard measures, patients themselves are currently the best single source of data on how well care is integrated, co-ordinated or has high continuity. The Commonwealth Fund has carried out repeated multinational surveys of people with chronic conditions focusing on health system performance, and has published a range of findings stratified by the number of chronic conditions, and some examples are included below (Commonwelath Fund, 2011). These show that firstly, people with multiple conditions experience more problems with co-ordination (Figure 6.7) and medical error (Figure 6.8) which is likely to be at least partly mediated by the number of doctors that people see (Figure 6.9). Secondly, co-ordination problems are experienced by at least one in three people with multimorbidity in virtually every country (Figure 6.7). However, experience of co-ordination problems and errors by people with multimorbidity varies almost two-fold between countries.

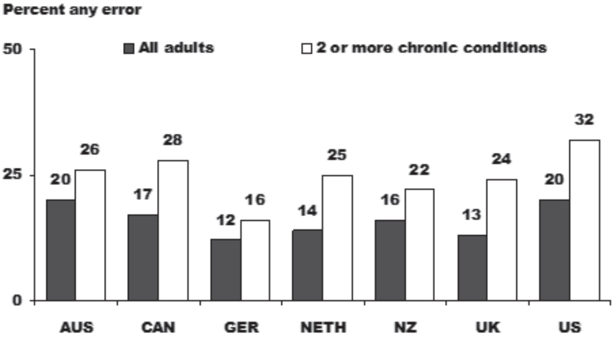
Figure 6.7. Experience of co-ordination problems by number of chronic conditions



* Test results/records not available at time of appointment, received conflicting information from different health professionals and/or ordered test that had already been done.

Source: 2010 Commonwealth Fund International Health Policy Survey in Eleven Countries.

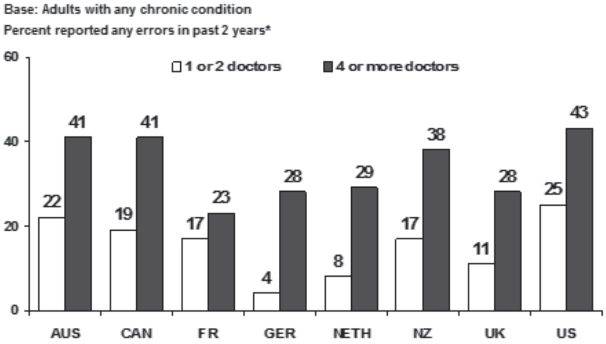
Figure 6.8. Experience of medical errors by number of conditions



Note: Errors include medical mistake, wrong dose/medication or lab test error.

Source: 2007 Commonwealth Fund International Health Policy Survey. Data collection Harris Interactive, Inc.

Figure 6.9. Experience of medical errors by number of doctors seen



* Experienced medical mistake, medication error and/or lab test error or delay.

Source: 2008 Commonwealth Fund International Health Policy Survey of Sicker Adults. Data collection Harris Interactive, Inc.

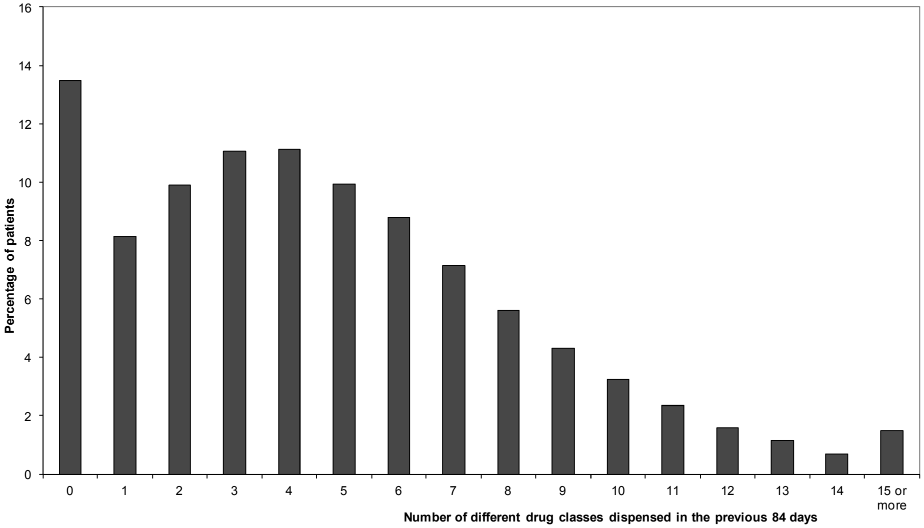
Treatment burden and poly-pharmacy

Health service professionals and guideline developers have historically paid relatively little attention to the burden that treatment imposes on people with multiple conditions, in terms of attendance at appointments (especially when these at multiple geographically dispersed institutions; Pham *et al.*, 2007), and drug and non-pharmacological treatment regimes (May *et al.*, 2010; O'Brien *et al.*, 2011). This has led to calls to make "treatment burden" more explicit in research and organisation of care (May *et al.*, 2010). May *et al.* propose that improving this requires research to establish the weight of treatment burden and create tools to assess it in clinical practice; encouragement of co-ordination in clinical practice most plausibly through strengthening primary care; acknowledging co-morbidity in clinical evidence to make guidelines more useful by providing recommendations for people with multiple conditions rather than isolated recommendations condition by condition; and prioritising decision-making from the patient perspective to ensure that their concerns are paramount (May *et al.*, 2010). Most existing research in this area focuses on poly-pharmacy or multiple medication use, rather than treatment burden in its entirety.

Poly-pharmacy has a range of definitions, from people taking five or more drugs to people taking more than ten or more (Linjakumpu *et al.*, 2002; Fincke *et al.*, 2005; Hovstadius *et al.*, 2009; Hovstadius *et al.*, 2010; Payne and Avery, 2011). Figure 6.10 shows the number of drug classes prescribed in the last four months to all older residents of one Scottish region in 2010 (in practice, this underestimates the total number of drugs since people may additionally take over the counter medications). Almost half of older people are dispensed five or more drugs and one in five are dispensed ten or more drugs, making poly-pharmacy the norm in older people in the same way that multimorbidity is.

Large-scale longitudinal studies of poly-pharmacy are uncommon because population electronic prescribing databases are relatively recent creations. However, poly-pharmacy does appear to be increasing (Hovstadius *et al.*, 2010; Aparasu *et al.*, 2005), due to a number of factors including increasing multimorbidity and the increasing number of drugs recommended for chronic use by clinical guidelines, often for prevention rather than symptom control. Examples of the latter include treatment of hypertension, drugs for osteoporosis, and drugs like statins, anti-platelets, and ACE inhibitors for primary and secondary cardiovascular disease prevention. Although each recommendation is backed by high-quality trial evidence for single diseases, very few are made with any consideration of co-morbidity (Boyd *et al.*, 2007; Boyd *et al.*, 2005). Boyd *et al.* neatly demonstrate the implications of disease-based guidelines for people with multimorbidity by considering the case of an elderly woman with chronic obstructive pulmonary disease, type 2 diabetes, osteoporosis, hypertension and osteoarthritis. Following guidelines to the letter would imply that she be prescribed 12 sometimes interacting or contradictory medications taken at six different times of day, with an additional range of non-pharmacological recommendations (Boyd *et al.*, 2005).

Figure 6.10. Number of drug classes prescribed in the last four months to all 74 707 residents aged 65 and over in the Tayside region of Scotland on 1 April 2010

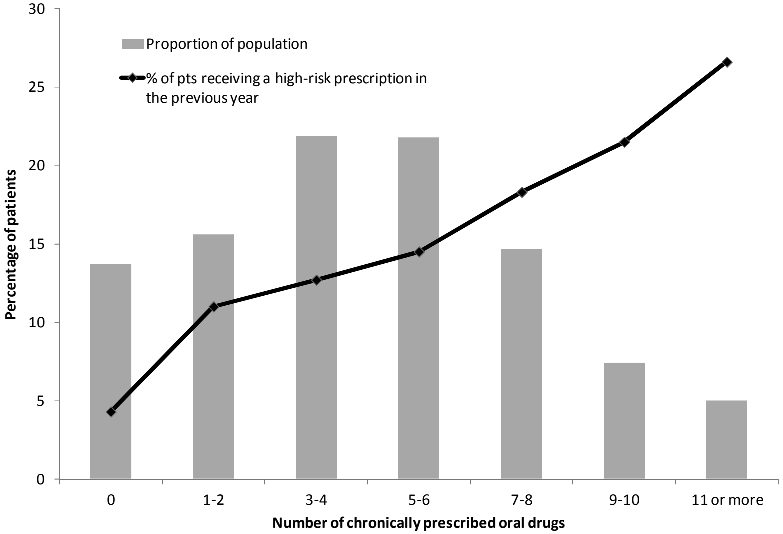


Source: Data provided by Dr Colin McCowan using the University of Dundee Health Informatics Centre dispensed prescribing database.

Each individual recommendation is entirely rational, but the whole may not be, because poly-pharmacy is a significant cause of iatrogenic harm and is strongly associated with adverse drug events and preventable admissions to hospital (Leendertse *et al.*, 2008; Hohl *et al.*, 2001). Figure 6.11 shows data from a primary care database study of high-risk prescribing in people particularly vulnerable to adverse drug events because of age, co-morbidity, or co-prescribing (the population examined is the same 1.76 million patient dataset described in Annex 6.A1). High-risk prescribing was measured using 15 indicators, and the figure shows the percentage of patients receiving one or more such prescriptions by the number of chronic medications prescribed. Just over 4% of patients who only received intermittent medication had received a high-risk prescription in the previous year, compared to over a quarter of those taking 11 or more chronic medications.

However, it is important to recognise that although poly-pharmacy carries risk, it is not always inappropriate (Aronson, 2006) since under-prescribing can cause as much or more harm as over-prescribing (Gallagher and O'Mahony, 2008; Gallagher *et al.*, 2008; Steinman *et al.*, 2006). In practice, although it is possible to measure high-risk prescribing and poly-pharmacy using routine data (Guthrie *et al.*, 2011), defining whether such prescribing is appropriate or not usually requires a more detailed consideration of an individual patient's circumstances than is possible using electronic data (Boyd *et al.*, 2005; Boyd *et al.*, 2007; Steinman *et al.*, 2010). What this highlights is the importance of making guidelines more person than condition focused, and of ensuring that decision-making takes proper account of patient concerns and priorities (May *et al.*, 2010).

Figure 6.11. Rates of high-risk prescribing in patients particularly vulnerable to adverse drug events by number of chronically prescribed drugs



Source: Guthrie *et al.* (2011).

Summary of impact and cross-cutting issues

Overall, there is good evidence that multimorbidity is associated with a range of negative outcomes including death, poorer quality of life, and worse functional status, as well as with increased health service use. Evidence for poorer quality of care processes is mixed, but there is evidence that people with multimorbidity are at greater risk of care co-ordination problems, ineffective or unsafe poly-pharmacy and of receiving unsafe care. There are two important issues cutting across different outcomes. First, the association between multimorbidity and different outcomes is variable, in the sense that morbidities and patterns of multimorbidity associated with poor quality of life may not be strongly associated with mortality or hospital admission (Perkins *et al.*, 2004). For example, osteoarthritis and skin conditions may have major impact on quality of life and are likely to have some impact on medication use and ambulatory consultation, but are unlikely to be strongly associated with either hospital use or mortality. Second, it is unclear whether multimorbidity is consistently associated with these outcomes in an additive way or a multiplicative way (*i.e.* whether worse outcomes are simply the sum of the impact of the underlying individual conditions, or if the sum is greater than the parts), although for quality of life and functional status, there is some evidence that the impact of multiple conditions is greater than the sum of the impact of the individual conditions (Kadam *et al*., 2007; Rijken *et al*., 2005). There is a need for further research to better understand these relationships. Overall, the impact of multimorbidity across a range of outcomes is considerable, and there are significant implications for health service organisation and care delivery.

Implications for the creation of clinical evidence and guidelines

Evidence of effectiveness of specific technologies and interventions is largely based on randomised clinical trials (RCTs). Most such trials typically have narrow inclusion and broad exclusion criteria because trial designers seek to maximise internal validity and to minimise trial costs by excluding people less likely to benefit from treatment. However, the selection of patients with only one condition, or the exclusion of the multimorbid, the elderly or those with poor functional status reduced external validity, which is the generalisability of the findings to real-world populations where most people have multimorbidity (Van Spall *et al*., 2007). For example, the proportion of people with chronic obstructive pulmonary disease (COPD) in a population survey eligible to be included in the main trials underlying current guidelines ranged from 0-20% (median 5%) depending on the trial criteria (Travers *et al*., 2007). Although there are significant cost implications, there is therefore a need for trials to be conducted in more representative populations (van Weel and Schellevis, 2006).

Additionally, there are implications for the translation of evidence into clinical guidelines (Boyd *et al*., 2005; van Weel *et al*., 2006; Dawes, 2010). As currently framed, guideline recommendations are usually framed in terms of single diseases and few take any account of other conditions that people may have. Where this does happen it is typically where there is overlap in recommendations (for example, cross-reference between diabetes and cardiovascular guidelines in terms of cardiovascular risk management) (Boyd *et al*., 2005). Guidelines are also typically framed in terms of recommendations to act, rather than recommendations about when to stop or to not use treatments, or how to balance competing recommendations. A consequence is that patients with multiple conditions may rapidly acquire high levels of poly-pharmacy where every individual drug is guideline recommended, but the overall drug burden is both difficult for patients to manage (May *et al.*, 2010; O'Brien *et al.*, 2010) and potentially harmful in itself (Boyd *et al.*, 2005; Steinman *et al.*, 2006; Steinman *et al.*, 2010). Developing clinical guidelines which are tailored to the particular set of conditions that an individual has will require explicit cross-referencing between guidelines at a minimum, and explicit considerations of the comparative magnitude of benefit and harm of different recommendations.

Implications for health system organisation and delivery of care

People with multimorbidity have worse quality of life, functional status and outcomes, make more use of health care (in terms of both more consultations/admissions and using more providers), experience greater problems with co-ordination and error. A key challenge they pose health care systems is therefore how to improve the continuity of their care. Continuity has three dimensions (Box 6.1) encompassing information flows between providers, agreement about how individuals and conditions should be managed (including a clinician or team taking clear responsibility for co-ordination), and the development of longitudinal personal relationships (Guthrie *et al.*, 2008; Haggerty *et al.*, 2003). Longitudinal relationships are particularly important in helping clinicians balance biotechnical rationales for care with ones that are based on an individual's biography, being sensitive to an individual's priorities and preferences as they change over time (Gunn *et al.*, 2008).

There are many possible ways in which health systems can seek to improve one or all of these dimensions of continuity, and key interventions are briefly discussed below although reviewing any of them in detail is beyond the scope of this review.

1. Strengthen primary care and generalism, and facilitate integration of generalist and specialist care.
2. Create new, more intensive services for selected patients or at particular points in the care pathway.
3. Self-management support interventions.
4. Interventions to address common combinations of particular conditions.

Box 6.1. Three main dimensions of continuity of care

Informational continuity

Formally recorded information shared between providers is the core, but is complemented by tacit knowledge of patient preferences, values, and context that is usually held in the memory of clinicians with whom the patient has an established relationship

Management continuity

Shared management plans or care protocols at a minimum to provide a sense of predictability and security in future care for both patients and providers, but also a provider or practice taking explicit responsibility for organising and co-ordinating follow-up, and mediating specialist recommendations where necessary.

Relationship or personal continuity

Built on accumulated knowledge of patient preferences and circumstances that is rarely recorded in formal records, and on interpersonal trust based on experience of past care and positive expectations of future competence and care. Informational and management continuity have a non-personal minimal core, but taking responsibility for co-ordination and integration is likely to be usually based on relationships with individual providers or sometimes practices/small teams.

Source: Adapted from Guthrie *et al*. (2008).

Strengthen primary medical care and generalism, and facilitate integration of generalist and specialist care

Responsibility for co-ordinating the care of people with multimorbidity, and managing the individual rather than their individual diseases is most likely to be taken by a generalist rather than a specialist clinician (although where one disease dominates, then single disease specialists can take this role). Generalists include primary care physicians, general internists (although these are declining in numbers in many countries), general paediatricians and geriatricians. However, as shown above using Scottish data, approximately half of people with two or more conditions are aged under 65 years, as are almost two-thirds of people with multimorbidity that includes a mental health condition. Age-defined specialists such as geriatricians and physical health specialists like general internists will therefore be potentially limited in their scope of practice for many people with multimorbidity. In at least some circumstance, “specialist” generalist care will be more appropriate than primary care generalist care, for example in the care of children or the elderly with the most complex physical needs.

The key issue is that generalists will usually be best placed to co-ordinate care when it is very complex, and although geriatricians and others will sometimes be the most appropriate generalist, primary care clinicians are likely to be best placed to deliver continuity across all three of its dimensions for people with multiple conditions, since specialists are usually reluctant to provide care or co-ordination outside their areas of technical expertise (Starfield *et al*., 2005; Gunn *et al*., 2008; WHO, 2008). There is evidence that countries with a strong primary health care system have better health outcomes (Starfield *et al*., 2005; Macinko *et al*., 2003), but primary care is often a relatively weak and underdeveloped part of health care in many countries, and even countries with existing strong primary care systems face significant challenges from aging populations and increasing multimorbidity. Primary medical care training is typically shorter than that of specialists, with training in medicine of the elderly only one component among several (if present at all), and experience of chronic disease management and ambulatory care co-ordination relatively limited at best.

From this perspective, the US definition of the patient-centred medical home is useful (Box 6.2; Crabtree *et al*., 2010; Starfield *et al*., 2004). This embeds existing definitions of primary medical care in terms of first contact, continuous and comprehensive care in the context of a longitudinal relationship (WHO, 2008). However, it also makes more explicit statements of physicians' responsibility for care co-ordination and integration, communication including the meaningful use of health information technology, the quality and safety of care, and improved access, as well as recognition of the importance of payment systems and aligning incentives for primary care practices to facilitate these.

Evaluation of demonstration projects implementing primary care medical homes in the United States has shown how large the changes needed are, and the difficulty experienced by practices in moving even part-way towards the ideal (Crabtree *et al*., 2010; Stewart *et al*., 2010; Nutting *et al*., 2010; Jaen *et al*., 2010). Primary care is typically stronger in most other developed countries, but usually in terms of existing systems better delivering the first three of the US principles. Extending primary care to encompass the additional co-ordination and quality dimensions is likely to be challenging in most countries, and may require both changes to the training of new primary care physicians and nurses (for example, to explicitly include care co-ordination or have additional medicine in the elderly experience) and changing the practice of the existing workforce.

However, it is also important to recognise that high quality health care requires an appropriate balance between primary care and specialists, and ideally close integration between them. A commonly used model used in improving continuity for people with chronic illness is the Chronic Care Model, which is also likely to be applicable to multimorbidity (Figure 6.12; Wagner *et al*., 1998; Improving Chronic Illness Care, 2011).

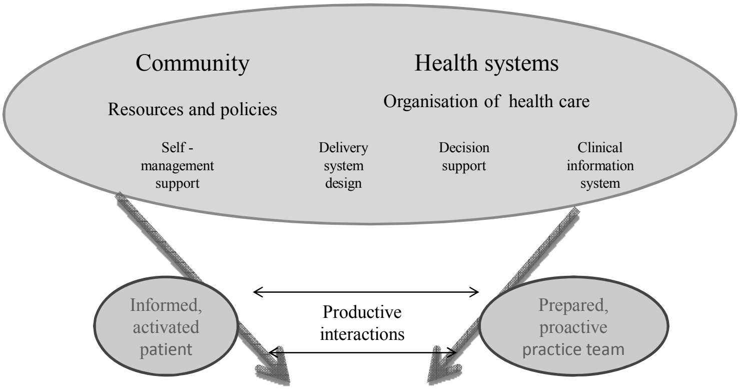
Box 6.2. Summary of the Joint Statement of Four Physician Organisations[1] on Principles of the Patient-Centered Medical Home

1. **Personal physician:** Each patient has an ongoing relationship with a personal physician trained to provide first contact and continuous and comprehensive care.
2. **Physician-directed medical practice:** The personal physician leads a team of individuals at the practice level who collectively take responsibility for the ongoing care of patients.
3. **Whole-person orientation:** The personal physician is responsible for providing for the entire patient's health care needs and taking responsibility for appropriately arranging care with other qualified professionals.
4. **Co-ordination and/or integration of care:** Care is co-ordinated and/or integrated across all elements of the complex health care system (*e.g,* subspecialty care, hospitals, home health agencies, nursing homes) and the patient's community (*e.g*, family, public, and private community-based services). Care is facilitated by registries, information technology, health information exchange, and other means.
5. **Quality and safety:** Quality and safety are hallmarks of a medical home, achieved by incorporating a care-planning process, evidence-based medicine, accountability, performance measurement, mutual participation, and decision making.
6. **Enhanced access:** Enhanced access to care is available through systems such as open scheduling, expanded hours, and new options for communication between patients, their personal physician, and practice staff.
7. **Payment:** Payment appropriately recognises the added value provided to patients who have a patient-centered medical home beyond the traditional fee-for-service encounter.

1. American Academy of Family Physicians, American Academy of Pediatrics, American College of Physicians, American Osteopathic Association. Adapted from American Academy of Family Physicians (AAFP), American Academy of Pediatrics (AAP), American College of Physicians (ACP), American Osteopathic Association (AOA), Joint principles of the patient-centered medical home, February 2007, *www.aafp.org/pcmh/principles.pdf.*

Source: Crabtree *et al*. (2010).

Figure 6.12. The chronic care model



Source: Adapted from the The MacColl Institute 1996-2011. The Improving Chronic Illness Care program is supported by The Robert Wood Johnson Foundation, with direction and technical assistance provided by Group Health's MacColl Institute for Healthcare Innovation.

The Chronic Care Model highlights the importance of both the community and health systems, with a number of elements including self management support and encouraging patients to be informed and active, and changes to the organisation of health care through delivery system redesign, decision support and clinical information systems to create integrated professional teams. It is beyond the scope of this chapter to consider all of these in detail, but self management support and delivery system redesign for common co-morbidities are discussed in more detail below.

Create more intensive services for selected patients or at particular points in the care pathway

The needs of people with chronic illness and multimorbidity vary over time. As an example, an older person with multiple conditions admitted to hospital with a hip fracture will have short to medium term needs for increased levels of personal, nursing and medical care after discharge. Failure to meet these needs is likely to be associated with higher rates of hospital readmission, admission to nursing home care, and mortality. There is a considerable body of evidence of specific interventions to support care transitions (usually in the frail elderly at hospital discharge) or to provide intensive case management of people identified as at particular risk of emergency hospital admission (usually in older people with multiple conditions). These interventions typically involve a nurse, social worker or allied health professional providing care co-ordination and sometimes preventive care or treatment (Beswick *et al*., 2008; Hutt *et al*., 2004; Roland *et al*., 2005; Gravelle *et al*., 2007).

In England, (weak) evidence of a beneficial impact of nurse-led case management in elderly people at high risk of hospital admission (Kane *et al*., 2001; Kane *et al*., 2003) led to nationwide implementation of "community matrons" to deliver this service, but evaluation did not show any evidence of a beneficial impact (Gravelle *et al*., 2007; Boaden *et al*., 2005). More broadly, Beswick *et al.* systematically reviewed 89 trials of community-based complex interventions to support older people in living at home (Beswick *et al*., 2008). The trials included examined a number of interventions including nurse-led case co-ordination in older people being discharged from hospital, falls prevention programmes, and geriatric assessment of older people living at home. The meta-analysis found that compared to controls, people in the intervention groups had a significantly lower relative risk of "not living at home" of 0.95 (95% CI 0.93-0.97; driven by a reduction in nursing home admission), and of hospital admission of 0.94 (95% CI 0.91-0.97). There was no evidence that more intensive interventions were more effective than less intensive ones. Interestingly, trials done since 1993 had consistently smaller effect sizes, which the authors believed was because of improvements in care co-ordination in "usual care" resulting from publication of earlier trials. The authors concluded that interventions to improve assessment and care co-ordination of elderly people were effective and were likely to have the largest effects in systems which currently performed poorly in terms of care co-ordination. However, their addition to health care systems which had already incorporated elements of these into routine practice might not be worthwhile (Beswick *et al*., 2008).

Self-management support

No matter how health systems are organised the problems associated with multimorbidity are mainly dealt with by people in their own homes in the context of their everyday lives. As Bodenheimer *et al.* (2002) point out, "*the question is not whether people with chronic conditions manage their illness, but how they manage*" (p. 2470).

Definitions of self-management include reference to a person's ability to manage symptoms, treatments, physical and psychosocial consequences and lifestyle changes necessary to live with a chronic condition (Bayliss *et al.*, 2003; Lorig and Holman, 2003). They suggest good self-management is when people: have an understanding of their conditions and treatment; are able to manage their medication; self-monitor their symptoms and other indictors of disease; recognise and manage the impact of illness on their physical function, their emotions and how they manage their social roles (thus balancing their "lines of work"); are able to reduce other risks to their health; and are able to interact and work with health professionals collaboratively (Battersby *et al.*, 2010).

The extent to which people are successful "self-managers" depends on the resources and skills they have available to them. The basic tenant of self-management support is that:

- Good self-management skills can be learned;
- People can learn to recognise and draw together the resources they have or available to them;
- Support concerns itself more broadly than "illness work", the medical aspects of the illness, to deal with the broader impact of the illness on daily life and on life roles; it is problem-based (Lorig and Holman, 2003); and
- Support extends beyond behaviour change to encompass the emotional and social adjustments people have to make (Newman *et al.*, 2009).

An important question is how self-management skills are learned. Some will not need to learn them, already having enough personal and social resources and a high level of health literacy to manage the problems that multiple illnesses bring. For others self-management support that elicits or teaches practical skills to manage everyday problems (such as self-monitoring or other skills, changing behaviours through goal setting, implementation intentions, "if-then" plans, and enhancing self-confidence to change, and problem solving; Mulligan *et al.*, 2009) is more effective than traditional, didactic education alone (that is, although patients' workable understanding of illnesses and their treatment may be necessary it is not sufficient for good self-management; Coulter *et al.*, 2006).

Self-management support can be provided in a different settings (for example clinic or community), in a different forms (for example group-based, one-to-one, internet-based) and by different people (for example trained or untrained facilitators or by clinicians). Group-based self-management support such as the Chronic Disease Self Management Programme (Lorig *et al.*, 2006) and Expert Patient Programme (Health Do. Expert Patient Programme, 2011), is based on a formal curriculum, led by trained lay, volunteer, leaders. The curriculum is designed to teach skills in problem solving, decision-making, finding and using resources, and developing relationships with health professionals. It is thought to operate by changing expectations of outcomes (outcome expectancies) and through raising confidence (self-efficacy) that improvements and change in what one does is possible. A review of 17 trials conducted in 2007 showed that participation in the programmes result in small improvements in people's confidence to manage their condition (SMD 0.30, 95% CI 0.41-0.19), in self-rated health (WMD -0.20, 95% CI -0.31 – -0.10) and in how often people took aerobic exercise (SMD -0.20, 95% CI -0.27 – -0.12). There were also small improvements in pain, disability, fatigue and depression but the programmes did not improve quality of life or resource use (Foster *et al*., 2007).

Other approaches to group-based support include the organisation of social support through professionally created peer group interaction (whether face to face or on-line). For example, many medical charities run both face to face and on-line support groups which can offer information, emotional support and help with appraising situations based on members' own experience. A qualitative study suggests that peer support in MND is valued for the practical benefits and information it can provide, and for the camaraderie or emotional support given. Seeing others managing well can provide hope but seeing others managing less well can lead to sadness and to isolation from the group as a defensive measure (Locock and Brown, 2010). Evidence of the effectiveness of professionally facilitated peer support programmes on health or other outcomes is not well summarised.

The problems with self-care that many people with multimorbidity experience (Bayliss *et al*., 2003), the low reach of self-management or peer support programmes (Kennedy *et al*., 2005), and the importance of relationship or personal continuity of care for people with multimorbidity means that primary care based self-management support is likely to be needed. Battersby *et al.* propose 12 "evidence-based principles for self-management support in primary care" developed through a nominal group process to identify primary care based practices and processes and then a targeted literature search on each (Battersby *et al*., 2010). The authors recognise that integrating self-management support into routine clinical practice is difficult and that evidence of its cost-effectiveness is currently lacking and that for this type of intervention measuring effectiveness over short periods of follow-up is difficult. Although promising approaches are being attempted and evaluated (Watt et al., 2008), self management support is currently a highly plausible approach to managing multimorbidity, but as yet with only limited evidence for cost-effectiveness.

Interventions to address common combinations of particular conditions

Depression and physical illness commonly co-occur (Figure 6.4 above) and it appears that the number of conditions and the subsequent functional impairment drive the relationship rather than a particular physical condition or single biological pathway (although research continues to explore potential common causal pathways) (Moussavi *et al*., 2007, Stegmann *et al*., 2010). There is a clear dose-response relationship between the number of chronic physical health problems (multimorbidity) and depressive symptoms, which is likely to be mediated via perceived health related quality of life and functional impairment (Gunn *et al*., 2010). The links between depression and physical illness are likely to be bi-directional (Stegmann *et al*., 2010; Ormel *et al*., 2002). Lifestyle factors, treatment compliance and help seeking behaviour all influence the relationship (Prince *et al*., 2007), and there is strong evidence of the negative effect of deprivation (Mercer and Watt, 2007).

The high prevalence of co-morbid depression and diabetes/coronary heart disease (CHD), and the clear negative impact on outcomes of people with both, makes this co-morbidity cluster an attractive one to target for intervention. In response, studies are emerging that test the impact of treating depression on co-existing diabetes or coronary heart disease (CHD), and more recently of co-ordinated care management of people with depression and diabetes and/or CHD (Katon *et al*., 2010; Kinder *et al*., 2006). Kinder *et al.* found that depression care management of people with co-morbid depression and complicated diabetes was better than usual primary care, but did not improve diabetes control (Kinder *et al*., 2006). In contrast, a case management intervention focusing on depression, diabetes and CHD improved depression and diabetes/CHD outcomes, and patient satisfaction with care (Katon *et al*., 2010).

Mostly, depression interventions for either depression alone or in the context of other comorbidities seek to implement care based on the chronic care model (Wagner *et al*., 1996). This usually includes a model of care that requires a system wide approach to include (Gunn *et al*., 2006):

1. A multi-professional approach to patient care. Usually a general practitioner (GP) or family physician and at least one other health professional (*e.g.* nurse, psychologist, psychiatrist, pharmacist) are involved with patient care.
2. A structured management plan. In line with introducing an organised approach to patient care interventions should offer practitioners access to evidence based management information. This can be in

the form of guidelines or protocols. Interventions usually include both pharmacological (*e.g.* antidepressant medication) and non-pharmacological interventions (*e.g.* patient screening, patient and provider education, counselling, cognitive behaviour therapy).

3. Scheduled patient follow-ups. Usually one or more scheduled telephone or in-person follow-up appointments to provide specific interventions, facilitate treatment adherence, or monitor symptoms or adverse effects.
4. Enhanced inter-professional communication. Interventions should include mechanisms to facilitate communication between professionals caring for the depressed person. This includes team meetings, case-conferences, individual consultation/supervision, shared medical records and patient-specific written or verbal feedback between care givers.

Interventions based on the chronic care model have been taken up and tested in many countries (Richards *et al.*, 2008) throughout the world with the expectation that they will be cost-effective. Yet a recent systematic review shows that the evidence for this claim is still inconclusive and calls for a more thorough assessment of the costs and benefits of such approaches (de Bruin *et al.*, 2011). The common co-occurrence of depression with multiple chronic physical conditions sets an enormous challenge for health care systems worldwide which have tended to separate physical and mental health care and even when they have attempted to integrate care have focussed on co-morbidity (a single condition such as diabetes or heart disease with depression) rather than the more commonly occurring multimorbidity. Tackling the problems of multimorbidity requires an integrated approach between physical health care and mental health care.

Measuring health service performance for people with multimorbidity

Developing specifications for measures is beyond the scope of this review, so this section focuses on general rather than technical considerations, and on identifying the range of measures rather than recommending particular measures. There are two key requirements to measure health service performance for people with multimorbidity: first to define a population to examine, and a method of measuring multimorbidity; and second to measure relevant aspects of health service performance in that population.

Measuring multimorbidity

As described above, there are multiple existing methods for measuring multimorbidity, and no agreement as to which is best. Relevant choices to be made when deciding how to measure multimorbidity include:

- Which population to measure multimorbidity in (population sample, restricted by age or by particular patterns of service use such as those admitted to hospital).
- Whether to measure using patient self-report, electronic health records, or administrative data. Unless there are population-wide electronic health records available, then population samples are likely to require self-report measures.
- Which conditions to include in a multimorbidity measure. Existing measures vary in the rationale for including conditions in any count, and the number of conditions included. Diederichs *et al.*'s systematic review of 39 measures found that high prevalence of disease was the most common reason for including them, with other less common justifications being a condition's impact on mortality, function or health status. The 39 measures examined varied greatly in the number of conditions included in the measure (from 4 to 102 conditions, mean 18.5) (Diederichs, 2010).
- Whether to use an unweighted count of conditions, or to use a measure weighted in relation to severity or some outcome(s) of interest. The majority of measures examined in the most recent systematic review were unweighted counts (similar to those presented in this chapter for Scottish data), but a range of weighting methods were identified. Most commonly, conditions in measures were weighted according to their association with an outcome of interest, such as mortality, hospital admission, or health care resource use. Less commonly, conditions were weighted by severity measured by patient self-report (for measures where patients both report the presence of selected conditions and their severity) or based on pre-specified criteria such as prescription drug use.

There is no multimorbidity measure that is clearly best for all purposes. Rather, the choice should reflect the purpose to which the measure is to be put, and its feasibility. For prevalence studies, then population sampling and reasonably comprehensive inclusion criteria for conditions to be included are appropriate. For measures to be used to admission rates for people with different levels of multimorbidity across countries, then a weighted measure using administrative data is likely to be more appropriate.

Relevant measures of health service performance

There are a number of measures of health service performance that are particularly relevant to people with multimorbidity. These include:

- Patient experience of discontinuity and its consequences such as care co-ordination problems, duplication of care and health service error. Although structural measures of health service integration are theoretically feasible, patient survey is likely to be the best way to measure this (Commonwealth Fund, 2011).
- Individual-level measures of the quality and safety of health care for people with multimorbidity. A number of different types of measure are possible. These include primary care health care process and intermediate outcome measures such as those included in the UK Quality and Outcomes Framework and similar programmes internationally (NHS England, 2009; National Committee for Quality Assurance, 2010), and hospital-related measures such as the occurrence of health care associated infections and other adverse events (Drosler, 2008). Primary care measures typically require access to data from electronic health records, although some can be feasibly implemented in patient surveys (Steel *et al*., 2004, Steel *et al*., 2008). In contrast, hospital measures can be feasibly implemented using administrative data, although data quality varies across countries (Drosler, 2008).
- Potentially preventable hospital admissions and other patterns of service use which are believed to generally undesirable such as the development of preventable complications of care (Wolff *et al*., 2002), repeated emergency or "revolving door" admissions, nursing home admission or other institutionalisation (Beswick *et al*., 2008).
- Mortality, either at all ages or focused on younger people using a potential years of life lost (PYLL) approach (Nolte and McKee, 2004).

In practice, choice of performance measure is likely to balance policy and health system importance and the feasibility of implementation. Choice of multimorbidity measure is likely to be primarily driven by the dataset being used to measure performance. For example, examining potentially preventable hospital admission rates in people with multimorbidity requires measuring both admission and multimorbidity at patient level in the same administrative hospital admissions datasets.

Conclusions

Multimorbidity is so common as to be the norm for the majority of people with chronic conditions. It is strongly associated with a range of adverse outcomes including mortality, reduced functional status and quality of life, increased health services use, and patterns of care which are undesirable including problems with care co-ordination and error, and potentially preventable emergency admissions. Improving primary care and strengthening its care co-ordination role, and better integration between primary and specialist care would both be expected to improve the quality of care for people with multimorbidity, and there is some evidence for the effectiveness of other interventions in particular groups. Although there is no consensus on how best to measure multimorbidity, measurement is feasible in datasets which can also support health system performance measurement. Although there are considerable technical issues that need to be resolved, measuring the quality of care for people with multimorbidity is feasible and would focus attention on health system performance for people with the highest levels of need.

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Annex 6.A1

Description of the Scottish dataset used for descriptive epidemiology

The dataset was provided by the Primary Care Clinical Informatics Unit (PCCIU) at University of Aberdeen, who extract complete anonymised copies of the clinical IT systems of Scottish general practices taking part in the Scottish Programme to Improve Clinical Effectiveness – Primary Care (SPICE-PC). Practices consented to the use of anonymised data for research, and PCCIU operating procedures have been reviewed by the NHS Research Ethics Service who do not require review of individual projects providing that only anonymised data is used. The data used here was extracted in Spring 2007 when 309 practices with 1 751 841 registered patients contributed (approximately one-third of Scottish practices and of the Scottish population). The patients included are representative of the wider population in terms of age, sex and socioeconomic deprivation, although the practices themselves are more likely to be involved in the training of doctors and to have taken part in voluntary quality assurance and improvement programmes (Elder *et al.*, 2007). For each patient, the presence or absence of 40 chronic conditions was measured using Read Code morbidity data with prescribing data where appropriate (for example, since it often remits, asthma was defined as the presence of an asthma Read Code and asthma treatment in the preceding year). Definitions were based on UK Quality and Outcome Framework Business Rules where available, and Read Code groups created by the Information Services Division (ISD) of NHS Scotland where not (NHS England, 2009; ISD Scotland).

A subset of 40 practices with 226 593 registered patients consented to have their data linked to the acute hospital admission dataset (SMR01) held by ISD, and this data was used to examine admission rates for potentially preventable conditions and all other emergency admissions. Potentially preventable admissions were defined using a standard NHS Scotland list of ICD10 codes, and included (among others) specified admissions with heart failure, COPD, asthma, angina, diabetes complications, hypertension, cellulitis, epilepsy.

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