Chapter 1

The latest disease burden challenge: People with multiple chronic conditions

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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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