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OCCASIONAL
PAPER

Health and Well-Being in the Home

A Global Analysis of Needs, Expectations, and Priorities for Home Health Care Technology

Soeren Mattke, Lisa Klautzer, Tewodaj Mengistu, Jeffrey Garnett, Jianhui Hu, Helen Wu

Sponsored by Royal Philips Electronics

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Preface

Societies attach great value to providing their aging and disabled populations with adequate care and peace of mind, but changing demographics, economic development, and growing rates of disease and disability have increased the burden on health and social security systems and have endangered the viability of current arrangements.

This paper presents the results of a global study of the perspectives of key stakeholders in terms of needs, expectations, and priorities in home health care. It explores the potential role of advanced home health care technologies in ensuring independent aging and the sustainability of related health care systems.

There is a paradox in the market for home health care technology. Experts agree, in principle, that the current model of care delivery is ill equipped to deal with future challenges, particularly the rapidly increasing demand for care due to an aging population and improved survivability of many diseases. They also see the potential value of home health care technologies to relieve pressure on health care systems because of their ability to substitute for expensive and scarce professional labor and to promote a shift in care from high-cost institutions to patients' homes. These changes not only would decrease cost and improve the sustainability of health care systems but would also be consistent with patient preferences for more active aging, which includes greater independence and involvement in care decisions and delivery.

Despite its potential, the use of home health care technologies, especially the more advanced solutions, remains limited, as are initiatives to change the status quo. Removing obstacles to adoption will require concerted efforts from various stakeholders. This paper outlines the areas in which different stakeholders can take action to improve uptake levels for home health care products and services.

This work was sponsored by Royal Philips Electronics and conducted in RAND Health, a division of the RAND Corporation. Comments are welcome and may be directed to Soeren Mattke (Soeren_Mattke@rand.org). A profile of RAND Health, abstracts of its publications, and ordering information can be found at www.rand.org/health.

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Summary

Background

An increasing number of countries are experiencing the so-called "epidemiological transition": Chronic diseases with the need for long-term treatment have begun to replace infections as the primary cause of death in these aging societies. This shift is not confined to the developed world. While noncommunicable diseases accounted for 44 percent of the burden of disease in low- and middle-income countries in 2002, it has been estimated that, by 2030, this share will reach 54 percent (Lopez et al., 2006). As a result, there is growing concern about the sustainability of the current system of health care delivery, which is compounded by rapidly rising costs and workforce shortages. This concern has triggered an interest in approaches to mitigate the impact of chronic disease and disability on population health, economic productivity, and health care spending.

Several medical and technological innovations have theoretically framed this challenge as an opportunity and have caused the health care sector to rethink current paradigms of health care delivery. For example, promoting tools for aging in place and for transforming the current provider-driven model into a patient-centric system not only would objectively improve health status but would also enable patients with chronic conditions to live an active and fulfilling life as an integrated segment of society.

Advances in home health care products and services are attractive, promising, and, perhaps, even necessary solutions to mitigate the current pressure on the health care system while improving the patients' well-being beyond the physiological parameters of disease control. These innovations allow the shifting of care from institutional and professional settings to patients' homes and enable patients to self-manage their conditions, assisted by formal or informal caregivers as needed.

Home health care and self-management devices and services span a broad spectrum. Depending on the interpretation of the terminology, they can include everything from mobility support tools to basic diagnostic and therapeutic tools, such as glucose meters, to telemedicine solutions and care delivered by home health care professionals. For our purposes here, we focus on home health care technologies and solutions and do not address durable medical equipment (e.g., walkers), supplies (e.g., wound care products), or professional services, such as in-person home care.

Technological advances have pushed the frontier of care management into the home setting, and today's tools go well beyond mere monitoring and narrow functionalities; they allow the integration of monitoring and therapeutic systems, provide educational content, and enable communication and data flow between the patient and professional health care providers. Such

solutions have the potential to not only support current care delivery but also fundamentally change the model to a more efficient and patient-centered one. They also make it easier for patients to age in place, if they prefer, and avoid institutionalization.

To better understand the current and future roles of home health care technologies, we conducted a global study of the needs, priorities, and expectations of key stakeholders regarding home health care in six countries (China, France, Germany, Singapore, the United Kingdom, and the United States). The sample was selected to include a variety of health care systems, geographic areas, cultural traditions, and economic development. We conducted interviews with a broad range of stakeholders (government officials, researchers, regulators, providers, insurers, manufacturers, distributers, and patient organizations), an analysis of existing data, and a literature review to develop country case studies as well as an integrated global view. This paper summarizes the results of that research.

The Case for the Use of Home Health Care Technology

The increase in the elderly population, together with improved survivability of many diseases, is projected to result in significantly higher numbers of people living with chronic conditions. This trend started in the developed world but is increasingly affecting developing and transitional economies. Singapore, for example, has become the world's most rapidly aging country, and 80 percent of all deaths in China are now caused by chronic diseases.

These changes in demographics and disease patterns are expected to further accelerate the growth of health care spending. In the United States, for example, the elderly (age 65 years or older) account for only 12 percent of the total population yet incur 34 percent of total health care spending (CMS, 2004). Since health care spending is already growing faster than gross domestic product (GDP) in most countries, there is growing concern about the financial sustainability of current care delivery systems.

Home health care technology is seen as an attractive solution because it empowers patients to self-manage their conditions to a greater extent and helps shift care from high-cost institutional and professional settings to patients' homes and communities. This shift could not only reduce cost but also alleviate pressure on health care systems that are already suffering from workforce shortages and capacity constraints.

In addition, shifting parts of in-person care to home health care solutions would be consistent with fundamental cultural changes with respect to aging and care provision. Informal care by family members, particularly women, has traditionally been the main source of long-term care. However, demographic and economic trends are eroding this traditional arrangement. Smaller families, increased labor-market participation among women, and higher mobility have left fewer intergenerational families with the ability to provide care informally (Timonen, 2009). This shift started in Western countries after World War II and is now affecting Asian countries, such as China and Singapore, despite strong cultural norms that children are expected to take care of their parents in their old age (Gu, Dupre, and Liu, 2007). In the United States, the proportion of elderly persons receiving only informal care decreased concurrently with an increase in formal or institutional care between 1984 and 1994 (Spillman and Pezzin, 2000). In parallel to this transition, the attitudes of the elderly have also changed in that many prefer to live active and independent lives in their homes and communities, potentially supported by tools and technologies, for as long as possible.

Obstacles to the Adoption of Home Health Care Technology

Policymakers

Policymakers and the experts who advise them have expressed strong interest in home health care technologies, especially advanced solutions with the potential to fundamentally change care delivery. Several initiatives have been launched to study those technologies. The main driver for this interest is the hope that these technological applications can become partial substitutes for increasingly scarce professional labor or can support professional care delivery while reducing cost.

Patients

Despite interest at the policy level, uptake of home health care technology, especially the more advanced solutions (such as telemedicine), remains limited in the countries assessed in our study. A key obstacle is that patients, particularly the current generation of elderly and care-dependent persons, have strong reservations about the greater use of home health care technologies. Our analysis showed that patients and their informal caregivers lacked the familiarity with technology, health literacy, and self-efficacy to effectively use home health care solutions for self-management. They also were not fully aware of the range of products and their benefits. Affordability was also seen as an issue, as home health care products are often not covered by insurance, and the discretionary income of the elderly and disabled remains limited. Further, patients have access to affordable or subsidized domestic helpers in many countries, making the relative cost of home health care products high. Finally, cultural factors can drive patient reluctance to adopt home health care devices, including fear of stigmatization, concerns about increasing isolation and loss of human contact, and data privacy concerns.

Providers

Patient reluctance is compounded by limited support among providers, driven by limited evidence of the clinical effectiveness of these new technologies. Because most home health care devices can be approved based on manufacturers' data and without clinical trials, many providers remain skeptical about whether the attractive functionalities of such technologies actually translate into better management of diseases and disability—and into better outcomes for patients. Providers are also concerned about the lack of integration of home health care technologies into the current system of care delivery, as well as the potential threat to their business model if office visits are replaced by remote interactions.

Insurers and Payers

Our study showed that home health care products are less comprehensively covered than other medical care and even medical technologies used by providers. In Singapore and China, products for home health care are generally not covered by insurance. In Western countries, many first-generation devices, such as glucose meters and continuous positive airway pressure (CPAP) machines, are usually covered by health insurance, but advanced technologies, like remote monitoring or telemedicine solutions, are generally not. Backdoors to coverage are pilot and demonstration projects and care management programs, whose operators contract with insurers to coordinate care for complex patients with the goal of improving care and reducing costly exacerbations, which sometimes provide such technologies to patients.

This theme of limited coverage is partly the result of the history of insurance provision. Countries typically started providing insurance for medical care delivered by professionals and are now only gradually expanding coverage for self-care. But there are two fundamental obstacles that inhibit coverage decisions for home health care technologies.

The first is incongruence with established payment systems, which were set up based on the historic priority of providing care for acute illness. Thus, coverage of care is typically linked to encounters (e.g., office visits, hospital admissions) or products (e.g., drugs, durable medical equipment). Payment systems have not evolved to better reflect the needs of patients with chronic conditions that require ongoing management rather than episodic treatment. Thus, there is often no suitable mechanism to pay for solutions that are ongoing services, such as telemedicine, which requires providers' attention to data submitted from patients' homes outside of a direct encounter. Another issue is that payment systems and budgets are commonly established according to care sector, and funds are not fungible across sectors. This can create a distortion of incentives for innovations that bridge different sectors, because cost may accrue to one sector while benefits accrue to another. An often-discussed example is electronic health records. Although electronic health records can make the provision of care safer and more efficient, providers are reluctant to adopt them because they would incur the investment and training cost while insurers would reap the financial benefits.

A second fundamental obstacle to coverage of home health care technology is the limited evidence for its impact on patient outcomes and health care cost. While many small pilot projects have shown health benefits, particularly for first-generation devices and connected solutions to manage heart failure (see, e.g., McManus et al., 2010), the wider impact on the health care system has not been sufficiently assessed.

Regulators

In general, market approval for home health care products is straightforward. Devices are mostly classified as low-risk, and regulatory approval only requires manufacturing data and functionality testing but not clinical trials. But regulatory obstacles can arise for newer generations of home health care products because these devices can fall under the jurisdiction of several regulators, such as medical device and telecommunication regulators (in the case of connected devices). Other issues include whether some home health care services would have to be regulated as the provision of medical services with substantial implications for liability and restrictions on who may provide such services. Finally, restrictions on the distribution channels for home health care devices are seen as creating a barrier to market entry and increasing costs to consumers.

Options to Remove Obstacles to Adoption

Our analysis shows that removing these obstacles to the adoption of home health care tools is not a trivial task; it will require concerted efforts from many stakeholders. We argue that both the policy environment and the products themselves must be designed to yield the highest benefit from both the individual and societal perspectives, carefully considering the existing health care system and the vision for its future development.

Policymakers

Policymakers, such as health ministry officials, will play an important part, as they will have to shape a vision for the appropriate role of home health care in their jurisdictions and drive the agenda to implement that vision. Key components of that agenda will be the alignment of payment systems and incentives with policy goals, clarification of the regulatory framework for home health care technology, and efforts to promote patient receptiveness to new models of care delivery. We have seen signs that home health care is on policymakers' radar in many countries and that there are efforts that can be used as a foundation for constructive debates with the wider stakeholder community. But given the mounting pressure on the health care system, the visibility and intensity of these efforts will have to be increased.

Industry

Home health care technology companies can support these efforts in two important ways. First and foremost, tools must be developed in accordance with patient needs, i.e., they must have an intuitive and simple design and be affordable. To meet patient needs, companies will also have to think about their offerings as solutions rather than merely products. This means that these companies must provide ongoing support for patients and their informal caregivers and integrate their services and data with those of other professional care providers. Second, companies will have to demonstrate to stakeholders the value of their products in a convincing fashion. Regulatory approval and attractive design will be a necessary first step, but companies will have to develop robust evidence for the clinical effectiveness and cost-effectiveness of their products compared to treatment alternatives in an effort to convince providers and payers. A good example of such an assessment is the ongoing Whole Systems Demonstrator (WSD) trial in the United Kingdom, currently the largest randomized control trial of telehealth and telecare in the world (UK Department of Health, 2009).[1]

Providers

Because patients rely heavily on their providers for medical advice, providers' knowledge about the range of existing products and the benefits of their use is essential. But providers also need to shift from being paternalistic caregivers to being partners of patients in the care process.

Conclusions

Against a background of concerns about the sustainability of current systems to deliver health care, driven by rapidly increasing costs and workforce shortages, we find evidence that home health care devices can be a potential solution. Stakeholders agree that these tools could give patients a greater ability to self-manage their conditions in partnership with their providers and could help them improve their health status and overall well-being. Shifting more responsibility to patients could also reduce cost and free up capacity in delivery systems.

However, while such devices have theoretical appeal, they challenge and disrupt current paradigms and structures. Increasing uptake will require major changes that can be achieved

[1] The WSD is a two-year project funded by the UK Department of Health that aims to determine how technology—particularly telehealth and telecare—can help people manage their diseases. For more information about the project, see UK Department of Health (2009).

only through the concerted efforts of a broad set of stakeholders. Indeed, stakeholders have to take an integrated view and work together to achieve a new paradigm that is focused on providing patient-centric care. Under this paradigm, incentive structures will allow health care providers to allocate time to educate and guide patients in the correct usage of home health care devices.

Our analysis shows that stakeholders from a heterogeneous sample of countries have similar hopes and concerns with regard to the adoption of home health care technologies. There is broad-based agreement that fundamental changes are necessary to reap the potential benefits of these devices. However, stakeholders also pointed out that it is important to take into account cross-country differences in health care delivery, as well as cultural and socioeconomic contexts, when designing a roadmap for implementing home health care solutions. Indeed, differences in health care provision (e.g., insurance arrangements, patients' level of health literacy and empowerment, patients' willingness to pay) will have important implications for the types of devices that may prove most useful, from which patients will benefit the most, and the type of supportive tools (guidelines, training) that should be provided to ensure optimal health outcomes and the largest efficiency gains.

Acknowledgments

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Abbreviations

AED	automatic external defibrillator
CNSA	Caisse Nationale de Solidarité pour l'Autonomie [National Solidarity Fund for Autonomy]
CPAP	continuous positive airway pressure
FCC	U.S. Federal Communications Commission
FDA	U.S. Food and Drug Administration
GDP	gross domestic product
NICE	National Institute for Health and Clinical Excellence
WSD	Whole Systems Demonstrator

CHAPTER ONE

Introduction

An increasing number of countries are experiencing the so-called "epidemiological transition," a term coined by Omran (1971) to describe the long-term shift in mortality and disease patterns. Characteristics of this shift include declining fertility rates and increased life expectancy, which, in combination, lead to an aging society. These trends are accompanied by the "gradual displacement" of "pandemics of infection . . . by degenerative and man-made diseases as the chief form of morbidity and primary cause of death" (Omran, 1971). While not too long ago this shift had been confined to the Western Hemisphere, developing economies undergo similar changes. For example, while noncommunicable diseases accounted for 44 percent of the burden of disease in low- and middle-income countries in 2002, it has been estimated that, by 2030, this share would reach 54 percent (Lopez et al., 2006). As a result, there is a growing interest in approaches to mitigate the impact on population health, economic productivity, and health care budgets. In fact, several medical and technological innovations theoretically frame this challenge as an opportunity and have caused those in the health care sector to rethink current paradigms of health care delivery. For example, promoting tools for active aging and for transforming the provider-driven model into a patient-centric system not only would objectively improve health status but would also enable patients with chronic conditions to live an active and fulfilling life as an integrated part of society.

Advances in home health care products and services are attractive, promising, and, perhaps, even necessary to mitigate the current pressure on the health care system while improving the patients' well-being beyond just their health status. These innovations allow the shifting of care from institutional and professional settings to patients' homes and enable patients to self-manage their conditions, assisted by formal or informal caregivers as needed.

Home heath care and self-management devices and services span a broad spectrum. Depending on the interpretation of the terminology, they can include everything from mobility support tools to basic diagnostic and therapeutic tools, such as glucose meters, to telemedicine solutions and care delivered by home health care professionals. For our purposes here, we focus on home health care technologies and solutions and do not address durable medical equipment (e.g., walkers), supplies (e.g., wound care products), or professional services, such as in-person home care.

Technological advances have pushed the frontier of care management into the home setting, and today's tools go well beyond mere monitoring and narrow functionalities; they allow the integration of monitoring and therapeutic systems, provide educational content, and enable communication and data flow between the patient and the professional health care provider.

In light of these current trends, such solutions have the potential to not only support current health and long-term care delivery but also fundamentally change the model to a more efficient, patient-centered one.

The home health care and self-management technologies addressed in our study can be categorized into three general groups:

- *First generation:* Nonconnected, typically single-purpose devices, such as glucose meters, sleep support devices, automatic external defibrillators (AEDs), and ventilators. These devices are intended for a narrow application and are designed to optimize a particular straightforward use, such as limited therapeutic or self-management functions. These devices do not require any data exchange and are more stand-alone products than integrated services. The market for these devices is very mature, and they have reached wide uptake and acceptance. The costs are largely covered by health care insurance, and in countries where they are not, such as China, there is a significant willingness to pay for the devices out of pocket (particularly in more affluent, educated urban areas).
- *Second generation:* Connected devices without interactivity that send signals from patients to professional health care providers. These one-way transmitting devices include such tools as alarm pendants, which—at least in industrialized countries—are quite common. Another type of second-generation technology includes telemonitoring devices that transmit other physiological indicators and allow remote monitoring. This latter type has not been found to be widely deployed, despite the commonly acknowledged potential of these devices. Given the focus on specific chronic diseases, such as cardiovascular diseases or chronic obstructive bronchopulmonary disease, the devices are often included in the protocol of small pilot studies or disease management programs targeting specific risk groups; their general provision through insurance systems is not commonplace.
- *Third generation:* Connected devices with interactivity. These complex technologies can fundamentally transform medical care by empowering patients and informal caregivers to manage certain conditions. In contrast to second-generation devices, third-generation devices allow data and information to flow back and forth between patients and providers. Typical applications can be found in the area of telemedicine.[1] These devices also distinguish themselves from telemonitoring services due to the fact that they are not disease-specific but patient-centric, thus allowing a broader functionality. Like the second-generation devices, they are not yet routinely covered by health insurance.

To better understand the current and future role of home health care technologies, we conducted a global study of the needs, priorities, and expectations of key stakeholders regarding home health care in six countries (China, France, Germany, Singapore, the United Kingdom, and the United States). The sample was selected to include a variety of health care systems, geographic areas, cultural traditions, and economic development. We conducted expert interviews, an analysis of existing data, and a literature review to develop country case studies as well as an integrated global view.

[1] For the purposes of this study, we considered only patient-facing applications under telemedicine, not applications that support physician-to-physician communication, such as teleradiology.

In Chapter Two, we discuss the factors driving the demand for home health care products and technologies. Chapter Three outlines obstacles to the use of such solutions, and Chapter Four presents a series of options to remove these obstacles. This paper concludes with our recommendations to increase uptake, presented in Chapter Five.

CHAPTER TWO

The Case for the Use of Home Health Care Technology

Every society is shaped differently, faces different demographic and disease patterns, operates under different political and institutional systems, and espouses different cultural values. Therefore, acting within a country or a subset of its population requires an in-depth understanding of these specific characteristics. Nevertheless, across the countries assessed in our study—China, France, Germany, Singapore, the United Kingdom, and the United States—several factors have emerged that are common drivers of the need to consider innovative approaches to implement home health care solutions.

Increased Burden of Disease and Disability

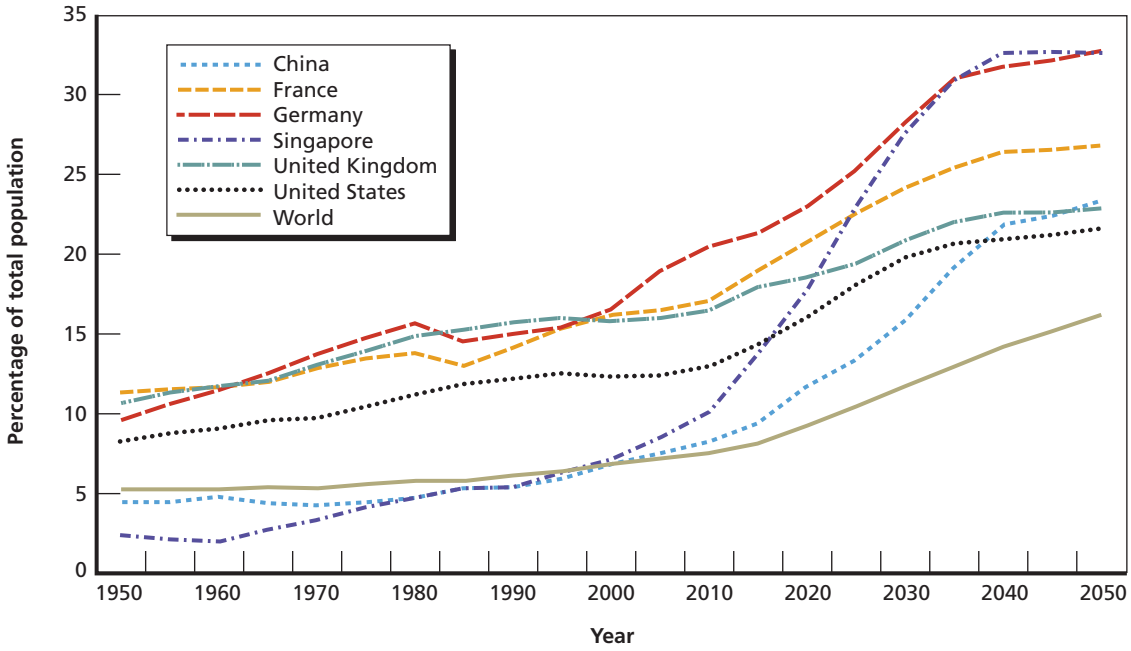
While the worldwide share of the 65-and-older population is forecasted to more than double over the next 40 years, from 7.6 percent in 2010 to 16.2 percent in 2050, for the countries in our study, the respective numbers are far higher, as shown in Figure 2.1.

At the same time, the share of the 80-and-older population (though comparatively small) will nearly triple across the globe, from 1.5 percent to a record high of 4.3 percent (United Nations Population Division, 2008), as illustrated in Figure 2.2.

This increase in the elderly population, together with improved survivability of many diseases, will result in significantly higher numbers of people living with chronic conditions. There is some hope that the hypothesis of morbidity compression (see Fries, 1980) will hold, especially in developed countries, and that, in synch with the increase of life expectancy, healthy life years will also increase, postponing the age at which chronic illnesses and disabilities set in. This expected increase in healthy life years can be attributed to lifestyle changes, a focus on prevention, and the fact that "physiologic and psychological markers of aging may be modified" (Fries, 1980). However, current trends indicate that the increase of healthy life years will fall short of paralleling the increase of total life years. Rather, estimates by the World Health Organization suggest that the burden of chronic conditions, such as diabetes, will grow steadily in the countries that we studied—and more dramatically in some of them (see Figure 2.3).

In Germany, about two-thirds of the age 65+ cohort currently suffers from at least two chronic illnesses; 82 percent of all long-term-care cases are among those aged 65+, with every third person above age 85 needing care. Projections suggest that more than 4 million people will need long-term care in 2050 (if morbidity compression holds, this number is estimated to be 3.5 million), with a growth (compared to base-year 2007) of 27.71 percent by 2020, 46.3 percent by 2030, 68.04 percent by 2040, and 94.01 percent by 2050 (Sachverständigenrat

Figure 2.1
Proportion of Population 65 and Older (projected to 2050)



SOURCE: United Nations Population Division, 2008.
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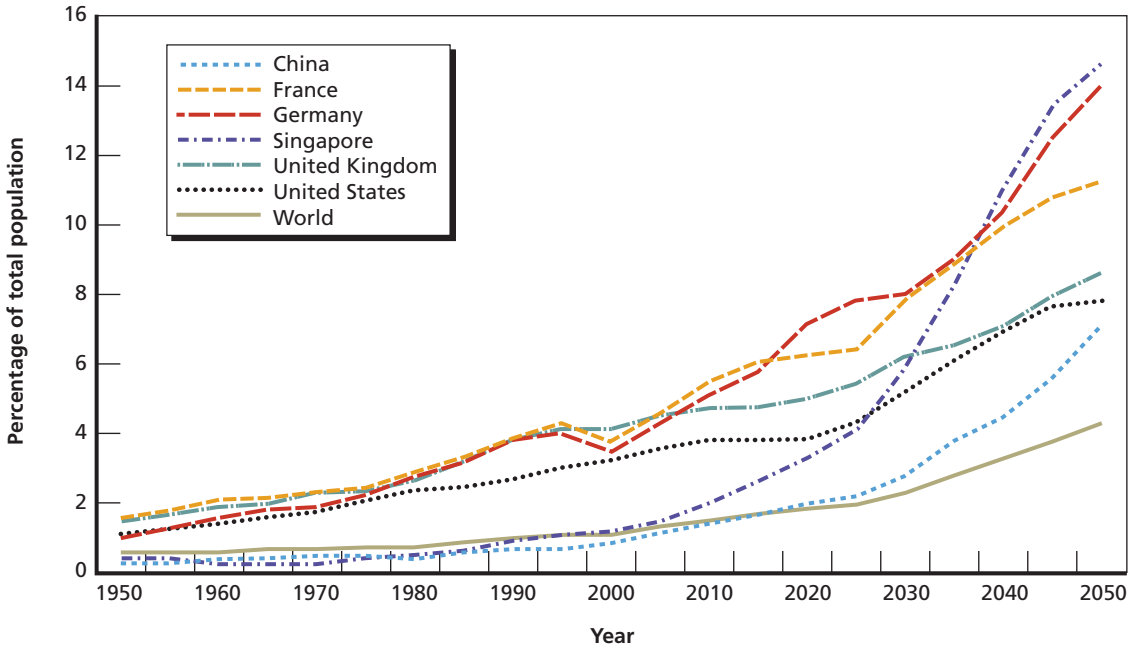
Figure 2.2
Proportion of Population 80 and Older (projected to 2050)



SOURCE: United Nations Population Division, 2008.
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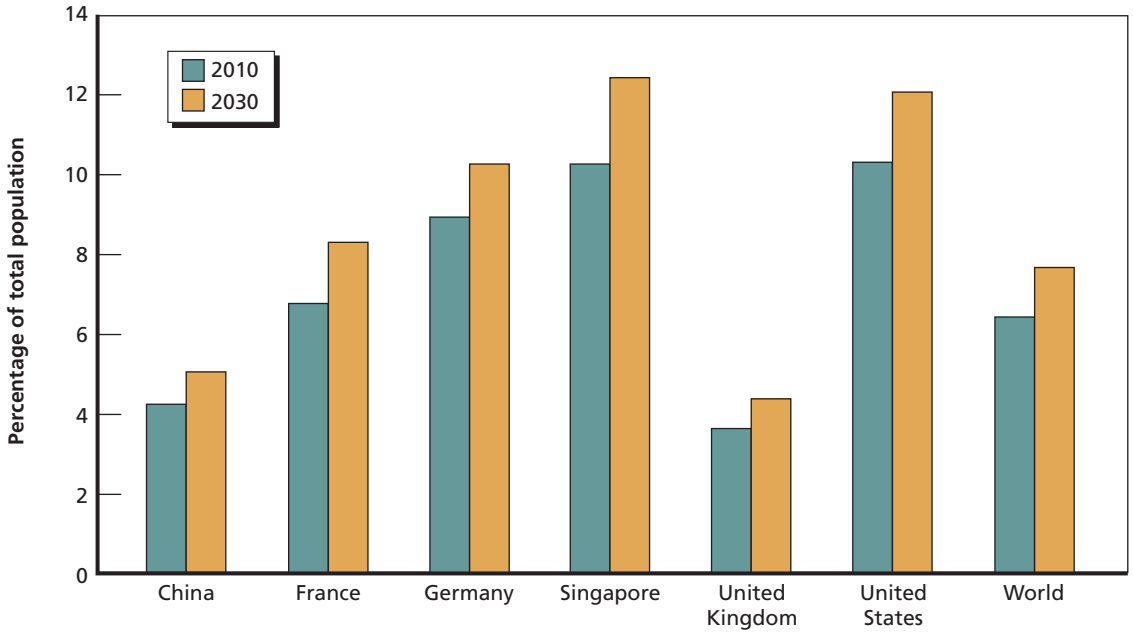
Figure 2.3
Prevalence of Diabetes (2010 versus 2030)



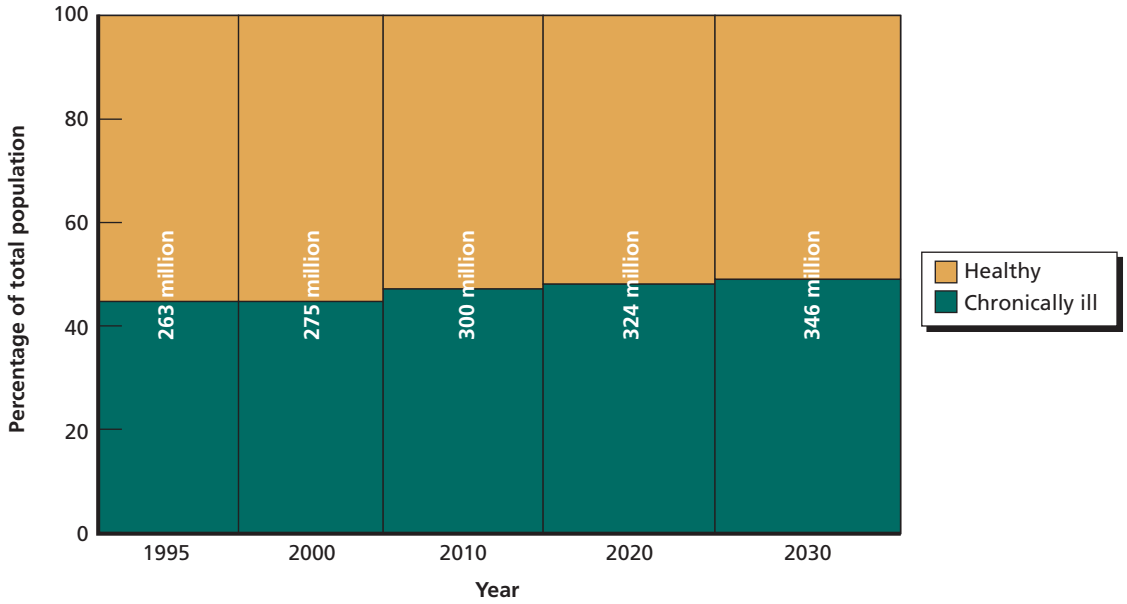
SOURCE: International Diabetes Federation, 2009.
RAND *OP323-2.3*

zur Begutachtung der Entwicklung im Gesundheitswesen, 2009). Numbers in Singapore are even more alarming. Among Singapore residents age 65–74, 86 percent have diabetes, hypertension, or high cholesterol (Singapore Committee on Ageing Issues, 2006). In the United States, 84 percent of Medicare enrollees suffer from at least one chronic condition.[1] In addition, nearly half of the overall U.S. population lives with some type of chronic condition, and 25 percent of the population will be living with multiple chronic conditions by 2020. Overall, the total number of patients with chronic disease is expected to rise to 156 million by 2020 (46 million of whom would be Medicare enrollees) and 171 million by 2030 (see Figures 2.4 and 2.5). In France, slightly more than half of the elderly population suffers from at least one long-term disease, with many afflicted by at least two such diseases.

Even in China, the first country that is getting old before getting rich, where current chronic disease prevalence is notably lower than in Western countries, the numbers are rapidly increasing, with an estimated 80 percent of total deaths and 70 percent of disability-adjusted life years attributed to chronic diseases in 2005 (Wang et al., 2005)—proportions that are similar to those of a typical developed country. The World Health Organization (2005) further estimates that deaths from chronic diseases in China would increase by 19 percent over the next ten years, with deaths due to diabetes increasing most dramatically—by 50 percent.

[1] Medicare is the federally supported social insurance program covering the elderly and disabled in the United States.

Figure 2.4
Prevalence of Chronic Disease in the U.S. Population



SOURCE: Wu and Green, 2000.

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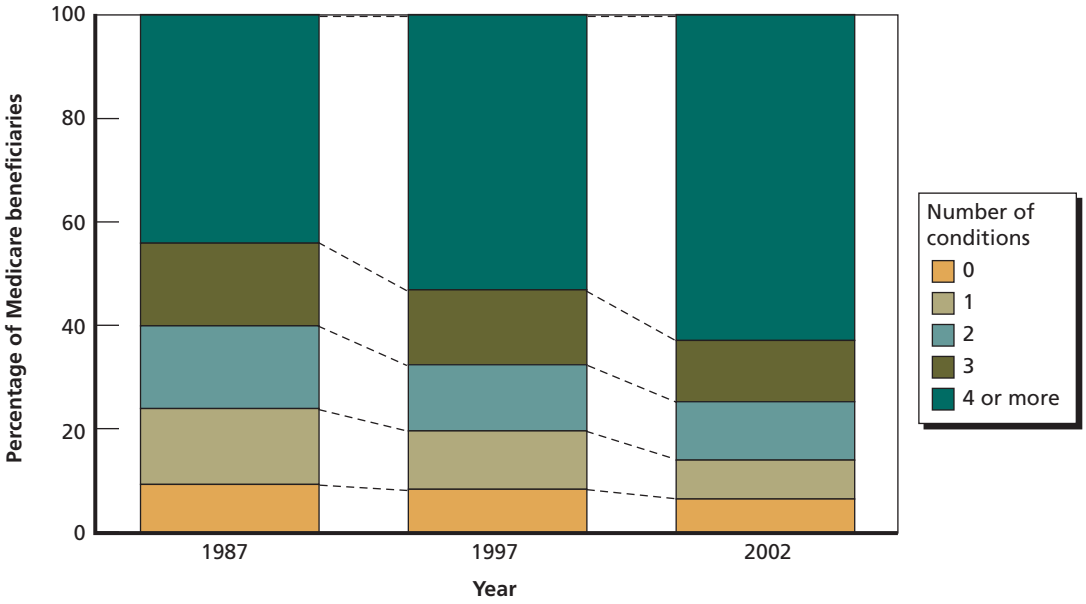
Figure 2.5
Prevalence of Chronic Disease Among Medicare Beneficiaries



SOURCE: Thorpe and Howard, 2006, p. w383, Exhibit 3.

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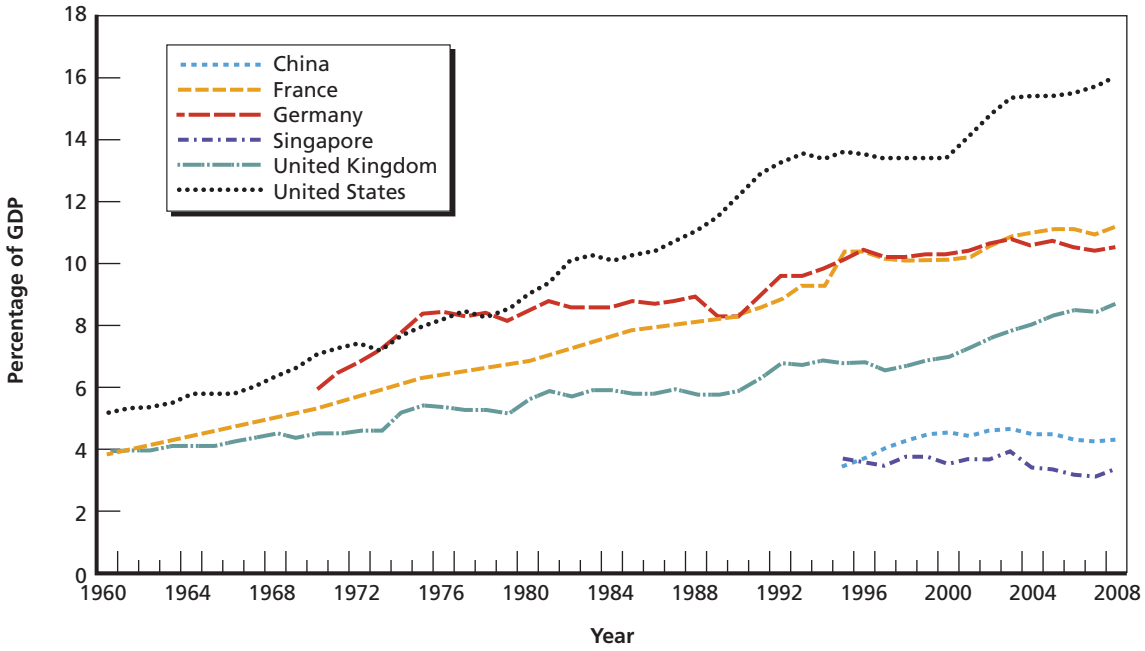
Financial Sustainability

> The public health care system is swamped. There are far more inpatients than we can manage, and home care is a very attractive solution.
>
> —*Health department official*

With health care expenditures growing at a rate well above gross domestic product (GDP) growth in many countries, concerns about the financial sustainability of current health care systems have emerged (see Figure 2.6). These concerns are fueled by the previously mentioned changes in demographics and disease patterns. This situation may prove detrimental even for countries like the United States, where the forecasted 2050 share of the population age 65+ is the smallest of all the countries we studied, at only 21.6 percent. U.S. health care spending, at 16.2 percent of GDP (in 2008), is already the highest in the industrialized world and is forecasted to reach 19.3 percent of GDP, or US$ 4.5 trillion, by 2019. Thus, many countries are finding themselves on an unsustainable path, as exemplified by the anticipated depletion of the Medicare trust fund by 2029.

These statistics are especially disconcerting in light of evidence that shows disproportionately higher health care expenditures for older age groups, driven by the higher prevalence of chronic illness and disability. In the United States, for example, the elderly account for only 12 percent of the total population, yet they incur 34 percent of the total health care spending, with an average annual expenditure of $14,797 per person aged 65 and older. This is 3.3 times the average spending for people between the ages of 19 and 64. Further, 75 percent of health care expenditure in the United States is related to the treatment of chronic diseases. In

Figure 2.6
Rise in Health Care Spending as a Proportion of GDP



SOURCE: 2010 data from the Organisation for Economic Co-Operation and Development and the World Health Organization.

RAND *OP323-2.6*

France, health care expenditures in 2007 accounted for about 11 percent of GDP, which is the second highest health expenditure as a proportion of GDP after the United States. The public health insurance system has been running large deficits in the past two decades, amounting to €4.4 billion in 2008. A sharp increase, to €70 billion in 2020, is expected, primarily because of the higher disease burden due to the aging population (Durand-Zaleski, 2010). Singapore is a global model of low health care expenditures, spending only 3.1 percent of its GDP to achieve the world's ninth-highest life expectancy at birth. However, it also forecasts a tripling of its elderly population by 2030, so fiscal sustainability is a real concern. Furthermore, hospitalization rates for the elderly have been on the rise, which may stem from limited access to quality outpatient care and an unmet need for home health care.

Although the numbers are not available for all countries under discussion, spending on home health care seems to have increased across our sample. In France, for example, the largest fund in the public health insurance system paid approximately €3.34 billion for medical devices. While about 60 percent of that amount was spent on durable medical equipment, expenditure growth is now mostly driven by therapeutic devices (e.g., oxygenators, electrotherapy devices, diabetes management devices) and other home health care devices (Eurasanté, 2007).

Workforce Shortages

The increase in the population suffering from chronic diseases or a reduced ability to perform activities of daily living is pushing demand for health and long-term care workers. For example, despite efforts to increase physician supply in the United States, the supply of physicians will fall short of demand by 5.5 percent by 2020 (U.S. Department of Health and Human Services, 2008). Similarly, vacancy rates for physicians in the United Kingdom remained above 3 percent in 2003, and the UK health care system anticipates continuing shortfalls in productivity targets among the current medical workforce. Although Singapore is seeking to build its health care workforce to become a regional center of medical excellence, these efforts have focused on inpatient care providers. Home health workers are underpaid and thus in short supply: A government survey of eldercare service providers found that recruiting and retaining staff was challenging due to low salaries and limited training opportunities (Singapore Committee on Ageing Issues, 2006). Low wages are a consequence of the large share of foreign workers in eldercare (47%), as foreign workers earn substantially less than residents (Singapore Committee on Ageing Issues, 2006).

Workforce shortages have already led many countries to attract qualified personnel through immigration. Among European countries, the United Kingdom is leading the field with nearly 31 percent of all registered physicians, while foreign-born doctors make up only 6 percent in Germany and 3.6 percent in France (García-Pérez, Amaya, and Otero, 2007). Strong pull factors for the migration to the United Kingdom are high salary levels in health care and a widely spoken language. But even within countries, an unbalanced density of health care providers in rural areas can increase the potential regional benefit that self-management solutions could bring. In China, for example, the divide between rural areas and cities in terms of access to health care is a major challenge for equality of access. And even in Germany, there has been an "exodus" of health care professionals from the former East German states, especially the more rural areas.

In Germany, policies to facilitate the immigration of care professionals are being debated to overcome the estimated gap of 50,000 long-term caregivers (Rademaker, 2010). This unmet need is expected to increase significantly in light of a doubling of the population with long-term care needs, from the current 2.2 million to 4 million by 2050. These proposals, however, have been criticized as short-term solutions to attract cheap foreign labor and hide a long-term problem, which is the shortcoming in educating sufficient numbers of qualified personnel and the unwillingness to provide adequate pay and acceptable working conditions for domestic care professionals (DBfK, 2010). But there is also an increasing unmet need for informal caregivers, which we discuss in the next section.

Patient Preferences for Independent Living

The concept of independence is subjective and multifaceted and, as such, is difficult to define, assess, or measure. Practitioners, researchers, policymakers, family members, and local authorities often differ in their interpretations of the concept. Yet, they do agree that independence is a high priority for older people as well as those who work with and for them (Leeson, Harper, and Levin, 2003). There are also differences in terms of how older people understand their independence, which reflects personal circumstances, values, and preferences. Many older people think about their independence in the same way as when they were younger, while others attach different meanings to it due to stressful life events, such as bereavement (Parry et al., 2004). Across our six countries, the elderly express a strong preference for living autonomously in their own home and a desire to be taken care of by family members. In Germany, for example, 73 percent favor living on their own, 21 percent can imagine living with their offspring, and only 6 percent want to live in a nursing home (Wilde and Franke, 2006; Georgieff, 2008). The desire to be taken care of by children is strong in Singapore, where 76 percent of residents aged 55 and older live with their children—typically an unmarried child—and 43 percent live in the same estate as their children or closer (Singapore Ministry of Community Development, 2009). The elderly seek to live in their own familiar environment for as long as possible and favor independent living even if they suffer from health impairments (Grauel and Spellerberg, 2007; Georgieff, 2008). The move from their private home into a nursing home is viewed as the loss of autonomy and quality of life, as well as a sign of frailty (Schneekloth and Wahl, 2008). A comprehensive literature review by Leeson, Harper, and Levin (2003) examined the factors that determine the ability of older people to live independently. One central theme was that independence is closely related to the idea of "aging in place"—that is, enabling older people to remain in their own homes and communities for as long as possible. Research has illustrated that the home is a place of privacy and self-identity whose role becomes more important when the routines of employment disappear (Means, 1997). Parry et al. (2004) conducted a qualitative study to explore older people's perceptions of independent living. The interviews revealed that independence is perceived as being lost only if people are no longer able to exercise autonomy over key aspects of daily living. Most crucial with regard to autonomy, perhaps, is retaining "one's functional capacity and [the ability] to cope with everyday routines . . . in spite of illness" (Laukkanen et al., 2001).

These preferences are reflected in the actual living arrangements of older people; about 94 percent of the 60-and-older population in Germany lives at home, with only 6 percent of older Germans living in nursing homes, special dwellings for the elderly, or assisted living

(Menning, 2006; Georgieff, 2008). Similarly, in France 95.5 percent of those over age 60 are living at home, and 92 percent of those between the ages of 80 and 84 do so. Only 4 percent of the elderly population lives in institutional settings (Franco, 2010). In China most long-term care is provided in the home setting. This is partly explained by cultural pressure and, since 1996, legal requirements that oblige children to take care of their older family members to counter opposing trends in society. Another factor is capacity constraints as institutional long-term beds are available only to 1 percent of the population as opposed to "the prevailing 5–7% norm in the international community" (Giacalone, 2010; see also Li, 2008). One major psychological driver for choosing a nursing home is the fear of suffering a fall or similar serious accident at home without being detected.

The Changing Face of Informal Care

> It really is a cottage industry. Home care is provided on an informal basis.
>
> —*Health department official*

Informal care by family members, particularly women, has traditionally been the main source of long-term care. However, demographic and economic trends are eroding this traditional arrangement. Smaller families, increased labor-market participation among women, and higher mobility have led to fewer intergenerational families with the ability to provide care informally. This shift started in the Western countries after World War II and now also affects Asian countries, such as China and Singapore, despite strong cultural norms that children are expected to care for their parents in their old age (Gu, Dupre, and Liu, 2007).[2] Given the rapid pace of economic development in these countries, the transition has occurred much faster and has led to substantial unmet needs because the formal long-term care sector is still underdeveloped.

Motivated by capacity constraints and cost considerations, but also by patients' desire for independent living, governments are enacting policies to promote informal care at home. In Germany, for example, the long-term care insurance system covers home-based care provided by either professionals or informal caregivers. Instead of receiving professional care, the individual with long-term care needs can chose to receive monthly payments to use at his or her own discretion for his or her care. This money is often used to reimburse informal caregivers, such as family members or domestic helpers. Other countries provide access to low-cost domestic workers as a substitute for family caregivers. Singapore provides temporary work visas for domestic workers from surrounding countries. Given that country's many high-income households and low labor rates for immigrant maids, an estimated 80 percent of Singaporean families can reportedly afford a live-in maid. China has had significant population movement from rural to urban areas, with women typically working as live-in maids in domestic settings. In France, a historic law that granted residency for immigrants who had lived in the country illegally for ten years was used to ensure a continuous supply of low-wage domestic workers, but this law was eventually repealed in 2006. Nevertheless, the law still leaves some discretion at the prefect level to grant residency on humanitarian grounds. As such, along with other

[2] In China, the one-child policy has aggravated this situation.

measures for legalization (for example, family ties), a non-negligible number of illegal immigrants are given residency: In 2009, *Le Monde* estimated that number to be 20,000.[3]

It is clear, however, that these arrangements are neither sustainable nor optimal. Income differentials between rural and urban areas, as well as between neighboring countries, are shrinking over time, and immigration is increasingly restricted, as evidenced by the repealed law in France. Thus, supplies of low-wage domestic aides will likely dry up over time. In the words of a public official interviewed for this study, "We hope to be able to buy ourselves enough time to implement a viable long-term solution." There is also a concern about quality of care: Individuals with complex care needs are put into the hands of young women with limited education and no training in medical or nursing care.[4] They often do not speak the same language or dialect as the individual and thus have a limited ability to interact with employers or care providers. Continuity is also an issue in Singapore, where immigration policies typically restrict maids to living in the country for no more than two to three years.

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[3] While official estimates of the number of illegal immigrants in France do not exist, the total number is generally estimated to be between 200,000 and 400,000 ("France to Tighten Migrant Rules," 2005).

[4] Some agencies for domestic workers in Singapore provide a two-hour course in elder care.

CHAPTER THREE

Obstacles to the Adoption of Home Health Care Technology

Despite the clear potential of home health care technology, uptake—especially of the more advanced solutions—remains limited in the countries in our study. In this chapter, we present our analysis of our stakeholder interviews to gain insight into potential obstacles to uptake.

Policymakers

> The Ministry of Health is worried but not very proactive. . . . [Ageing] policy is very visionary on paper, but implementation is often lacking.
>
> —*Nonprofit agency official*

Policymakers and the academic experts who advise them have expressed a strong interest in home health care technologies, especially advanced solutions with the potential to fundamentally change care delivery. Several initiatives have been launched to study those technologies. For example, in Europe, the e-HealthImpact project, sponsored by the European Commission's Information Society and Media Directorate General, provided an economic assessment of e-health in 2006. In 2008, the UK Department of Health initiated its Whole Systems Demonstrator, the largest-ever randomized controlled trial of telecare and telehealth (UK Department of Health, 2009). It is expected to present its final findings in March 2011.

Drawing on its well-connected Internet infrastructure, Singapore's Ministry of Health has supported a variety of pilot and research initiatives in telemedicine. The recently passed health reform legislation in the United States has several provisions to encourage the use of telehealth solutions.

The main driver for this interest is the hope that these technological applications can become substitutes for increasingly scarce professional labor while reducing the cost of care delivery. This is particularly true in countries like China and Singapore, which already suffer from capacity constraints in their health care systems. Especially in Singapore, the world's fastest-aging country, severe concerns have been voiced about the ability of the current delivery model to sustain the health care needs of the elderly. The U.S. Census Bureau predicts increases of 316 percent and 209 percent, respectively, in Singapore and China's over-65 population between 2008 and 2040; Singapore's growth rate is the highest in the developing and developed world (Kinsella and He, 2009).

In anticipation of such large numbers of elderly, policymakers have recently turned their attention to the population-level needs of this group. Singapore's government commissioned a series of reports to study its current capabilities and recommend what the government must

do to support the housing, accessibility, health care, and general well-being of the elderly (Singapore Committee on Ageing Issues, 2006; Singapore Ministry of Community Development, 2009). These reports recommended sweeping changes to the regulatory, coverage, and health care delivery environment in Singapore, but they have not yet been implemented.

While interest is also high among policymakers in the United Kingdom, the decentralized nature of that country's health care system has impeded the diffusion of innovative technologies and solutions that might improve clinical outcomes and reduce cost. In particular, local primary care trusts have wide latitude in determining how care is organized and purchased, resulting in a so-called "post-code lottery," in which some districts embrace new technologies and innovations while others are slow to evolve.

> Greater use of home health care technologies is not just an option for the future. It's a necessity.
>
> —*Adviser to ministry of health*

It is likely that home health care will gain a more prominent place on the policy agenda in the near future. Several governments have commissioned white papers on this subject. In Germany, for example, the Ministry of Health, in cooperation with other stakeholders, is currently composing an "inventory" of existing telemonitoring projects. Similarly, the French Ministry of Health and the Secretariat on Aging in the Ministry of Labor, Social Relations, Family, and Solidarity, among other relevant public agencies, have commissioned reports on the role of health technologies in improving autonomous living for the elderly.[1] The Ministry of Health in Singapore has launched a joint initiative with the Economic Development Board to promote advanced home health care solutions. It also made "right-siting" of care, i.e., shifting of care provision to the most efficient setting, a policy priority (Lim, 2007). The United Kingdom has sought to spur uptake of innovative products through local-level innovation grant funding of up to £18 million through such initiatives as the Assisted Living Innovation Platform.

Patients

Patients, particularly the current generation of elderly and care-dependent persons, have strong reservations against the greater use of home health care technologies, especially the more advanced systems. Our analysis showed a variety of reasons for this reluctance to adopt.

Limited Familiarity with Technology

The current generation of elderly and disabled persons tends to have limited familiarity and comfort with the use of technology, such as mobile phones and the Internet (Marquié,

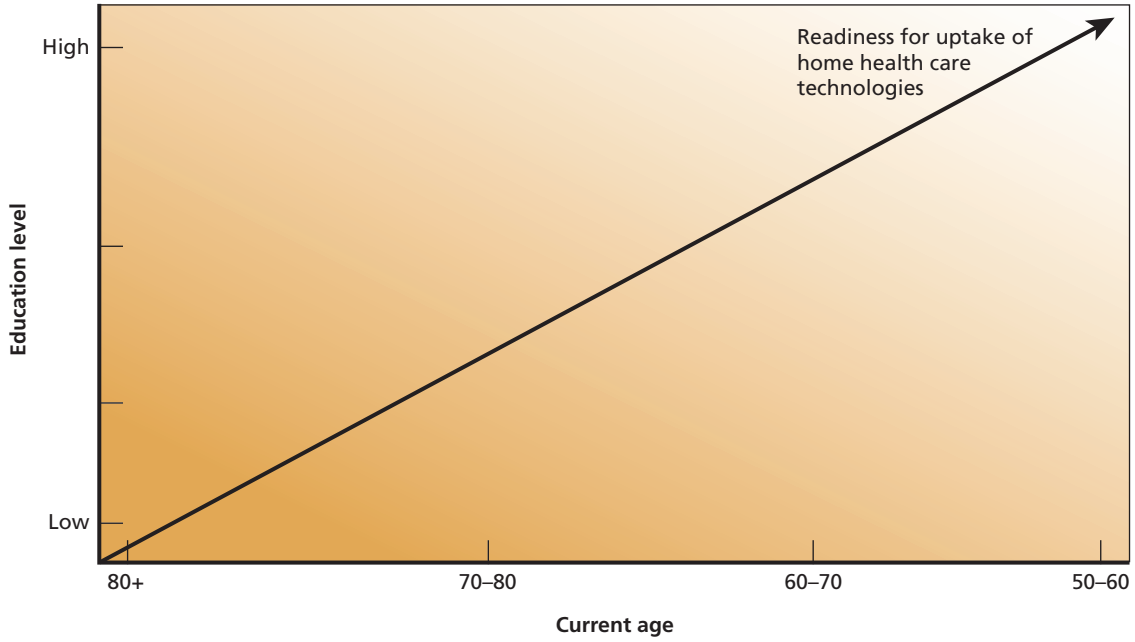
[1] For example, Poulain et al. (2007), a report commissioned by the Caisse Nationale de Solidarité pour l'Autonomie (CNSA, the National Solidarity Fund for Autonomy) and l'Agence Nationale de la Recherche (the National Agency for Research), aimed to identify and characterize available technologies for health and autonomy in the French market and to investigate the potential growth of the market over the next five to ten years. Rialle (2007), a report commissioned by CNSA and the Centre Nationale de la Recherche Scientifique (National Center for Scientific Research), provided an overview of the available technologies to improve the daily lives of the elderly. Lasbordes (2009), a report presented to the Ministry of Health by the senator Pierre Lasbordes, mapped out a five-year plan for the deployment of telehealth in the medical and medicosocial fields. Franco (2010), a report commissioned by the Secretary of State on Aging, investigated ways to improve the lives of the elderly who wish to live at home through a variety of interventions, including technologies for home health care.

Jourdan-Boddaert, and Huet, 2002; Magnusson, Hanson, and Borg, 2004). This is particularly true in China and Singapore, where rapid economic development has provided opportunities to increase wealth and standards of living without formal education. It is not uncommon for fairly well-off elderly people to be barely literate. Thus, these patients are not in a position to utilize advanced technologies for home health care.

> It's a generational issue. The current elderly are not ready to use advanced technology, and home helpers are cheap.
>
> —*Health department official*
>
> We don't have an IT-savvy population among those with chronic conditions.
>
> —*Health department official*

Nevertheless, it is important to note that potential users of home health care technology are not a homogeneous group. As a number of studies have documented (e.g., Westerman et al., 1995; Calvert et al., 2009) and our interviews have corroborated, comfort level with technology varies with age, residence (urban or rural), education, and socioeconomic status. Thus, schematically, when thinking about potential users and their receptiveness to home health care devices, readiness for uptake is increasing among younger cohorts and with higher education levels (see Figure 3.1). This may also imply that patients with early onset of chronic conditions are better candidates for home health care products because they have to embrace self-management early, as opposed the elderly who slowly age into disability and are cognitively less flexible. One study (Verbrugge and Jette, 1994) that investigated the use of technical assistance devices and human assistance among adults in the United States who experienced some difficulty performing common tasks found that there were strong age differentials in the extent and type of assistance used. While elderly patients were more likely to use both technical and human assistance, the nonelderly

Figure 3.1
Drivers of Readiness for Uptake of Home Health Care Technologies



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were more likely to rely on technical assistance only; those over age 75 primarily used human assistance.

Limited Health Literacy and Self-Efficacy

Health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (Ratzan and Parker, 2000). Low health literacy has been widely linked to poor health outcomes (Paasche-Orlow and Wolf, 2007). Self-efficacy is a component of health literacy and plays a role in this relationship by affecting access and utilization of health care, as well as self-care abilities (Paasche-Orlow and Wolf, 2007). These constructs are only partially related to general education levels; even well-educated individuals may lack fundamental knowledge about medicine and biology.

> My father-in-law, a retired political science professor, was diagnosed with high cholesterol levels and prescribed a statin. When he returned for follow-up, he was baffled that his cholesterol was still high, even though he had dutifully taken all the pills in his first box as prescribed. Having never been chronically ill before, he had assumed that statins work like antibiotics, and your problem is cured once you have taken your pills.
>
> —*Health researcher*

The current generation of elderly is accustomed to following doctor's orders but less likely to self-manage their conditions. Indeed, in the United Kingdom, for example, patients often lack confidence or interest in assuming a greater role in self-management of their conditions because they are accustomed to the historically provider-centric nature of the health care system whereby most patients receive care through traditional outpatient visits. Some stakeholders have noted that currently discussed "personal budgets" may help stimulate greater demand among patients. Those proposals would give patients discretion over the use of a limited yearly budget to seek the most appropriate solutions for their own care with the intent to engage them as informed customers. In rural China, many elderly people equate being sick with being unable to go to work due to an acute illness and regard chronic disease as an inevitable part of getting old that cannot be changed.

Patient willingness to use technologies will change as the current near-retirement population ages, however. This group is much more technology-savvy and also more willing to take control of their own health care needs. In Singapore, this group is also highly educated. The country's educational advancements preceded the current 65-and-older population. Of those residents aged 60 years and older in 2010, only 3.3 percent had college degrees. The overall figure has steadily increased with each younger age group (6.6 percent among those 55–59, 8.5 percent among those 50–54) (Singapore Department of Statistics, 2006).

The tipping point for acceptance of home health care technologies could be accelerated by a sudden, external turn in events as well. Communicable disease epidemics, including SARS, H5N1, and H1N1, have affected all the countries in our study in some way. Practicing community mitigation by managing personal needs at home has gained acceptance as the world faces threats from global communicable disease epidemics.

> There may be catalysts to adoption. . . . If the world is hit by an epidemic and everyone wants to stay home, home health technologies may become popular more rapidly. . . [During the SARS epidemic] in 2003, people were willing to adopt home care solutions and remote modalities for consultation.
>
> —*Health department official*

Lack of Adequate Training and Support

> Someone [will] eventually sell the [home health care] device on eBay, because they know how to use it properly.
>
> —*Government official*

Patient and caregiver unease with home health care devices is driven to some extent by the complexity of some technologies. A number of interviewees suggested that, while the devices may have great functionality, manufacturers have not put enough thought into training or long-term support for patients and their caregivers. Providers, the usual source of advice, may also not be familiar with the specifics of devices, especially if patients bought them without provider input. As such, patients and caregivers may find these devices overwhelming or too complex to use. In Singapore, we were told that well-meaning children or grandchildren sometimes buy such devices as gifts for parents or grandparents, but the products never get used. Similarly, one interviewee from the United States suggested that poorly understood home health care products may not be used consistently or reliably.

Competing Demands

The care needs of the chronically ill and frail are complex and extend well beyond basic primary care management of individual diseases. An inability to perform activities of daily living, such as cooking or shopping, may make self-management of underlying diseases a relatively low priority. Evidence from a prospective cohort study of more than 10,000 individuals 65 and older indicated that these abilities are lost at different stages in later life (Seidel, Crilly, et al., 2009). Half of the sample reported a disability in shopping by age 75, in housework by age 77, and in cooking by age 85. However, the subset of individuals with one or more chronic conditions at baseline experienced a disability several years earlier, the order being identical to that in the overall cohort. A cross-sectional study of 5,000 community-dwelling 55- to 93-year-olds found that most difficulties with cooking, housework, and shopping were attributable to limitations in bending or stooping (23–45 percent), standing (16–25 percent), and reaching (5–19 percent) (Seidel, Richardson, et al., 2010).

Limited Discretionary Income

The high prevalence of limitations in performing activities of daily living implies that the chronically ill and frail have substantial needs for basic support tools and home modifications (e.g., lowered work surfaces to allow working while seated or lowered shelves to avoid reaching above shoulder level). The cost of such tools and modifications may consume a large part of patients' discretionary income, because these costs tend to be high: Many tools are produced by niche manufacturers with inefficient supply chains in small quantities that do not achieve economies of scale, leading to high prices and underdeveloped design (Metz, 2000). They are also typically distributed through specialty retailers with high markups.

Also, few assistive devices, and even fewer home modifications, are covered by third-party payers. Coverage is comparatively generous in Germany: Supportive care devices (*Hilfsmittel*) can be covered by health insurance if prescribed by a physician. Long-term care insurance pays for noncovered items that are required for the person to live autonomously or to support the work of the caregiver, with a small co-payment.[2] Contrary to Germany, there is no insurance

[2] The co-payment is 10 percent for each device up to a maximum of €25. Co-payments are capped at 2 percent of annual income or 1 percent if the person suffers from a chronic illness.

> Look at those products! They cost cents to manufacture but retail at tens of dollars, just because they are branded and patented.
>
> —*Geriatrician during a visit to a home health aid showroom*
>
> Cost is often a chicken-or-egg problem. Technologies would get cheaper with volume, but volume for costly items is hard to generate.
>
> —*Health researcher*

coverage in China and Singapore. China's current health care reform aims to provide basic health care as a public service to all citizens but focuses on treatment rather than preventive care. Home health care tools are mostly considered "replaceable" by health services provided in institutions and thus are not covered by any social health insurance. Singapore's reimbursement scheme focuses on health care facilities; outpatient expenditures, such as home health care, are out-of-pocket expenses. In the United States, Medicare does not cover most long-term or "custodial" care services and pays only for medically necessary skilled nursing facilities or home health care. Social care in the United Kingdom is means-tested, unlike traditional health care services, which are essentially free at the point of use. Therefore, recipients above a certain asset threshold must rely on their own savings and income to pay for many home health care services. As a result of these policies, patients already face substantial out-of-pocket expenses for solutions to help them remain independent. In France, only minimal partial coverage for certain home health care devices—those on a preapproved list—can be obtained through the statutory health insurance system. Nevertheless, other funds, administered at the district level and within the sociomedical sector, offer alternative funding mechanisms. Since 2006, the French Prestation de Compensation du Handicap (Disability Compensation Benefit) has covered between 80 and 100 percent (depending on personal income) of costs for home health care aids and devices for disabled individuals between the ages of 20 and 59. The elderly may receive similar coverage through another fund—the Allocation Personnalisée d'Autonomie (Personal Autonomy Allowance)—but unlike under the disability benefit, there are no dedicated funds for home health care devices. Rather, beneficiaries obtain an allowance for a range of services (including human assistance), and devices are covered from what remains of the allocated allowance package (Poulain et al., 2007).

Combined with the limited discretionary income of retired and disabled populations, the affordability of advanced home health care devices becomes a severe constraint, especially in countries with limited coverage.[3] Adult children are a common source of income for elderly residents in Singapore, with 77 percent of those 65 and older receiving income from their children (Singapore Ministry of Community Development, 2009). Having to ask one's children for even more money to buy home health care devices is a major barrier. Similarly, our stakeholder interviewees in China unanimously agreed that affordability is a significant obstacle to widespread use of home health care products and services, especially in rural areas. Some estimated that it is acceptable for an ordinary Chinese family if the cost of home health care tools accounts for less than 1 percent of annual household expenditures, which, according to data from *China Statistical Yearbook 2009* (National Bureau of Statistics of China, 2009), translates

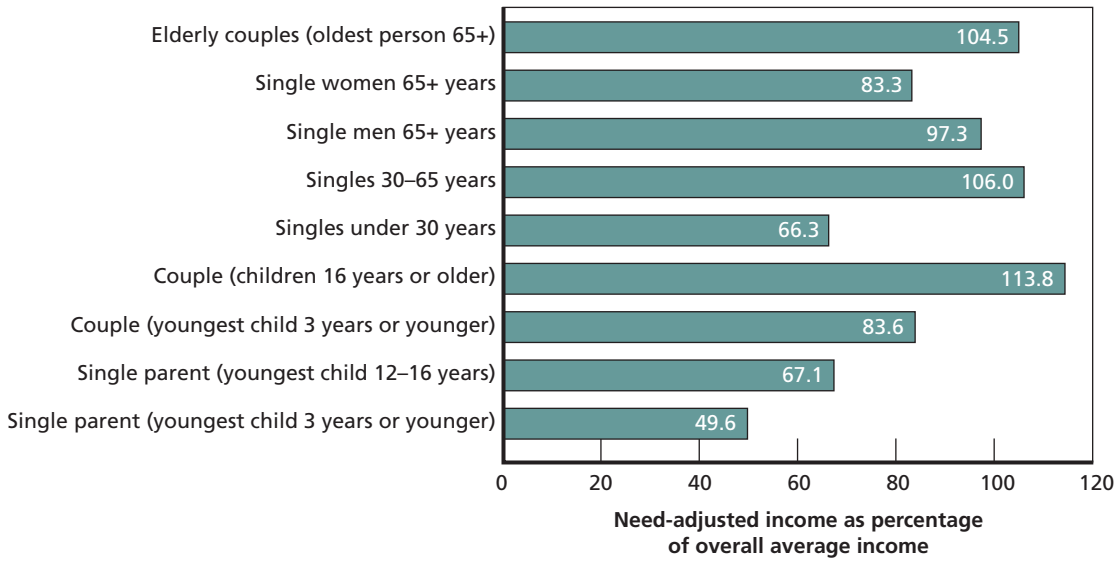
[3] In the United States and the European countries in our study (the United Kingdom, France, and Germany), first-generation devices are largely covered by insurance systems. However, many second- and third-generation technologies are not. In China and Singapore, where there is limited or no insurance coverage for such devices, all such purchases are made out of pocket by patients or their families.

to roughly $50 in an urban setting and $22 in a rural setting. The price of a brand-name blood pressure monitor can easily exceed $50, and many therapeutic tools are much more expensive.

However, the picture is somewhat different in Germany, where in 2003, elderly couples' average annual incomes were quite high (at €20,218 per capita) compared to the need-adjusted incomes of other demographic groups (see Figure 3.2) (Plickert, 2008). Similarly, in France, the current generation of elderly has a relatively high standard of living compared to both previous generations and the current working population, with larger savings and lower levels of debt. Effectively, the current elderly generation's standard of living is estimated to be 140 percent of that of the working population; the median value of retirees' assets is more than €141,000, compared to €115,900 for the working population, and the share of wealth held by retirees accounts for 57 percent of total wealth in private assets, with the remainder (43 percent) held by the working population (Franco, 2010). Thus, as suggested by one interviewee, the issue in these countries may not be the affordability of home health care devices, per se, but more the fact that these populations are not used to paying for health care out of pocket.

Further, personal care as a possible alternative to advanced support tools is sometimes covered by insurance or available at relatively low cost, especially compared to alternative care options. This situation creates another obstacle to uptake. For example, in France, a care-dependent elderly individual can obtain close to full coverage for professional home health care services through social health funds. In Germany, young men can chose to work in social care in lieu of mandatory military service at very low wages (about €10 per day).[4] In China and Singapore, patients have access to relatively cheap household labor, as stated earlier, usually in the form of live-in maids, who, despite a lack of clinical training, often provide the elderly with such care.

Figure 3.2
Income Comparison, by Household Type, in Germany 2003



SOURCE: Plickert, 2008, citing data from the German Institute for Economic Research.
RAND *OP323-3.2*

[4] The currently debated abolishment of compulsory military service would also make civil service purely voluntary, thus probably reducing the supply of this workforce.

Cultural Obstacles

Cultural factors also drive patient reluctance to adopt home health care devices. Several interviewees suggested that, in France, such devices may have a negative connotation and there is a fear among the elderly of being stigmatized as "old" or "disabled." Additionally, some may fear that the use of these products will increase isolation by prompting less human interaction and fewer visits by family members or home health care professionals. In-depth interviews with older people who received home health services showed that many spent considerable time and effort on daily tasks; they were not willing to accept help because being able to carry out tasks was regarded as preserving their sense of self and dignity. Those suffering from dementia were most likely to rely on others to help them (Godfrey, 1994). Thus, issues arise from providing assistance because it can lead to labeling and stigmatization (Verbrugge and Jette, 1994). Furthermore, with connected technologies, concerns about data privacy and the misuse of sensitive health information are common (Welsh et al., 2003). This is especially an issue in Germany, where protection of personal data is seen as very important.

> Some people saw themselves as dependent on technology rather than empowered.
> —*University-based health researcher*

> People expect to see a doctor, and that is one cultural norm that may need to change.
> —*Health department official*

Providers

Limited Evidence

Limited evidence of the clinical and comparative effectiveness of home health care technologies was the most commonly voiced concern among providers in our interview sample. Our scan of the published literature confirmed the interviewees' assessment. We found evidence, mostly from small-scale trials, of the clinical effectiveness of many first-generation devices and connected solutions to manage heart failure. Some evidence for successful use on a larger scale comes from the U.S. Veterans Health Administration, but no large-scale studies of advanced technologies, such as telemonitoring, in diverse populations have been published.

A recent review of randomized controlled trials comparing continuous positive airway pressure (CPAP) with usual care, placebo, and dental devices for adults with obstructive sleep apnea-hypopnea syndrome found that CPAP devices were generally effective compared to usual care and placebo. But there was heterogeneity of treatment effects by severity: No statistically significant difference was found between CPAP and dental devices for adults with moderate symptoms (McDaid et al., 2009). For glucose self-monitoring, a recent review found consistent evidence for improved glucose control (Edelman and Bailey, 2009). Regarding home use of automatic external defibrillators (AEDs), the evidence is mixed: Earlier studies found beneficial effects (Perry and Galanos, 2006), but a recent trial, which compared AEDs with conventional resuscitation methods in patients with previous myocardial infarction, found that access to AEDs did not significantly improve overall survival (Bardy et al., 2008).

Most home health care devices can be approved based on manufacturer data without clinical trials, so many providers remain skeptical about whether the attractive functionalities of any specific product actually translate into better management of disease and disability—and thus better outcomes for patients. This is particularly true for more complex technologies, such as telemedicine solutions, for which the impact is not as immediately visible as for, say, a

home glucose meter. In addition, a large number of new devices are being brought to market, and, given the lack of comparative effectiveness data, providers are uncertain which of the options to recommend for different patients across various contexts and conditions. The safety of the devices in the hands of untrained patients and caregivers, especially outside closely controlled settings, is another concern. Furthermore, providers must consider whether the standard of care is compromised if they do not respond to data transmitted to them by a remote monitoring device.

Limited Integration into Current Care Model

In our interviews, providers remarked that home health care devices, especially the interconnected ones, are usually not integrated into the overall care process and might further contribute to fragmentation of care. While they are an attractive tool for collecting and transmitting patient data, the data may not be transmitted to the patient's primary care provider, but to a third party, such as a disease management organization. In the United Kingdom, for example, responsibility for delivery of home care is already shared among a number of service providers. Local councils are responsible for organizing social care in the community and often enlist the private and voluntary sectors to deliver care. However, home health care services generally require an assessment

> I think one of the biggest challenges in home health care is . . . little continuity of care across providers. People are discharged from hospital. The hospital doesn't communicate with home health providers; no one has responsibility with the care provider to ensure care in the home is appropriate and meshes well with the broader plan of care for that individual.
>
> —*Health researcher*

> I can give a personal anecdote concerning a friend who has severe, unstable asthma. She is in her 60s. She has more or less controlled her asthma with the usual medications, which she understands very well for many years, but the condition seems to have worsened lately, threatening periodic hospitalization. Incidentally, she is not confident with—indeed, is severely challenged by—complex, high-tech equipment of any description. About six months ago, she was advised to acquire a nebulizer (in a private consultation with an asthma specialist, not her GP [general practitioner]) for use at home. Her daughter ordered one over the Internet. The patient went to the GP and requested a prescription for the medication. The GP disapproved of the device and said that it was unsafe. (This later proved to be nonsense.) The GP recommended a different device—like the one used by the practice. The GP also referred her to the practice nurse specializing in asthma who, in turn, referred her to a specialist asthma nurse in the community health services. The patient duly saw the specialist nurse, who loaned her [a national health service] nebulizer but gave her no instructions on its use. The patient lacked confidence in the advice she was getting from this nurse and felt entirely ill at ease with the device. Meanwhile, the private specialist saw and approved the nebulizer which had been purchased, and the son-in-law worked out how to make it operate. A suitable drug was obtained, and the nebulizer was made to work. However, there was a sting in the tail. Nebulizers, as you may know, have to be sterilized after each use. The instructions simply say that this is so and that "any proprietary sterilizing solution can be used." At this point, a pharmacist was consulted, but he or she declined to give any advice on a sterilizing solution or related equipment. At this point, the patient—who was confused and deterred by the required sterilization procedure—gave up.
>
> —*Former senior economist, department of health*

and referral from the patient's general practitioner. Additionally, district nurses are available to provide care to patients in their own homes after physician referral, but they are formally employed by local National Health Service hospitals.

Home health care devices might complicate matters further by creating a "parallel universe" in which patients receive advice and recommendations without the involvement of or coordination with their primary care providers. Thus, providers have a strong preference for tools that can be integrated into a patient's routine care delivery. This is a particular concern in countries without a strong primary care model, such as the United States, where many insurers do not restrict the use of multiple physicians. One interviewee from the United States suggested that patients are likely to "ping-pong back and forth between providers" when communication among providers across settings is nonexistent and no provider takes responsibility for how care is coordinated. This is also a concern in Singapore, where patients commonly use different doctors' offices or clinics for convenience, since visit fees are low and payment is out of pocket. As a result, discharge planning and care transition are poorly managed, especially when different entities provide inpatient, outpatient, and home health services.

Threat to Current Care Model

Providers are reluctant to support the widespread use of tools for patient self-management, including home health care devices, because these products have the potential to fundamentally disrupt the current model of care delivery. The concerns are partly motivated by economic considerations and partly by deeply ingrained conceptions of the role of physicians. Economic concerns center on the potential loss of revenue if home and office visits are replaced by remote interactions, as well as on additional costs, such as if providers must acquire and maintain the technology to interface with these new products. Noneconomic concerns expressed in our interviews included a fear of deprofessionalization and the mechanization of jobs and, similar to patients' perspectives, a general reluctance to replace human contact with electronic tools.

Quality Concerns

While concern about product quality is not an issue in developed countries, most stakeholders in China identified it as a major challenge to the widespread use of home health care tools. Some consumers lost trust in the products, often because they found that the products did not work properly or they thought the advertisement exaggerated the products' capabilities.

> I think diagnosis and treatment [provided] in hospitals is [of] higher quality than at home. . . . Some advertisements are exaggerative or even false, which influences the public's trust in home health care tools.
>
> —*Consumer*

> You cannot always get the same results when conducting repetitive tests.
>
> —*Health researcher*

Insurers and Payers

Limited Coverage

Overall, home health care products are significantly less well covered than the medical technologies used by providers. In Singapore and China, products for home health care are generally not covered by insurance. Even in Western countries, with their more comprehensive coverage

schemes, later-generation, connected technologies for home health care, such as remote monitoring and telemedicine solutions, are generally not covered outside of pilot and demonstration projects. A backdoor to coverage of those tools are care management programs, whose operators contract with insurers to coordinate care for complex patients with the goal of improving care and reducing costly exacerbations. Those programs sometimes provide such technologies to patients as part of the intervention.

The specifics of the coverage policies differ substantially, not just across countries but also by the type of product or the setting in which it is used. This is explained, in part, by differences in insurance arrangements. Germany is the only country with a dedicated social insurance program for long-term care that also covers home-based care. Currently, the program covers supportive care devices (*Hilfsmittel*) that are required for the patient to live autonomously or to support the work of the caregiver, with a small co-payment, as discussed earlier. Furthermore, under specific conditions, home modifications are financially supported, and the program provides partial coverage for professional care (in nursing homes or via ambulatory care providers) or subsidizes the patient's financing of his or her own informal care needs. Other home care devices that are considered a requirement to treat a disease, such as glucose meters, are provided by the sickness funds.

In the United Kingdom, the provision of social care benefits, including home health care, is means-tested and requires recipients with incomes above £20,500 to rely on their own savings until their assets have fallen below this threshold, at which point they become eligible for state funding. The country also covers district nursing through referrals by general practitioners, which allows registered nurses to provide care to patients in their own homes. The United States does not have comprehensive coverage for home health care, except in areas that fall under coverage of medical care, such as home health care workers during recovery from hospitalization, palliative care for dying patients, and selected self-care tools, such as glucose meters. In Singapore, health care financing is "largely site-based, stipulating the requirements for a facility-based practice. We have absolutely nothing to cover home care or remote care," according to an interviewee.

The care setting sometimes influences coverage: For example, testing strips for glucose meters are not covered for home use in China, but patients can get tested with the same devices free of charge in community health centers.

This theme of limited coverage is partly the result of the history of insurance provision. Countries typically started providing insurance for medical care delivered by professionals and are only gradually expanding coverage for self-care. But there are two fundamental obstacles that inhibit coverage decisions for home health care technologies: the incongruence with the established payment system and the limited data on the impact of home health care technology on patient outcomes and the cost of care.

> Sometimes, it's cheaper for patients to sit at home until they need to be admitted to the hospital, because the cost of care is covered [in the home].
>
> —*Nonprofit agency leader*

Incongruence with Established Payment Systems. While payment systems differ substantially across countries, all were set up based on the historical priority of providing care for acute illness. Thus, coverage of care is typically linked to encounters (e.g., office visits, hospital admissions) or products (e.g., drugs, durable medical equipment). Payment systems have not evolved to better reflect the needs of patients with chronic conditions that require ongoing management rather than episodic treatment.

Thus, there is often no suitable mechanism to pay for solutions that are an ongoing service, such as telemedicine.

Another issue is that payment systems and budgets are commonly established by the care sector, and funds are not fungible across sectors. This can create a distortion of incentives for innovations that bridge different sectors, because cost may accrue to one sector while benefits accrue to another. For example, Germany has global budgets for ambulatory services provided by physicians in private practice, i.e., the sickness funds pay a fixed, risk-adjusted amount per enrollee into a fund from which all physician services are paid. If service volume increases, payment rates fall. Thus, sickness funds have no financial incentive to invest in solutions, such as home health care tools, that can substitute for office-based services, because the funds would bear the additional cost with no possibility to offset it with savings from fewer office visits. There are numerous examples of health care innovations that would be beneficial from a systems perspective but are not adopted because existing incentive structure creates so-called "payment silos." An often-discussed example is electronic health records. Although electronic health records can make the provision of care safer and more efficient, providers are reluctant to adopt them because they would incur the investment and training cost while insurers would reap the financial benefits.

Recognizing this problem, many countries are now experimenting with innovative payment models that would allow better alignment of payment flows with patient needs and thus, potentially, coverage of home health care technology. Recent reform legislation in the United States created accountable care organizations that will provide care for patients across the continuum of needs under gain-sharing arrangements. The same reform legislation also has several provisions to promote telemedicine uptake. In Germany, disease management operators are free to use technologies as part of their services. Reforms in the United Kingdom will link health and social care budgets. However, other reform provisions in the UK National Health Service place greater financial responsibility into the hands of providers and may not promote the level of coordination necessary to facilitate greater integration of home health products and services. Newly created consortia of providers may lack the incentives to push for such efficiencies, as they likely will not be able to reap benefits from any cost savings they generate in delivering care. If these newly formed provider consortia are unable to benefit from any such savings, or if they do not bear any risk in exceeding their budget, there may be little motivation to adopt home health care technology.

Limited Data on Impact. As discussed earlier, evidence for the impact of advanced home health care technology on patient outcomes is still limited, which explains not only provider reluctance but also its limited insurance coverage. Many smaller pilot projects have shown health benefits (e.g., McManus et al., 2010; Cleland et al., 2005), and cost savings have been documented for some technologies. For example, the use of telemedicine for heart failure was shown to reduce overall cost and hospital admissions in a recent Cochrane review (Inglis et al., 2010). A recent study found that CPAP devices were more effective but also more costly than alternative treatments (usual care, placebo, and dental devices) for obstructive sleep apnea in populations with moderate to severe daytime sleepiness (McDaid et al., 2009). But evidence from larger-scale studies of patients with a variety of conditions is needed to assess the wider impact on the health care system.

In fact, several insurance systems, such as Medicare in the United States, require proof of clinical effectiveness before they will cover new technologies. These requirements are typically

more stringent than those for regulatory approval (discussed later), implying that regulatory approval is only the first step in establishing a market for a product.

The lack of evidence on the cost-effectiveness of home health care products is an even greater impediment to insurers covering these products. In Germany, coverage of new methods and products by the statutory health care system requires a demonstration of economic efficiency in addition to clinical effectiveness. Similarly, in France, an application must be submitted to the public health safety authority, where it is reviewed by the committee in charge of setting tariffs for medical devices. The committee gives the final approval and sets the price for reimbursement after negotiations. This process can take a several years (Beuscart, Chazard, and Souf, 2010). The burden of proof differs by payer. For example, in the United Kingdom, the National Institute for Health and Clinical Excellence (NICE) evaluates treatment approaches based on an incremental cost-effectiveness framework. That is, researchers estimate the value of a new approach compared to current standards of care based on its incremental cost per quality-adjusted life-year. NICE typically uses a threshold of £30,000, i.e., a new treatment approach does not have to be cost-saving, but the incremental cost must be in line with that threshold. Singapore does not have a comparable agency, but its Ministry of Health commissions health technology assessment studies and leverages reports generated by NICE and other agencies to inform coverage decisions.

Other payers have more stringent requirements, especially for the coverage of health care services. Employers that provide health insurance in the United States have some discretion over the range of covered benefits. In recent years, many service providers have started to aggressively market solutions to employers to reduce medical costs, especially for chronically ill patients. A wide range of products have been developed, such as automated systems to remind patients to take drugs or visit their physicians, call center–based disease management, and in-person case management. After initial enthusiasm, doubts have begun to set in about the true value of some of these products, as objective research remains scarce (Mattke, Seid, and Sai, 2007). Employers have also begun questioning the added value of programs that address similar patients with different approaches. Thus, a clearly defined and objectively documented value proposition is becoming increasingly critical to obtain insurance coverage for new products.

In addition, this lack of a value proposition creates a vicious circle, whereby the lack of evidence leads to limited coverage and provider awareness, familiarity, and acceptance, leading to limited awareness and uptake by patients and caregivers. In turn, the weak demand for home health care products serves as a disincentive for companies to invest in new products or research for the evaluation of the existing products.

Regulators

In general, market approval for home health care products is straightforward. Devices are mostly classified as low-risk, and regulatory approval only requires manufacturing data and functionality testing but not clinical trials. In the European Union, obtaining the CE (conformance) mark in one country is sufficiently valid for marketing the product across the EU. In China, only approval by the State Food and Drug Administration is necessary.

Regulatory obstacles can arise for newer generations of home health care products, as these devices can fall under the jurisdiction of several regulators. The most salient issue voiced

in our interviews with several regulators was that connected devices are currently regulated by both medical device and telecommunication regulators, each with different rules and requirements. The problem is slowly being recognized, and there have been some steps to harmonize regulation. For example, in the United States, a recent partnership between the U.S. Food and Drug Administration (FDA) and the Federal Communications Commission (FCC) states that these agencies will "work together to promote initiatives related to the review and use of FDA-regulated medical devices . . . that utilize radio frequency emissions or otherwise fall under the jurisdiction of FCC" (McCarthy, 2010).

Other issues include whether some home health care services, particularly telemedicine solutions, would have to be regulated as the provision of medical services—an outcome with significant implications for liability and restrictions on who may provide such services. Finally, restrictions on the distribution channels for home health care devices are seen as creating a barrier to market entry and increasing costs to consumers. For instance, only distributors that are licensed and registered by the Health Sciences Authority may distribute such products in Singapore.

CHAPTER FOUR

Options to Remove Obstacles to Adoption

In Chapter Two, we outlined the underlying factors that make home health care tools and services a potentially attractive solution to future challenges in care provision, and in Chapter Three, we looked at the hurdles that must be overcome to put such solutions into practice. Our analysis shows that removing such obstacles to adoption is not a trivial task; it will require concerted efforts from all stakeholders. In this chapter, we argue that both the policy environment and the products themselves must be designed to yield the greatest benefit from both the individual and societal perspective, carefully considering the existing health care system and the vision for its future development. There is no silver bullet for success, but our analysis points to several areas in which stakeholders can take action. This will obviously be best achieved through a coordinated approach guided by a shared vision.

Policymakers

Creating a Vision for the Future Role of Home Health Care

Policymakers' primary role is to provide an environment that is conducive to the appropriate adoption of home health care devices. To this end, they must first articulate a vision for the role of home health care technologies in the future provision of health care. Given the newness of many home health care solutions—and their potential to bring about a paradigm shift in health care provision—articulating a thoughtful vision on the role of these technologies in the future of health care is a critical first step to shaping policy.

In most countries, this process has just begun. In France, public agencies and ministries have commissioned a number of official reports investigating the role of technology in the broader discussion of the welfare of people with disabilities or loss of autonomy. In the United Kingdom, the Department of Health has taken a proactive approach to promoting greater uptake of home health care devices through its sponsorship of research efforts (e.g., the Whole System Demonstrator [WSD]) and its efforts to create incentives for increased adoption by providers. In Singapore, the Ministry of Health has launched an initiative to promote advanced home health care solutions, although policymakers recognize that substantial resources need to be committed for change to happen.

The most visible example of an operational telehealth initiative is the Care Coodination/Home Telehealth (CCHT) program of the U.S. Veterans Health Administration to remotely coordinate the care of veterans with chronic conditions and avoid unnecessary admissions for long-term institutional care (Darkins, 2006). The program is likely the most widely developed use of telehealth to date and has documented preliminary successes in improving veter-

ans' health outcomes, such as fewer hospitalizations and emergency room visits and improved health-related quality of life (Chumbler, Mann, et al., 2004; Chumbler, Neugaard, et al., 2005; Huddleston and Kobb, 2004).

These are signs that home health care is on the radar of policymakers, and these efforts can be used as a foundation for constructive debates with the wider stakeholder community to answer the question of how home health care can best be used to support and improve the existing system.

Creating Incentives

Beyond providing a vision, policymakers are also in a position to remedy some of the structural obstacles to increased uptake of home health care devices. In particular, new coverage policies could go a long way in encouraging adoption.

A key obstacle is the lack of a model to pay for innovative home health care solutions. Payment systems are traditionally set up to pay for transactions (e.g., office visits, procedures) or products (e.g., drugs, durable medical equipment). Systems typically do not have a way to pay for ongoing management provided, for example, through a telemedicine program. This limitation has implications well beyond home health care; it interferes more generally with the delivery of patient-centered management for chronic disease. Many countries are therefore testing new payment models.

In Germany, disease management programs receive a fee per enrollee and have discretion over the use of those funds. However, these programs currently focus on specific conditions, limiting their usefulness for the multimorbid and frail elderly or disabled. Similar programs exist in the United States, where they have lately become more patient-centric and less disease-focused. In particular, case management programs for high-risk patients attempt to coordinate care across a broad range of conditions and social care needs. The recent health reform legislation promotes accountable care organizations that manage the continuum of patient care under risk-sharing arrangements.

Much work remains to be done to create proper incentives for home health care, however. For example, Singapore subsidizes hospital care, but patients are not able to use funds in their MediSave accounts to purchase home health care technologies that have the potential to reduce expensive hospital admissions.

Clarifying the Regulatory Environment

Another way in which policymakers can facilitate faster adoption and innovation is by clarifying and simplifying the regulatory environment. This is especially important for third-generation devices, for which regulatory frameworks can overlap (for example telecommunication and medical products regulation for connected devices). In addition, to counter patients' concerns related to data privacy and to allow proper sharing of sensitive health information, policymakers might consider introducing standards for data protection and interoperability for the use of second- and third-generation devices.

Promoting Health Literacy

Governments can also play a role in facilitating increased patient receptiveness of these new technologies. This can be done by promoting health literacy, focusing on self-management of long-term diseases and disability, and by educating patients and providers on the benefits of using technology for improved self-care.

Such support is particularly true for traditionally paternalistic health systems, in which patients rely heavily on providers in making treatment decisions (e.g., China, Germany, Singapore, and the United Kingdom). Campaigns also need to recognize the generational gap in comfort levels with new technologies. Certainly, it would be difficult to convince those over the age of 75 to switch to home health care devices; this group is generally not comfortable using such technologies and may already have access to professional home health care assistance. Hence, to maximize their positive impact, these types of interventions could target the younger cohorts to familiarize them with using such technologies in the future.

Improving Infrastructure

Better infrastructure is a precondition to the broader use of home health care, especially in developing and transitional economies. For example, mobile phone coverage and high-speed Internet are not readily available in some areas of rural China. Reliable electricity supply is another critical requirement.

Industry

Manufacturers of home health care devices need to convince patients, their caregivers and their professional care providers, and providers and payers of the clinical and cost-effectiveness of their products.

> We don't use information technology in a big way, currently. But if there is a proliferation of small IT firms jumping aboard, things may move very quickly. . . . Health care innovators must come out of the woodwork.
>
> —*Health department official*

For users, a key obstacle is the limited user-friendliness of some products. Investment in market research to better understand patients', caregivers', and communities' attitudes toward home health care technologies and, more generally, the reasons behind the limited uptake of home health care devices may prove beneficial. In essence, product designs should have the end user in mind: Producers should aim for simple and intuitive products that require little supervision from professional health care providers. "Experience-based design"—used, for example, by the UK National Health Service's Institute for Innovation and Improvement—is an emerging field that could provide new perspectives in this regard. Experience-based design involves identifying the ideas, emotions, and memories patients have when interacting with products and services (Greenhalgh, Russell, and Swinglehurst, 2005; Bate and Robert, 2007).

Other important features include the ability to provide patients with customized, actionable feedback and the products' incorporation of existing technologies, such as televisions, the Internet, and mobile phones, with which patients are already familiar. Such products are preferable over those that require patients and their caregivers to learn a whole new technology. Furthermore, elderly patients with multiple chronic diseases would benefit from one device that can support multiple needs rather than several different devices.

The industry could also focus on producing easy-to-follow guidelines for users and providing adequate training and support for both users and their caregivers. In doing so, it may help to recognize the diversity of product users and caretakers in terms of the level of comfort with technology and education levels. Another important consideration, particularly in coun-

tries like Singapore, is the comfort level of informal caregivers with the language of instruction, as well as the language used in the guidelines.

Additionally, the industry could benefit from better targeting of potential users when deciding whether to commercialize a new device. The targeting process might start with identifying logical first adopters, keeping in mind that benefits may be greater for patients living in rural and more remote areas, where provider density is low. Benefits may also be greater for patients with advanced stages of a single disease, as opposed to more frail patients suffering from complex multimorbidity; the former would be more adept at using the new devices. To improve affordability of home health care devices, producers could also explore innovative commercial models, such as leasing or subscription models, that would avoid high upfront costs for patients and their families.

To win over providers and payers, producers of home health care products must focus on generating solid evidence of both the clinical effectiveness and cost-effectiveness of their new technologies. Indeed, obtaining regulatory approval in the countries examined in this study currently requires only that manufacturers show that devices function as intended—and not that these devices improve the quality of care or health outcomes in the context of unsupervised use. Nor do manufacturers have to demonstrate that their products are less costly than professional home health care assistance. These latter requirements often have to be met to obtain coverage and promote uptake, however. Proving the value proposition of these technologies is not an easy task; it requires a system-wide examination of benefits and costs. A good example of such an assessment is the ongoing WSD trial, a two-year project funded by the UK Department of Health that aims to understand how technology, and particularly telehealth and telecare, can help people manage their diseases. The WSD is the largest randomized control trial of telehealth and telecare in the world.[1]

From the producers' perspective, there is great value in proving to insurers the cost-effectiveness of these devices. Indeed, once payers have sufficient evidence, these two entities could even start thinking about innovative commercial models, such as the risk-sharing agreements that are now common in disease management programs and for some expensive drugs.

Providers

As discussed earlier, home health care devices have the potential to improve patients' health and well-being. But because patients rely heavily on their providers for medical advice, providers' knowledge about the range of existing products and the benefits of their use is essential. To that end, by putting more emphasis on improving patients' experiences and health outcomes, providers may be able to improve the overall quality of their services.

Additionally, providers may shift their roles from being paternalistic caregivers to being partners of patients in the care process. Although providers may be faced with initial time and capital investments when supporting home health care products, if provision is well organized and embedded in the right incentive scheme, there may be long-term significant time savings that enable better and more efficient care.

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[1] For more information about the project, see UK Department of Health (2009).

CHAPTER FIVE

Conclusions

Against a background of concerns about the sustainability of current systems to deliver health care, driven by rapidly increasing costs and workforce shortages, we find evidence that home health care devices can be a potential solution. Stakeholders agree that such products could give patients a greater ability to self-manage their conditions in partnership with their providers and help them to improve their health status and overall well-being. Shifting more responsibility to patients could also reduce costs and free up capacity in delivery systems. However, while such devices have theoretical appeal, they challenge and disrupt current paradigms and structures. Increasing their impact will require major changes that can be achieved only through the concerted efforts of a broad set of stakeholders. Indeed, stakeholders must take an integrated view and work together to achieve a new paradigm that is focused on providing patient-centric care. Under this paradigm, incentive structures will allow health care providers to allocate time to educate and guide patients in the correct use of home health care devices.

Our analysis shows that stakeholders from a heterogeneous sample of countries have similar hopes and concerns with regard to the adoption of home health care technologies. There is broad-based agreement that fundamental changes are necessary to reap the potential benefits of these devices. But stakeholders also pointed out that it is important to take into account cross-country differences in health care delivery, as well as cultural and socioeconomic contexts, when designing a roadmap for implementing home health care solutions. Indeed, differences in health care provision (e.g., insurance arrangements, patients' level of health literacy and empowerment, patients' willingness to pay) will have important implications in terms of the types of devices that will prove most useful and provide the greatest benefit to patients, as well as the type of supportive tools (e.g., guidelines, training) that should be provided to ensure optimal health outcomes and the largest efficiency gains.

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