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Spurring the market for high-tech home health care

A daunting array of financial and operational barriers is holding back growth. What can be done?

Basel Kayyali, Zeb Kimmel, and Steve van Kuiken



On the surface, technology-enabled home health care should be thriving in the United States. The country’s aging population and the transformation of acute illnesses such as heart failure into chronic diseases mean that the number of patients is growing. In addition, new medical-technology devices could help keep patients at home rather than in costly institutions, such as assisted-living facilities or nursing homes—leading to potentially big savings for the health care system.

Instead, the full potential of the technology-enabled home health care market remains to be tapped. In the United States, home care accounts for about 3 percent (\$68 billion a year) of national health spending. The market is increasing by about 9 percent annually,¹ solid but hardly booming growth, especially since labor (mainly nurses and aides) accounts for about two-thirds² of the expenditure and home-monitoring technology represents a small fraction of it. What’s holding the market back? We observe a daunting array of financial and operational barriers, including the misalignment of incentives between payers and providers, the need to demonstrate a strong clinical value proposition, and the problem of designing attractive, easy-to-use products that facilitate adoption by patients.

Technology holds a central role in expanding the market for home health care. Historically, most of its infrastructure and equipment consisted of durable medical products: walkers, wheelchairs, wall rungs, safety rugs, and the like. That infrastructure enabled basic home care but could not substitute for the more sophisticated capabilities of specialized care settings, such as on-call nursing in long-term-care facilities. In recent years, however, new home care technologies—Internet-enabled home monitors, apps for mobile health, and telemedicine—are bringing aspects of advanced care into patients’ homes. These technologies are finding a place in all parts of the globe (see sidebar, “Home health care around the world”).

Expanded technology-enabled home care offers a promising pathway to bend the cost curve for ever-growing health care expenditures. Independent of the economic benefit, the moral value of enabling older members of society to live in grace and dignity in their own homes, with a ripple effect on their caregivers, is arguably the most important—if unquantifiable—benefit of home care. It will move ahead, however, only if stakeholders develop more equitable reimbursement models that create greater incentives to participate in the technology-enabled home health market. In addition, medical-device makers must focus on technologies that are easier to use, have a real impact on patients’ conditions, and make it possible to measure results.

¹Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group (www.cms.gov/NationalHealthExpendData), 2009 data; compound annual growth rate calculated for 2004–09.

²See Richard K. Miller and Kelli Washington, *The 2008 Healthcare Business Market Research Handbook*, 12th edition, Richard K. Miller & Associates, 2008, p. 143.

Home health care around the world

In developed countries, technology-enabled home care is increasingly viewed as a critical component in efforts to check both rising health care costs in the face of an aging population and the prevalence of chronic diseases. But in developing countries, it is used in a different way—to extend health care to remote locations where patients would otherwise never receive treatment. In these places, patients must travel significant distances to receive care: the World Health Organization estimated that the density of physicians across 12 African countries was less than 25 percent of that in the United States.¹

In response, recent years have seen the popularization of mobile health and telemedicine—the ability to perform clinical diagnoses and consultations remotely through audiovisual interactions—in rural areas of developing countries such as India. Home care technology allows doctors to process and analyze vital data about patients remotely, so that they can be served more effectively during consultations. Such technologies are designed to exploit the increasing penetration of wireless infrastructure in low-income rural areas.

One important difference between developed and emerging economies is the mobility of providers. In the latter, nurses, for example, are more likely to travel across communities,

given the paucity of fixed health care infrastructure. The business case for certain home care technologies may therefore be very different from what it might be in developed countries. The value the technology creates is more about increasing the productivity of nurses and doctors and extending care to patients who would otherwise never receive care than about preventing or delaying shifts of chronic-care patients to acute- or long-term-care settings, as it is in developed countries such as the United States. The underlying technology across the two scenarios is identical, however; at the core, both focus on bridging the physical separation of patient and provider, enabling a more convenient and lower-cost option for delivering medical care.

¹See Richard M. Scheffler, Jenny X. Liu, Yohannes Kinfu, and Mario R. Dal Poz, “Forecasting the global shortage of physicians: An economic- and needs-based approach,” *Bulletin of the World Health Organization*, July 2008, Volume 86, Number 7, pp. 516–23.

An understanding of these issues is important for all stakeholders: medical-device manufacturers, insurers, doctors, hospitals, and government regulators seeking to optimize investments in home health care. With the market growing, and expansion opportunities available both domestically and internationally, this is a promising time to be in the business of home care technology.

Where technology-enabled home care can help

The goal of technology-enabled home care—the delivery of health diagnostics or therapeutics in a patient’s home—is to prevent or reduce the need for institutional care, alleviating the financial and emotional burden upon society and individuals. Its central thesis is that some chronic illnesses can be treated through monitoring and interventions in a patient’s home rather than in higher-cost institutional settings.

Of course, the 65-and-over age segment forms the bulk of the home care population and fuels the market’s growth. These men and women experience care primarily in four settings: their homes, assisted-living facilities, acute-care facilities (hospitals), and long-term-care institutions, such as nursing homes or skilled-nursing facilities. Clinical or economic factors propel patients from one care setting to another. The shift from homes to assisted-living facilities is typically driven by a gradual decline in cognition or physical capacity, from homes or assisted-living facilities to acute-care facilities by events such as fractures or heart attacks, and from homes, assisted-living facilities, or acute-care institutions to long-term-care institutions by movement across a financial or clinical breaking point (for example, bankruptcy or a diagnosis of dementia or other chronic illness).

The most important value offered by technology-enabled home care is preventing or delaying the shift of patients to acute- or long-term-care settings. Technologies used in home care cannot address all the potential factors underlying such shifts—for example, trauma from a car accident lies beyond their reach. The medical conditions that can be addressed successfully by technology-enabled home care meet three criteria:

- They are chronic—persisting for years rather than days or months.
- They can be prevented or addressed by protocols—repeatable and standardized step-by-step instructions executed by nonphysicians.
- They are nonintensive—there is no requirement for round-the-clock attention or human monitoring.

Diabetes, hypertension, congestive heart failure, chronic obstructive pulmonary disease, and fracture prevention³ are high-prevalence medical conditions that satisfy these criteria. They are important disease targets for current and future technological advances in home care.

Choosing the right business model

To date, technology-enabled home care in the United States has succeeded in only a few settings: most notably, integrated payers and providers such as Kaiser Permanente (through its KP OnCall subsidiary) and US Department of Veterans Affairs (VA) medical centers (through the VA's Care Coordination/Home Telehealth program). There is increasing evidence of the value of such programs. A 2008 study of Telehealth found that hospital admissions dropped by close to one-fifth, while its cost was up to two orders of magnitude lower than that of alternatives.⁴

Given the potential savings, why do home care technologies have such low penetration? We find that eight key success factors, falling into three categories, must be satisfied simultaneously for a model to be commercially viable. Entrants into the home care technology market should cast a critical eye upon their offerings to verify that all eight success factors have been satisfied. Failure to meet even one can cripple an otherwise-promising business model.

Financial factors

1. Alignment between payers and providers. Episodic hospitalization reimbursements for congestive-heart-failure patients, for example, are misaligned with hospital-based technology-enabled home care programs: every patient successfully kept at home means less revenue for a hospital.⁵ A critical reason for the success of integrated payer–providers (such as the VA) in technology-enabled home care is their capitated reimbursement models—by patient per year, so each patient who avoids hospitalization represents a boost to the bottom line.

³Strictly speaking, fractures are neither a disease nor chronic. We list them here because the chronic morbidity stemming from fractures—especially those incurred during falls, potentially worsened by delays in detection and treatment—represent an important and preventable cause of the transition of patients from their homes to institutional care. Devices intended to detect falls (for example, personal-emergency-response systems) or even to prevent them (for example, gait monitoring and wearable accelerometers) are increasingly available commercially.

⁴See Adam Darkins, Patricia Ryan, Rita Kobb, Linda Foster, Ellen Edmonson, Bonnie Wakefield, and Anne Lancaster, “Care Coordination/Home Telehealth: The systematic implementation of health informatics, home telehealth, and disease management to support the care of veteran patients with chronic conditions,” *Telemedicine and e-Health*, December 2008, Volume 14, Number 10, pp. 1118–26.

⁵For an example, see Richard Bohmer and Laura Feldman, “The Duke Heart Failure Program,” Harvard Business School Case 604-033, revised February 2010. This program, an intensive effort by the Duke University Health System to keep patients out of the hospital through at-home remote monitoring and nursing intervention, was found in 2000 to have caused a 38 percent drop in the systemic patient costs. But the resultant loss of inpatient reimbursements to Duke translated into a local loss of money “hand over fist.”

Stakeholders, particularly payers and providers, must cooperate to ensure that incentives for relevant technologies are aligned. That means either creating new reimbursement models, such as direct payments for the use of home care technologies, or adapting existing models, such as bundled reimbursements that cover a comprehensive set of clinical activities across care settings.

2. *Remunerative.* A home care technology's return on investment must be clear to patients and, where different, to purchasers. Personal-health-record software aimed at individual patients, for example, remains unpopular because each user must enter a great deal of information manually in return for ambiguous benefits. On the other hand, at-home glucometers, which measure the concentration of blood sugar, have succeeded because the value to patients is simple, clear, and immediate.

Effectiveness factors

3. *Having significant impact.* A home care technology must affect a patient's clinical course of care; conversely, if it merely provides information that cannot change the course of disease progression or treatment, its value is negligible. Monitoring the weight of a patient with congestive heart failure, for example, effectively alerts clinicians to an imminent worsening of that condition. The at-home interpretation of new chest pain experienced by recovering heart attack patients is not useful, because the appropriate course of action is to go to the hospital—no matter what.

4. *Actionable.* Merely observing or flagging an event is not enough; a home care technology must be accompanied by some way to take action—through a device, a nurse, or the patient—when an intervention is required. A nursing intervention prompted by alarming weight gain in a congestive-heart-failure patient is an effective action; displaying a stand-alone Web page with a chart of recent weight gain by a patient, leaving it up to him or her whether and how to do anything, is an ineffective one.

5. *Timely.* The home care technology must be sufficiently rapid and reliable to be useful in guiding decisions or initiating interventions. An always-on accelerometer, for instance, quickly detects a fall. A daily automated phone call to check on a patient at home to see if a fall occurred does not.

6. *Closed loop.* A technology must contain a “closed feedback loop” to measure progress against goals and to verify whether effective actions or treatments actually occurred. Without such a loop, a technology's value cannot be proved, measured, or optimized. A technology that enters a patient's after-treatment physical-activity levels directly into a provider's electronic medical records through a wearable device has a closed feedback loop. A technology that enters a patient's physical-activity levels into a stand-alone system requiring a separate provider login has an open one. Without seamless processes, feedback

data may be overlooked or ignored. To fulfill a closed loop, a home care technology must be tightly coupled with processes and tools to ensure that measurements reach their intended recipients in a timely and easily viewed way.

Accessibility factors

7. *Usable*. Technologies must be available and understandable to the right users at the right place and time; poor user interfaces or immobile physical locations can doom business models. A wireless blood pressure cuff at home is easily usable, for example; a fixed blood pressure kiosk in a retail pharmacy is significantly less so. Further, if a technology has been tested only with tailored populations or under special conditions (such as clinical trials) it is important to verify that it will be scalable to larger populations and real-world conditions.

8. *Repeatable*. A technology must be used frequently—typically, at least daily—over the course of a chronic disease. Infrequently used technologies do not generate good habits among home care consumers and are eventually forgotten or ignored. The daily measurement of body weight on an electronic scale by congestive-heart-failure patients is repeatable. On the other hand, a device that performs an annual eye exam for diabetic patients works too intermittently to be compelling for home use.

What the future holds

The environment for home care technology is likely to change in the coming years. Greater adoption has two key drivers.

Health care reform

At a time of general fiscal stress and specific concern about billing fraud, public or private payers are unlikely to increase funding or coverage for home care. The Congressional Budget Office estimated that the 2010 Affordable Care Act, for example, will pare a cumulative \$39.7 billion from federal home-health-care reimbursements over the next decade.⁶ Payers are more likely to pursue various forms of capitation (payment per person rather than, say, per service) and shared-risk models, in an attempt to give providers an incentive to subsidize home care technologies and services.

Misalignment between buyers and beneficiaries is an important brake on the penetration of home care technologies. They are likely to benefit if reform efforts successfully accelerate the alignment of incentives—for example, through the creation of Accountable Care Organizations (groups of coordinated health care providers) or bundled payments between payers and providers.⁷ Indeed, the spread of home care technology has an

⁶Letter from Congressional Budget Office (CBO) to Representative Nancy Pelosi (then Speaker of the US House of Representatives), dated March 18, 2010, available at www.politico.com/pdf/PPM110_hr4872.pdf.

⁷A bundled payment is a single payment for all services related to a treatment or condition.

Related thinking

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especially strong potential to accelerate under such a scenario because care pathways that rely on skilled labor—pharmacists, nurses, and doctors—are most vulnerable to labor shortages and to eventual augmentation by technology-driven approaches.

Increasing the evidence base

As multiple technology-enabled home care pilots, at public and private organizations alike, have rolled out over the past decade, data accumulated on both sides of the ledger for clinical value and returns on investment. In some cases, technology-enabled home care pilots have produced compelling successes; in others, they have done less well.

Fraud remains a looming concern in home care; the US Government Accountability Office reported “estimated improper payments for Medicare of almost \$48 billion for fiscal year 2010,” including expenditures for home oxygen and other home health claims.⁸ To qualify for coverage from payers or to generate incentives within insurance for individuals, home care technologies may also offer new avenues to address home care fraud, in addition to improving patients’ health and quality of life and saving money.



We see substantial growth potential in technology-enabled home health care. An aging population and an increasing chronic-disease burden point to a large and growing market. But home care stakeholders must get the reimbursement models right and ensure that the technologies coming to market truly make a difference for patients and the bottom line alike. ○

⁸See statement by director Kathleen King, “Medicare program remains at high risk because of continuing management challenges,” US Government Accountability Office, GAO-11-430T, March 2011 (www.gao.gov/new.items/d11430t.pdf); and report to the US Senate Committee on Finance, “Medicare improvements needed to address improper payments in home health,” US Government Accountability Office, GAO-09-185, February 2009 (www.gao.gov/new.items/d09185.pdf).

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Basel Kayyali is a principal in McKinsey’s New Jersey office, where **Zeb Kimmel** is a consultant and **Steve van Kuiken** is a director. Copyright © 2011 McKinsey & Company. All rights reserved.