Technology-enabled home health
Are consumers ready?

Executive summary
As technology becomes more affordable and connected, it should enable an increasing variety of health care services to migrate from a hospital or physician office to the home. But how do consumers view technology’s role in health care? What concerns and reservations do they have? How willing will they be to adopt new technologies that bring care to their homes? The Deloitte Center for Health Solutions conducted focus group research to answer these questions and understand consumers’ opinions about health care technology and their vision of home health in the future.

In general, consumers are optimistic: To them, the benefits of technology-enabled home health far outweigh the risks, and they are eager to try it. For the unwell, home health technology can help manage their conditions and slow disease progression. For caregivers, it can offer peace of mind. For the healthy, it can provide the tools and support to maintain healthy behaviors.

Even though interest is high, we heard some concerns. Consumers value the personal nature of health care and the patient-doctor relationship. Many are concerned that increasing reliance on technology will erode the relationships that they feel are already threatened by the fragmented nature of health care, decreasing face time with doctors, and difficulty establishing and maintaining those meaningful relationships. While it may seem obvious that technology should reinforce and facilitate relationships rather than supplant them, consumers’ previous experiences with technology temper their enthusiasm.

Our broad definition of home health encompasses:
• In-home medical care or skilled nursing care provided by medical professionals
• In-home non-medical care to support activities of daily living (e.g., dressing, bathing, walking, eating) provided by paid or unpaid caregivers, such as family members, friends or home aides
• Medical care that today is typically provided in clinical settings (e.g., physician offices, post-acute care facilities, or hospitals) that can be shifted to the home.
Technology-enabled solutions that are perceived to intrude on people’s privacy, such as sensors that monitor an individual’s sleep quality or motion patterns at home, face resistance. Education may be required to effectively convey the benefits of such monitoring; consumers are then able to evaluate the pros and cons, and many are amenable to the tradeoff.

As more care moves to self-care, consumers want to have influence and control over their own care and health information. They expect to learn about new technologies and to be actively involved — as patients or caregivers — in deciding which technologies are used for their care, how they are used, and what data will be disclosed and shared.

Companies — whether newcomers or traditional players — developing the technology for home health are expected to negotiate a number of challenges:

- Addressing interoperability and building a unified patient record may require unprecedented levels of collaboration among multiple stakeholders (e.g., providers, health plans, patients, wellness vendors, home health agencies, and social services).

- Redesigning provider workflows should take into account changing roles and responsibilities of individuals on the care teams, the fluid nature of the teams, and the cultural shift from a provider-centric to a patient-centric model of care. We expect the most acceptable solutions will incorporate care teams because consumers trust their physicians and want those continued relationships.

- New technology solutions will serve diverse segments of users; among them, patients, caregivers, physicians, and care team members. Their needs, technology platforms, and comfort with technology will vary and issues, such as health conditions, disease stage, culture, income, and education will come into play. For example, a solution that might be appropriate for someone with diabetes who is highly engaged and tech-savvy will likely be different from a solution for a caregiver of someone with dementia.

- Sustaining consumer and provider engagement in technology-enabled home health may be one of the greatest challenges. To be able to customize engagement approaches, stakeholders will need to earn customers’ trust and develop in-depth understanding of their needs, limitations, and preferences. By involving future customers in solution design and testing, stakeholders will be able to not only derive useful early lessons but also inform engagement approaches that will lead to sustained use of the solutions.
Janice’s story

Janice is an 82-year-old widow who lives with her dog, Molly. Janice’s two children and all of her grandchildren live far away. Janice is on the welcome committee at her local home owners’ association: when people move into the neighborhood, she greets them with homemade brownies and lively conversation. She has made many friends over the years.

Because Janice once had a mini-stroke, her doctor convinced her to implant a Nano-chip that can detect early signs of a stroke and also monitor her diabetes. The chip collects and transmits information into Janice’s medical record, including blood pressure, pulse, blood sugar levels, and other biometric data. It also registers when her medications get absorbed. The Nano-chip is so small that the implantation process was just an injection in the arm. Now Janice gets reminders on her smartphone to take her medications and suggestions on diet (e.g., to have a snack when her blood sugar drops, or to have a glass of water if she is close to getting dehydrated).

Janice video-chats with a nurse twice a week and the nurse visits Janice at home once a week. Sometimes Janice’s daughter, Barb, participates by video. The nurse coordinates Janice’s doctor appointments — her primary care doctor makes house calls but not her cardiologist. The cardiology practice has an arrangement with a car service for patients who need rides and can access Janice’s calendar to schedule appointments around her errands.

Janice’s house is equipped with “smart” sensors that can monitor activities such as food consumption, sleep patterns, and more; for now, Janice and Barb have decided to enable two options: sensors that can detect and shut off unattended stove burners, and sensors that can identify and even anticipate falls.

Introduction

The story about Janice is futuristic, reflecting focus group participants’ collective vision of the future of home health. However, it may not be too far-fetched: some of the technologies depicted in the story already exist (e.g., video-visits and smart sensors) and other technologies are in development (e.g., a “smart pill” that can track adherence, a pre-cursor to the imagined Nano-chip).

Some in the industry believe that care in the home can be more cost-effective than in typical clinical settings, and that, if given the choice, consumers prefer to receive care at home.

As technology-enabled home health becomes more pervasive, how will consumers respond? What concerns and reservations will they have? Will they readily adopt new technologies? Deloitte conducted focus group research to better understand consumer expectations and preferences for receiving health care services in the future, focusing on care in the home.

The groups were conducted in three cities and included a mix of healthy and less healthy individuals (i.e., with chronic conditions) and were stratified by age: three groups with younger adults (21-44 years old) and three groups with

Several forces are expected to stimulate increased use of home health:

- Rapidly emerging technologies: Technology available today enables remote patient monitoring, virtual patient-clinician interactions, fitness and activity tracking, as well as detection and prevention of unsafe events (through “passive” home and body sensors). The growing ability to connect multiple technologies, devices, and the data they generate will likely create additional benefits.

- Population aging: As the US population ages and lives longer than previous generations, the cost of caring for the elderly increases. Alternatives to long-term care facilities, such as aging-in-place or living with relatives, are more cost-effective and more appealing to patients and caregivers.

- Rise of value-based care: As the health care system transitions toward patient-centric and outcomes-focused care and payment models, providers, insurers, regulators, and technology developers are likely to collaborate in establishing the necessary infrastructure for connected health (cHealth) solutions that enable “anytime, anywhere care.” Such solutions should help stakeholders proactively manage population health, resulting in cost savings.

- Rise of consumerism: Consumers shoulder growing financial responsibility for health care costs and make increasingly complex decisions as they select health insurance products, providers, and make treatment choices. Their experience with technology in other areas of their lives (e.g., retail, financial, and travel transactions) are likely to influence their expectations of technology-enabled health care.
older adults (45-64). With each group we explored how participants want to receive health care services in the future, barriers to adoption of home health technologies, and motivations and values around the use of health care services.

We also tested consumers’ reactions to two hypothetical scenarios depicting the use of technology-enabled home health solutions:

- **Scenario A**: An elderly person who has a couple of chronic conditions that are fairly well managed through technology-enabled self-care, regular video and in-person interactions with the care team, and at-home technology to collect and transmit clinical data.

- **Scenario B**: A healthy person who interacts with his/her care team through email or online chats, engages in health programs, and gets automated reminders about diet and exercise.

We shared one scenario at a time, capturing each participant’s unaided reaction; we then held an in-depth discussion where participants shared their perspectives with the group. After discussing both scenarios, we asked participants to develop scenarios that depict their vision of a technology-enabled health care future — they could generate new solutions to the pain points that they experience with today’s health care system and borrow features from Scenarios A and B. (See Figure 1 for the research flow and Appendix 1 for the research methodology.)

Figure 1. Focus group flow schematic
Key takeaways
We explored two areas of potential uses of technology-enabled home health: 1) managing chronic conditions and 2) promoting healthy living. By combining participants’ reactions to our pre-developed scenarios with their own ideas for the future of health care, we gathered rich insights on consumer attitudes and preferences on technology-enabled health, summarized below:

Solutions to manage chronic conditions
- “Passive” approaches to remote monitoring have strong appeal, especially among older (45-64 year old) research participants. Reconciling ethical concerns against the convenience of the monitoring is a complex trade-off negotiation regardless of age.
- Participants express desire for greater shared decision-making, where decisions about their care or the care of their loved ones are made collaboratively with clinicians.
- Control and choice are important: e.g., consumers want the ability to scale up or down the level of physical environment and biometric monitoring.
- Physicians and other practitioners on the care team enjoy the greatest trust from patients and are in the best position to provide education to patients and caregivers on pros and cons of home health technologies.
- Participants who used home health in the past as patients or caregivers report positive experience; without a physician’s or hospital’s referral many would not have known of home health options. Their experience informs nuanced and thoughtful perspectives on the future of home health technologies.

Solutions for healthy living
- In situations of acute illness or preventive screenings, younger consumers are more open than older participants to self-service options, such as using lab kits delivered by drones to perform lab tests. Older participants lean toward house-calls from a nurse or lab technician.

Solutions for chronic conditions and healthy living
- New communication methods (such as online visits) are expected to strengthen patient-provider relationships and increase access to care.
- Convenience and ease of use are key considerations in every application of technology-enabled home health. Solutions that deliver compelling benefits while reducing patients’ and caregivers’ burden are more likely to enjoy acceptance and sustained use.
- Approaches to consumer engagement should take into account many factors, e.g., personalities, lifestyles, comfort with technology, and communication preferences.
- Participants are perplexed that their patient information today is scattered; they believe they and their providers should have complete and easy access to this information.
Remote monitoring

**Initial reaction**
Participants are conflicted about managing medication adherence by using a “smart pill.” On the one hand, they recognize that remembering to take medications can be difficult, so reminders via a watch or smartphone are seen as extremely useful and convenient, especially by older participants (45-64 year old). On the other hand, participants raise safety concerns about ingesting the chips embedded in the pills, as well as ethical questions on how much oversight is too much: “As a society, I don’t want us to get to where everything we are doing is not human-based anymore and is all automated and monitored and ‘big brother’.”

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<tr>
<th>Benefits</th>
<th>Concerns</th>
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<tr>
<td>• Adherence to medications</td>
<td>• Safe to ingest? Safe over time? Tested?</td>
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<td>• Reassurance for care team</td>
<td>• Patient acceptance</td>
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<td>• Allows tracking if patient has dementia</td>
<td>• Can data be abused?</td>
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<tr>
<td>• Reminders via choice of watch or smartphone</td>
<td>• Ethical concerns</td>
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<td>• Convenience</td>
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**Participant-generated ideas**
Giving convenience and technology advances the benefit of the doubt, many focus group participants build upon the bio-sensor chip concept:

1. Implanted chips or Nano-technology that would monitor and transmit biometric data, with the option of turning on and off data-gathering and transmission
2. Robo-Doc: “You plug it in and it takes your vitals and tells you what you need.”

They also propose a low-tech solution that harnesses animals’ detective powers: “Integrating more animals; there are dogs for diabetes, if blood sugar is too low or too high you’re alerted before you feel it. The animal will know and will go get help.”
Communications with the care team

Excerpt from focus group scenario A
On the dining room wall your father has a touch screen that he uses to video-chat with a nurse daily around breakfast time. About once a week he has a video-visit with his doctor; the doctor goes over the data feeds and talks about his diabetes and heart failure; you often attend these video-visits remotely. Your father also uses this touch screen for video-calls with you.

Initial reaction
Video-chats and video-visits are viewed favorably, especially among the older focus group participants (45-64 year old), since such interactions provide regular contact with health professionals and may reduce the need for doctor visits: “I would like it if I were the daughter of this man and living a couple hours away. I still could be involved, could video conference and monitor the situation.” Convenience is yet another benefit, as visits would happen on the patient’s terms, in the comfort of his home.

Participants point out that the 84-year-old man depicted in the scenario may be lonely; as somebody living alone, this individual is already at risk of social isolation. The technology may further limit his social opportunities by obviating his need to leave the house.

Benefits
• Reduced doctor visits
• Video-enabled physical examination
• Social outlet
• Good option for remote locations if patient has poor mobility, no access to transportation
• Peace of mind for caregivers
• Convenient

Concerns
• Lack of ‘touch,’ impersonal
• Social isolation
• Usability; i.e., needs to be simple
• Hacking
• Ability to look into your home

Participant-generated ideas
Participants’ vision of the future incorporates technology-based and “old-school” approaches to care:

1. House visits by nurses, physicians, and health coaches: “Having a personal health coach come in twice a week, plan all the activities and cook a home meal. A doctor could come for a personal visit once a month and for the other times have an ongoing nurse case manager who would make home visits on a more frequent basis.”

2. Community engagement: “The support of a team, of other people in that neighborhood. They can be friends, neighbors, doctors, fellow patients to have activities and goals. Relationships are good for mental health.”

3. Hologram or virtual doctor: “Hopefully, in 10 years, you can have a hologram in the house and the doctor pops up and he’s there and it’s not like the video, it’s more a special feel and the person can see them and interact with them a little differently.”
Physical environment monitoring

Excerpt from focus group scenario A
Your father’s house is equipped with a number of sensors that track and transmit information to you and his care team:

- **Sleep quality**: How much time he spends in and out of bed, aberrations in his sleeping schedule
- **Mobility**: Whether and how often he leaves the house
- **Bathroom usage**: Whether he goes to the bathroom more or less frequently than usual
- **Activity levels**: Changes in activity that may signal health issues
- **Kitchen activity**: That he eats regularly; that stove burners are not left on for too long
- **Fall detection**: Identify and report falls; dispatch an ambulance to the house.

Initial reaction
As a general concept, “smart home” resonates with focus group participants. The less-intrusive sensors that offer obvious benefits are welcome, such as stove burner controls or fall detection. Participants’ reaction to other technology-based solutions appears to depend on their prior knowledge or exposure to elder care: those with experience are more accepting. Individuals familiar with diabetes care are quick to point out that as intrusive as bathroom usage monitoring is, there is clinical rationale to justify its use. When these more experienced participants present the benefits, those who opposed are willing to reconsider their initial position.

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<tr>
<th>Benefits</th>
<th>Concerns</th>
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<td>• Use of technology for safety reasons (e.g., stove left on, ambulance if need it)</td>
<td>• Depression, confusion, lack of social interaction</td>
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<td>• Patient and care team alerts if sensors detect an issue</td>
<td>• Sensory overload</td>
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<tr>
<td>• Improved health; i.e., eats regularly</td>
<td>• Reliance on electronics; what if there’s a power outage?</td>
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<tr>
<td>• Fall detectors may save lives</td>
<td>• Too intrusive/invasion of privacy; security</td>
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<tr>
<td>• Depression, confusion, lack of social interaction</td>
<td>• False alarms/false positives/accuracy and reliability</td>
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<td>• Sensory overload</td>
<td>• Not everyone will need all options</td>
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Participant-generated ideas
Participants offer several improvements to environmental monitoring:

1. Embedded or implanted chips could communicate geo-location; this option would be turned on in patients showing symptoms of dementia
2. Implanted chips or biosensors would become so smart as to predict and anticipate exacerbations or severe complications — such as a heart attack, diabetic shock, or stroke — and alert the care team in time to avert these events
3. Ability to scale the level of monitoring up or down:
   The patient and/or caregiver and care team would collaboratively decide which sensors should be activated.
Coordination and scheduling

Excerpt from focus group scenario A
On those occasions when your father needs to see his doctor in person, his appointment schedule is synched with a taxi service for a ride to and from the doctor’s office. In addition, both of you get multiple appointment reminders.

Initial reaction
Technology-based solutions can help consumers plan and coordinate health-related commitments, such as appointment scheduling, arranging transportation, or synchronizing calendars. Focus group participants are enthusiastic about such solutions: “I love the [appointment] reminders and wish they would give me more of them.”

Some participants voice concerns about the taxi service having data on the exact times the house will be unoccupied, as it could lead to the possibility of a home break-in if such information got into the wrong hands.
Solutions to promote healthy living
We explored technology-enhanced self-care activities to promote healthy living that fall into four broad categories: 1) nutrition, 2) physical activity, 3) prevention, and 4) dealing with acute episodes (e.g., accidents, infections).

Nutrition

Excerpt from focus group scenario B
Imagine you are 42 years old and healthy for your age. Maintaining a healthy weight has been a challenge. Recently, you signed up for a program that includes activity tracking, health coaching, and healthy meal planning and preparation. You and your family pre-select several dinner menus, and twice a week, the meals’ ingredients are delivered to your house. All ingredients are fresh, pre-washed, and pre-cut; you save time on meal prep but you still cook from scratch, following the enclosed recipes.

Initial reaction
Focus group participants in both age groups (21-44 and 45-64) react favorably to the concept of ready-to-cook ingredients for healthy meals delivered to their house.

Knowing which foods are healthy and how to prepare nutritious meals for the entire family can be a struggle for some; scheduled meal deliveries could alleviate the problem. Participants who are not very skilled at cooking appreciate the fact that all the ingredients and instructions are provided: “I’m not much of a cook, but I think I could do that.” On the other hand, more accomplished cooks might miss the traditional process of meal preparation: “Prepping is cooking. That’s the whole fun of it. You have a glass of wine and prep the vegetables.”

On balance, the positives outweigh the negatives. The biggest benefits are convenience, time savings and promoting healthy eating.

Participant-generated ideas
In their created scenarios, participants add nutritional counseling by a health coach. In their view, health coaches would be knowledgeable and licensed in multiple areas: nursing, nutrition, exercise, and mental health. A few participants prefer grocery lists with recipes over meal deliveries.

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<tr>
<td>• Saves time and energy, more time to enjoy with family</td>
<td>• Expensive</td>
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<tr>
<td>• Convenient</td>
<td>• Still have to cook</td>
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<td>• Quality, fresh ingredients</td>
<td>• Deciding in advance not practical for some</td>
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<td>• Lower medical costs as a result of improved health</td>
<td>• Where is the food coming from?</td>
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<td>• Portion control</td>
<td>• How and who determines what’s healthy?</td>
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<td>• Eliminates guesswork</td>
<td>• May involve more logistics than just grocery shopping</td>
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Physical activity

Excerpt from focus group scenario B
For activity tracking, you are part of a team of friends and neighbors and you compete with another team. You can set your own activity goals. A few times a day you get a prompt about your progress toward your goal. You can monitor your activity at both an individual and team level to see how it compares to your collective goal and to the rival team.

Initial reaction
Monitoring physical activity using apps or wearable devices is well-received as a general concept. The competitive nature of the proposed scenario, however, invites a mixed reaction. Older participants and females are less likely to be motivated by team rivalry; some may even feel discouraged: “I am not as good as them.” Those who like the competitive aspect see it as an added encouragement rather than true competition, and being part of a team creates a sense of accountability: “Exercising can be somewhat tedious if you do it alone. [Being part of a team] can give you that little push.”

Benefits
- Motivator to exercise
- Do better when part of a team
- Encouragement from others
- Control/set your own activity goals
- Sense of accomplishment when goals are reached

Concerns
- Potential for dishonest activity reporting/logging
- Prompts could be annoying
- Discourager
- Security and privacy considerations
Prevention

Excerpt from focus group scenario B
During an online chat with your health coach, you mention you plan to go to Asia on vacation. The coach recommends you get a few vaccinations: Hep B booster, tetanus booster, and flu vaccine. Two of the vaccines are available in pill form, so they arrive in the mail within three days. Additionally, you receive a “travel kit” that contains all of your prescription medicines prepackaged for the duration of the trip, plus extra supplies (such as antihistamine, sunblock).

Initial reaction
Focus group participants recognize the value of preventive services, such as vaccines and health screenings.

Interactions with a health coach receive a mixed reaction: some find it helpful, others consider it annoying. For a few, these opinions are based on actual experience: “I don’t like the idea of health coaching. I’ve had it in the past and resent it. They annoyed the living daylights out of me. They called me every 2-3 weeks: ‘Did you do this?’ They drove me crazy.”

A few question health coaches’ credentials to dispense medical advice. Even those who have worked with a health coach through their employer-sponsored wellness programs are not certain what type of training coaches receive: “A health coach is a professional in the health care field, maybe a fitness professional or MD, but doesn’t always have to be an MD. I deem it as someone who is giving nutritional guidance, overall health guidance, and some direction on how I should be exercising.”

Benefits
Concerns

• Prudent preventive measures
• Convenient
• Prepared for travel with supplies
• Valuable advice/tips from health coach
• Coach provides guidance, drives accountability

• Twice-a-month chats with health coach are too infrequent for some, too often for others
• Can this be trusted? Scam?
• Affordable?
• Potential for pills to get lost in the mail
• Where are pills from?
• Vaccine phobia
• Health coach training/credentials

Participant-generated ideas
In their own scenarios, participants focus on preventive health screening, envisioning several options:

1. Self-administered blood-prick test to measure blood sugar, cholesterol levels, and other bio-indicators
2. Drones delivering test kits and returning test specimens to the lab
3. “Drive-in” health booth: A person would drive-in to a health booth, have a full body scan and then all of that information is downloaded and put into their health record, which is accessible no matter where the person travels or seeks medical attention
4. Mobile clinic: A mobile lab or “Walgreens tour bus” staffed by a nurse-practitioner or physician assistant and equipped with basic lab and diagnostic equipment would come to a patient’s home and perform physicals and health assessments
Managing acute episodes

Excerpt from focus group scenario B
Before your trip to Asia, you are reminded that the telemedicine service where you can have a phone or video call with a doctor is available wherever you travel. You ended up using the service once when you got what turned out to be a nasty insect bite; luckily, the antihistamine that came with the travel kit helped.

Initial reaction
Focus group participants react favorably to a telemedicine option available during travel; it offers convenience and reassurance. Since none of the participants have had experience with a telemedicine service, they raise questions about the physicians’ credentials: “I don’t like telemedicine because I don’t know who I am talking to.” An endorsement from their own doctor or health plan would dispel such concerns. Ideally, participants would prefer to receive telemedicine services from their own doctor.

Benefits | Concerns
--- | ---
Medical resource to call when traveling | Who is on the line? Credentials?
Convenient | Antihistamine ‘helped’ but did it cure?
Reassuring | Bug could be region-specific
Options: phone or video

Participant-generated ideas
Ideally, telemedicine providers would have access to a centralized patient record. It is a recurring theme and a point of frustration that consumers’ patient information today is “all over the place” and each time they see a new provider, they have to start over—recounting family history, symptoms, allergies, and current medications.

Participants say that the technologies proposed for prevention and chronic care may also be used for acute care.
Stakeholder considerations
Focus group participants allude to several issues that present challenges for health care industry stakeholders.

Unified patient record, data liquidity, and governance
Today’s technology enables consumers to access their patient information electronically but it rarely resides in one location. For example, each provider has their own patient portal that is not linked to the patient’s health insurance or prescription benefits information, and wellness activities are captured in yet another system. As more information streams are added (from bio- and home sensors, wearable devices, or interactions with a health coach or nurse), it will become increasingly impractical to process the data if it remains siloed. Even if today’s electronic health record (EHR) technology was fully interoperable, it is not designed to collect and aggregate all of this disparate patient-generated data.

The issue of data governance also presents challenges: Who manages the data and who owns it? How do stakeholders achieve data liquidity? Is the chosen technology forward-compatible to take in and analyze future data feeds?

If providers act as “custodians” of patient information, they should define what a unified patient record means for them, as it will extend beyond the physician’s EHR to include ancillary provider information, prescriptions, wellness, behavioral and social health, body and home sensors, and many other information streams.

A model with patients as custodians of their own data is another option; it would require, among other things, stronger incentives for providers to share data with patients and tools to enable patients to set permissions and consents for data access.9

Patient privacy and data security
Increasing connectivity of technologies and devices prompts participant concerns about security of personal health information. Technology developers should consider developing risk mitigation strategies that take into account possible uses and misuses of their devices.10 For specific recommendations on forward-looking data security strategies, see Deloitte’s publication, Safeguarding the Internet of Things.11

Data liquidity – ability of the data to move freely and securely so it is available to the right people at the right time. Data liquidity relies on interoperability, the ability of different information systems to work together. Data governance refers to the overall management of data collection and use to ensure its usability, integrity, and security.
Health care providers are approaching a point where the amount of information and the number of data streams exceed their capacity to manage and process the data within their existing workflows and many providers have yet to realize efficiency improvements from the existing EHR technology.
Conclusions

Our focus group results suggest that consumers are open to adopting new technology that enables home health care and their concerns and reservations do not pose insurmountable barriers. Other studies support this trend. The Deloitte 2015 Survey of US Health Care Consumers shows that using technology to measure fitness and health improvement increased from 17 percent in 2013 to 28 percent in 2015, with the fastest growth rates observed among individuals with chronic conditions. Similarly, Rock Health* found that “super adopters” of digital health technologies tend to be sicker than non-adopters. This suggests that individuals who can benefit the most from technology are actually using it.

Since consumer and provider engagement is essential to the adoption and sustained use of technology-enabled home health, solution developers should consider involving them in the design, manufacturing, and testing process. The most cogent insights and experiences may be gleaned from caregivers and home health agency staff who are already working with remote monitoring and “smart” home technologies and are uniquely familiar with even the most complex patient needs.

* Deloitte Consulting is one of several partners of Rock Health; for a complete list, see http://www.rockhealth.com/partners
Our focus group results suggest that consumers are open to adopting new technology that enables home health care and their concerns and reservations do not pose insurmountable barriers.
Appendix 1. Study methodology

Six focus groups were conducted in November 2015:

- Six focus groups in three cities
- Three groups with younger adults (21-44 years old) and three groups with older adults (45-64)
- Between six and eight participants per group
- A total of 42 individuals participated in the focus groups
- Other recruitment criteria:
  - A mix of demographics: Gender, marital status, education, ethnicity
  - At least a few caregivers per group
  - Private health insurance coverage
  - At least one-half who have chronic conditions or recent acute episode(s)
  - A mix of engaged vs. unengaged in making treatment decisions
- Two hypothetical scenarios were presented as stimuli:
  - Scenario A: An elderly person who has a couple of chronic conditions that are fairly well managed through technology-enabled self-care, regular video and in-person interactions with the care team, and at-home technology to collect and transmit clinical data
  - Scenario B: A healthy person who interacts with his/her care team through email or online chats, engages in health programs, and gets automated reminders about diet and exercise
- Focus group flow:
  - Current use of health care services, experience with home health
  - Likes and dislikes about health care today
  - Scenario A or B (randomized): individual unaided reaction captured in writing, followed by a group discussion
  - Remaining scenario (B or A): individual unaided reaction captured in writing, followed by a group discussion
  - Working in groups of two or three, participants develop own scenarios
  - Each sub-group presents their scenario to the larger group
Appendix 2. Stimuli

Scenario A. Technology to help manage chronic conditions

Imagine you have an 84 years-old father, who lives alone. He has diabetes and chronic heart failure (CHF).

He takes several pills. They contain tiny chips that will transmit to his medical record whether the medicine got ingested. This way, his care team can be assured that he takes his medicines as prescribed. His watch and his phone give him reminders to take his medications on schedule. If he walks out the front door before he takes his pills in the morning, he will get reminders in the form of sound, voice or flash prompts from his door bell, the watch and/or the phone.

On the wall in his dining room there is a touch screen that he uses to video-chat with a nurse daily around breakfast. About once a week, he has a video-visit with his doctor; the doctor goes over the data feeds and talks about his diabetes and CHF; you often attend those video-visits remotely. Your father also uses this touch screen for video-calls with you.

He can use his TV for video calls but prefers to use it to get on Facebook or play online games with friends. The TV is programmed to give him a nudge for an "exercise break" every 1.5-2 hours.

His house is equipped with a number of sensors that transmit information to you and his care team:

- Sensors that track the quality of his sleep, how much time he spends in and out of bed, aberrations in his sleeping schedule
- Sensors that track whether he leaves the house and how often
- Bathroom usage: whether he goes to the bathroom more or less frequently than usual
- Activity levels: to track changes in activity that may signal issues
- Kitchen activity: that he eats regularly, that stove burners are not left on for too long
- Refrigerator sensors take stock of the fridge content and expiration dates and transmit a "shopping list" to the individual who comes to your father’s house twice a week to help with cleaning, cooking and other house chores.

The sensors throughout the house also can identify and report falls. An ambulance would get dispatched to your father’s house should that happen.

On those occasions when he needs to go to the doctor in person, his appointment schedule gets synced with a taxi service for a ride to and from the doctor’s office. Plus, both of you get reminders three days before, one day before and a few hours before the scheduled visits.

Scenario B. Technology to promote healthy living

Imagine you are 42 (or 67) years old, healthy for your age. You and your doctor monitor your blood pressure, weight and cholesterol levels.

Maintaining a healthy weight has been a challenge for you. Recently, you signed up for a program that involves activity tracking, health coaching and cooking healthy dinners. You and your family pre-select your dinner menu options a week or two in advance. Twice a week, the ingredients for your meals get delivered to your house: organized for each meal, all ingredients are fresh, prewashed, and pre-cut; you save time on prepping but you still cook from scratch, following the recipe that is enclosed with the package.

For activity tracking, you are part of a team of friends and neighbors and you compete with another team. You can set your own activity goals; a few times a day you get a prompt on your progress toward your goal. You can monitor your activity at your individual level and at the total team level, and see how it compares to your collective goal and to the rival team. Most of you use watches for activity monitoring but you can also use your phones.

You travel frequently. During your twice-a-month online chats with your health coach, you mention your plans of going to Asia on vacation. The coach recommends that you get a few vaccinations: Hep B booster, tetanus booster, and flu vaccine. Two of the vaccines are available in pill form, so they arrive in the mail within 3 days. Additionally, you receive a “travel kit” that contains all of your prescription medicines prepackaged for the duration of the trip, plus extra supplies (such as antihistamine, sunblock). For the tetanus vaccine, you choose to go to your local pharmacy.

As your travel itinerary gets added to your smart phone and your wearable devices, the reminders (exercise tips and weight monitoring) get adjusted to the time zones of your destinations. Before your trip, you are reminded that the telemedicine service where you can have a phone or video call with a doctor on duty is available wherever you travel. You ended up using the service once when you got what turned out a nasty insect bite; luckily, the antihistamine that came with the travel kit helped.
Endnotes


17. RJ Krawiec et al., No appointment necessary: How the IoT and patient-generated data can unlock health care value.


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