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INTRODUCTION

Today's home health care sector strives to achieve profitability and success under some of the most challenging business conditions possible. Consider the following perfect storm of issues facing current home health care operators:

- A broad, and sometimes conflicting, ecosystem of participants and agendas;
- Strong government regulation and oversight;
- Geographically dispersed, remote workers;
- Narrow profit margins;
- · High employee churn rates; and
- Demanding clients with complex needs.

With the first of our highly independent Baby Boomers entering their 70s, home-based health services undoubtedly constitutes a high-growth segment. However, it can be difficult for many providers to reap the benefits of an expanding client base when their companies are burdened with manual, paper-based processes; a lack of visibility into caregiver location and activities; and an inability to provide pertinent, real-time data and advice to these remote workers. Providers have to address these barriers if they want to improve the quality of patient care, while enhancing productivity and increasing profitability.

As this paper will discuss, mobile technology offers an immediate opportunity to solve these challenges. For even the most stubborn technology laggards, today's mobile devices and accompanying software applications should be recognized as indispensable tools in the increasingly consequential home health care mission.

TODAY'S HOME HEALTH CARE INDUSTRY: A BURGEONING AND COMPLEX ENDEAVOR

"Home health care" is a simple term for a complex endeavor. Typically, home-based health programs can include skilled nursing, personal care, both short-term and long-term therapeutic services, and/or hospice. This is a large market segment, and it's getting bigger. In the US alone, these providers produce approximately \$79 billion in annual revenues and account for 2.7% of national health care expenditures.¹



National Home Health Care Expenditures, US, 2004-2013

Source: National Health Statistics Group, 2014

The types of people involved in making this all happen include:

- The direct caregivers Nurses, aides, medical social workers, and a variety of therapists, including occupational, physical, and speech, all work together to provide care.
- The referring parties Physicians, health care facilities, insurance companies, and attorneys often directly recommend specific home health care agencies to their patients and clients.
- The patients themselves Today's home health care client can be an individual with an acute illness, a permanent disability, a chronic medical condition, or a terminal illness. The National Center for Health Statistics calculates that 5.9 million Americans received these services during 2011.²

Home health care is a highly regulated, highly fragmented sector characterized by a few large agencies and a multitude of small local companies, each striving to deliver high-quality treatment and remain compliant with an often bewildering assortment of state and federal regulations.

There are a number of factors facilitating growth in this market, both now and in the foreseeable future. Demographics are the primary driver, not only producing a very large and rapidly aging population, but one that prefers to stay in its own home longer.

Government regulation is also remolding the home health care paradigm in a number of ways. The Affordable Care Act (ACA) has resulted in more insured consumers now capable of affording in-home care. The ACA is also driving the US health care system to transition from hospital-based to patient-centered care (which often translates into home-centered care) by imposing penalties for excessive hospital readmissions. Finally, the ACA has also dragged the entire health care sector into the 21st century by requiring digitized (instead of paper-based) patient health records.

Wireless technology should be viewed as another major force for change in the home health care effort. Providers can now harness the power of smartphones, tablets, wearables, and even remote patient monitors (RPMs) to better manage mobile employees, decrease administrative paperwork, comply with regulations, and increase the quality of patient care. And with more affordable pricing models, the return on mobile technology investment can often be counted in months, not years.

HOW MOBILE TECHNOLOGY HELPS

When evaluating wireless solutions, home health care providers need to think in terms of both hardware (devices) and software (apps). While mobile anywhere-anytime voice communications alone can add immense value, the real game-changer is the ability to wirelessly communicate real-time data to and from remote employees. Mobile applications that are changing the way home health care is provided include:

Workforce Management

Mobile software on a caregiver's smartphone or tablet can reduce paperwork and increase efficiency. Each morning, the home health caregiver can pull up her case schedule on her mobile device, including maps and directions to client homes and relevant patient history notes. Once she arrives at a client location, she can clock in via a wireless time card app, document each aspect of client care on a wireless check-off form, and immediately transmit this information to administrative staff. When her duties are completed, the caregiver can clock out and pull up information regarding her next client appointment.

Many of these same capabilities are becoming available in a more abbreviated version on wearable form factors, such as smartwatches.

While work management software keeps the caregiver's day going smoothly, it also greases the wheels at headquarters. Leveraging the GPS capability on the mobile device, home health care administrators can monitor the location of each caregiver on a real-time basis. If a client cancels an appointment or an emergency need suddenly arises, the administrator can now shuffle assignments on the fly, assigning new work based on location, capabilities, etc. Management can also breathe easier about regulation compliance, since pertinent matters such as length of client visit are now tracked and recorded.

These types of mobile workforce management apps are available today, and the hosted versions tend to be priced on an affordable monthly per-user basis. They do not have to be built from scratch, yet they allow enough customization to provide health care providers with exactly the data they need to satisfy both patient care and administrative requirements.

From a pure ROI perspective, mobilizing administrative and workflow tasks can have a number of positive impacts:

- The reduced amount of paper and typing required of caregivers and HQ staff typically results in a quick payback.
- Because data inputs tend to be more accurate and timely, billing can be handled expeditiously and Medicare reimbursements can turn around more quickly.

- GPS location tracking translates into increased worker productivity and fewer missed appointments.
- Apps can analyze all of the various data submitted and issue both standard and customized reports to management, revealing trends and new opportunities.
- Mobile workforce management solutions also allow the caregiver to provide more attention to each patient, since they can access pertinent patient data beforehand, come into a home immediately prepared, and are able to quickly document each care activity on the wireless form.

Individual Patient Treatment

The actual quality of patient care can be significantly improved with the use of a number of different mobile point-of-care applications. For example, using their tablet or smartphone, nurses can access a patient's electronic health records (EHR) and individual care plans to enter data or help with diagnoses. Mobile imaging solutions allow caregivers to access and view a patient's CT scans, X-rays, MRI and PET displays. Some software even provides interactive, three-dimensional displays.

In addition to having rapid access to patient records and images, there are mobile communication and collaboration solutions that allow the caregiver to consult with other clinicians in real time. Leveraging the mobile device's cameras, caregivers can also upload a photo of the patient's current medical condition, share it with colleagues, and obtain immediate feedback and advice. Mobile videoconferencing can also be used to hold virtual consultations with relevant experts.

These mobile patient care solutions leverage enhanced and timely data sharing to improve the quality of caregiver decision-making and patient outcomes.

Medical Education and Reference Materials

Home health care providers must remain current on developments in their sector, and mobile technology can provide tremendous assistance in this effort. Traditional medical references have been translated into readily available mobile applications that caregivers can conveniently call up on their devices as needed. These include drug guides, medical calculators, industry articles, and patient symptom guides. They are updated on a regular basis, and the apps are specifically designed to display well on both smartphone and tablet form factors.

Anatomy-focused apps are especially impressive, providing detailed visual diagrams of the human body.

Remote Monitoring

Between actual on-site visits, home health care providers can continue to monitor patient and client conditions. Using a combination of specialized hardware and software, relevant biometric information can be captured and then wirelessly transmitted to the pertinent caregiver for review and action.

There are numerous types of remote patient monitoring solutions available today; however, three categories are of special relevance to the home health care provider:

• Chronic disease management – Specially designed monitors and meters can transmit blood pressure, glucose levels, heart rate, oxygen levels, even body weight to a patient's care team, helping to oversee chronic conditions such as cardiac disease, asthma, diabetes and sleep apnea.

- Acute and post-acute care Similar conditions can be monitored after returning home from a hospital stay. These also include tracking physical therapy and rehab activity. Early detection of problems enables quick intervention and a reduced hospital readmission rate.
- Assisted living Various 24/7 solutions can track an individual's location and motion, and issue an alert if the person abruptly stops moving or, in the case of a dementia patient, walks outside of predetermined boundaries. These monitoring systems can help the elderly to live independently for a longer period of time.

The introduction of consumer wearable technology, such as smartwatches and fitness bands, brings a new twist to the traditional remote patient monitoring landscape.



Instead of the specialized, single-sensor M2M medical monitors and software that have traditionally been made available, apps can be created to track a streamlined set of vital signs via the new and more convenient wearable—a multi-sensor smartwatch. Biometric monitoring can then be combined with other tools, such as location tracking, an emergency call button, and/or real-time connectivity to the caregiver, to provide convenience and peace of mind to patients and their families. Health apps for wearables are just beginning to be developed.

Implemented correctly, remote patient monitoring has tremendous potential for home health care providers as an additional service and revenue stream opportunity.

CHOOSING THE RIGHT MOBILE DEVICE

Mobile home health care solutions are only as good as the device they reside upon. Each device category smartphones, tablets, and wireless monitors—brings its own set of strengths, and providers should carefully assess the pros and cons of these powerful tools.

SMARTPHONES



Frost & Sullivan forecasts smartphone penetration to continue its steady and impressive climb, growing from 67% in 2013 to 95% saturation by 2020. Smartphones are both handheld computer and mobile phone, offering easy portability, an intuitive user experience, and powerful information processing. As their display screens have increased in size (commonly 5 to 6+ inches), they've become much more valuable to caregivers.

In the home health care setting, smartphones provide a number of advantages. They:

- Are typically the most affordable mobile device option;
- Are extremely portable, being able to easily fit in the caregiver's coat pocket;
- Now offer larger, easier to read display screens;
- Provide location awareness, typically utilizing GPS;
- · Can be ruggedized with third-party casing or come in ruggedized versions; and
- · Leverage the broadest set of medical software applications at this time.

However, vulnerabilities do exist. Smartphones:

- · Can be easy to misplace or leave behind;
- Might need to be recharged in the middle of a work day;
- Provide displays and processing power that are still too limited for more sophisticated, graphic-heavy medical apps; or
- May require data security.

TABLETS



The consumer tablet market has become one of the fastest growing sectors in mobile computing, with over 430 million tablets forecasted to be shipped globally in 2018. While initially targeted at consumers, these devices have quickly found their way into the business sector, including home health care.

Standard models weigh about a pound, are less than half-an-inch thick, and provide ample 10-inch displays. Other sizes—both larger and smaller—are also available, including the popular 7-inch mini tablets, which can fit perfectly in lab coat pockets. Multiple core processors deliver speed and power. And those big display screens are being leveraged by software developers to transmit high-resolution medical images.

The tablet form factor offers a number of benefits to home health care providers:

- While larger than the typical smartphone, tablets remain very portable and take up little space in a brief case or zippered folder.
- Their touch screens encourage quick and easy navigation, along with easy cleaning and disinfecting.
- Crisp, bright displays make it easy to view medical images, such as MRIs, X-rays and CT scans, at the point
 of care.
- Dual cameras, facing front and rear, allow the caregiver to share real-time images for review and diagnosis by other medical professionals.
- New ruggedized versions provide protection when the device is dropped or exposed to liquids.
- Digital pens are often available, providing a convenient way to take notes.
- Tablet price points are lower than those of laptop computers.
- The medical software application library for tablets continues to rapidly expand.

Concerns about tablets include the following:

• With some models, the additional cost of third-party casing can be necessary, given the consumer tablets' vulnerability to drops and disinfecting.

- As with any wireless device, data security has to be carefully managed.
- Battery life can be less than 10-12 hours.
- · Larger tablets can sometimes be viewed as a barrier between patient and caregiver.
- Without voice communications capability, some type of mobile phone is still required as a companion piece in most cases.

REMOTE PATIENT MONITORING DEVICES



Traditional remote patient monitoring devices belong to a larger mobile technology category called "machineto-machine" or M2M. While there are still a number of fairly clunky versions in existence, RPM meters and monitors are becoming progressively smaller, simpler, and easier to use.

This category includes a wide variety of devices—including pulse and blood pressure monitors, fingertip pulse oximeters, spirometers, glucose meters, and body weight scales—which the patient periodically connects to for readings. Typically, a Personal Area Network (PAN) interface—Wi-Fi, Bluetooth and ZigBee are common—wirelessly transmits the patient data to authorized caregivers.

When determining whether to invest in RPM devices, these advantages should be considered:

- Automated data collection increases diagnostic accuracy.
- Patients have a stronger sense of personal control and are more likely to comply with self-care behaviors.
- Patient safety, independence, and convenience are maximized.
- An increased emphasis on high-quality ergonomics has resulted in small, compact devices that avoid patient intimidation.

The "cons" of deploying remote patient monitoring devices include:

Unclear FDA approval requirements may slow the introduction of new, more advanced products.

- Data security may not be optimized.
- Little standardization exists at this time, which can lead to a confusing, non-integrated set of alternatives.
- The patient's insurance may not cover the cost of the device.
- Patients may resist using these solutions.

WEARABLES



While initially designed for consumer use, today's wearable device can work equally as well for remote workers. It's all in the apps, and top-tier application developers have already begun creating development kits to turn smartwatches into useful tools for field-based employees. For example, there is a smartwatch app available that allows a home health care aide to clock in and out of each job, view the shifts of other caregivers, and exchange messages with fellow aides. When choosing a smartwatch for workers, the home health care provider must pay close attention to the applications available for that particular device manufacturer and mobile operating system.

The introduction of consumer wearables presents a different spin when applied to the home health care patient or client. In the context of health monitoring, the initial wave of smartwatches and wristbands have focused on personal fitness and providing a "good enough" level of tracking accuracy. However, forward-looking device vendors also see the potential for a 24/7 health wearable that quantifies key biometrics in a much more rigorously precise fashion.

For example, in mid-2014, Samsung Business announced Simband, a hardware reference design for wearable health devices. Three noteworthy components of this design would make the wearable a good fit with the home health care effort:

- I. A sensor module allows different combinations of sensors to be utilized, depending upon the client's medical condition. These sensors could measure heart rate, blood pressure and flow, core body temperature, stress levels, etc. A GPS chip can track location and movement.
- 2. A new type of magnetic battery charger keeps the wearable monitoring on a consistent, 24/7 basis.
- 3. All data is uploaded to the cloud for easy access by authorized caregivers.

At this early stage, the advantages of medical wearables include:

- 24/7 monitoring Expanding beyond the limits of the usual one-hour appointment, the wearable allows the home health care agency to provide a new level of care that tracks and reacts on a real-time, anytime basis.
- Ease of use Designed properly, wearables can be easy for seniors or fragile patients to read and easy to wear.
- Reduced number of office visits with the doctor With the right backend support and analytics in place, physicians can work more closely with home health caregivers to address medical needs remotely.

Concerns regarding the use of wearables in the home health care sector include:

- Lack of high precision If not scientifically precise, caregivers will be hesitant to act on the recorded data.
- Backend systems and software apps These still need to be created.
- Data security HIPAA regulations must be satisfied.
- Reimbursement The patient's insurance may not cover the cost.
- Senior-specific needs The wearable ergonomics must be designed to meet the needs of clients with limited vision and motor capabilities.

MOBILIZING HOME HEALTH CARE: A CASE STUDY

Challenge

Philadelphia-based BAYADA Home Health Care operates 250 offices around the US. The provider needed to provide its caregivers (including therapists and medical social workers) with real-time access to patient data. In so doing, BAYADA also wanted to streamline its work processes in the field.

Solution

BAYADA selected Samsung and medical application provider Homecare Homebase to build and implement a custom mobile solution that allowed caregivers to download their assignments, view maps and directions, and then utilize wireless forms to record patient information. The new software was preloaded on the 7-inch Samsung Galaxy Tab® 7.0. After a limited pilot, BAYADA issued 4,000 of the devices to its workers.

Results

BAYADA experienced a significant reduction in employee travel time, an increase in caregiver productivity (including less after-hours paperwork), and overall improvement in its in-home patient care services.

FIRST STEP: CREATING A MOBILITY ACTION PLAN

When deciding where and how to begin integrating mobile technology into their day-to-day operations, home health care providers should keep the following action steps in mind:

- I. Decide on the composition of the strategy team. The actual users of the mobile solutions should be represented and take an active part in any decisions being made.
- 2. Clearly define and prioritize pain points. What is the first area that needs addressing? For example: Reducing paperwork? Improving the quality of patient care? Better dispatching? Meeting regulatory standards? Creating a new revenue stream?
- 3. Choose a mobility partner. Who is viewed as the most trusted advisor regarding mobile technology? Potential candidates include mobile device manufacturers, wireless carriers, mobile application developers, and systems integrators. Solicit recommendations from peers, interview prospects, and evaluate the strengths each brings to the table.
- 4. Determine whether to purchase prebuilt applications or create a customized solution. If custom, will it be built in-house or created by a third party? Given the level of in-house IT expertise, evaluate the pros and cons of cloud-based versus on-premise solutions. With cloud-based solutions, day-to-day management is handled by the developer. Also, servers and software don't have to be purchased outright, which can reduce a portion of upfront costs.
- 5. Decide which mobile form factor and operating system offers the best fit. What does the device need to do? Will the mobile solution scale easily to a smartphone or will it require the display size and processing power of a tablet? Will the onsite caregiver always have access to Wi-Fi, or will a cellular capability be necessary?
- 6. Ensure enterprise-grade security. Patient data security must be HIPAA compliant.
- 7. Be prepared to negotiate data plans, including overage charges, with the wireless carrier. A pooled plan often works best.
- 8. Run the business case. Clarify ROI expectations.
- 9. Consider a pilot. Depending upon the size of the home health care agency, a one- or two-month trial may be appropriate.

MOBILITY ACTION PLAN - FIRST STEPS				
\checkmark	Create strategy team, including actual end users.			
\checkmark	Define and prioritize pain points.			
\checkmark	Choose a trusted mobility partner.			
\checkmark	Decide on prebuilt vs. customized mobile apps.			
\checkmark	Define form factor(s) and mobile operating system(s).			
\checkmark	Ensure enterprise-grade data security.			
\checkmark	Negotiate data plans with wireless carrier.			
\checkmark	Run the business case.			
\checkmark	Consider a pilot.			

A FINAL WORD

Mobile technology has already begun to positively impact today's home health care effort. Providing highvalue, real-time data and analytics on a caregiver's mobile device enhances patient care, while also increasing employee productivity. Implementing remote patient monitoring takes caregiving to an even higher level, offering convenience and providing peace of mind to both the client and his or her family.

Simply put, mobile technology has become a must-have in the highly competitive and rapidly growing field of home-based health care.

To learn more about how mobility solutions can positively impact the home health care mission, please visit www.samsung.com/healthcare.

I National Health Expenditures by Type of Service and Source of Funds: Calendar Years 1960-2013. Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group.

² Long-Term Care Services in the United States: 2013 Overview. National Health Care Statistics Reports, Number I. Hyattsville, MD: National Center for Health Statistics, 2013.

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	San Antonio 7550 West Interstate 10, Suite 400 San Antonio,TX 78229 Tel 210.348.1000 Fax 210.348.1003		
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