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WHITE PAPER

HEALTHCARE MOBILITY

TAKING CARE BACK TO THE COMMUNITY

Healthcare systems around the world are under pressure to improve services, while reducing costs — doing more with less. Mobile technology and the Internet of Things (IoT) shows the potential to fast-track healthcare within the community and focus on prevention as opposed to treatment. However, the billions of devices emerging due to the IoT will introduce many new risks, security and privacy being the most significant. Hospitals and community health organizations need to mitigate these risks, to secure and manage all of these new devices, endpoints and solutions in today's rapidly evolving landscape.

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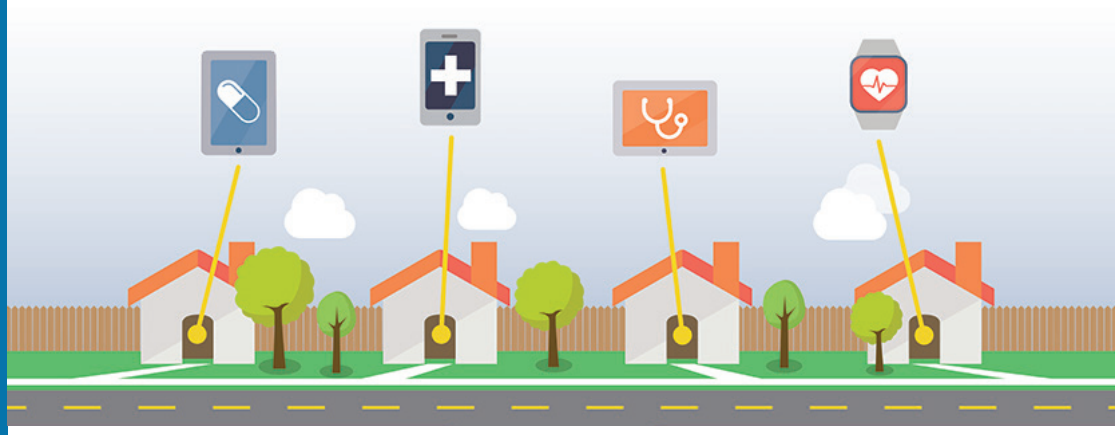
HEALTHCARE IS MOVING BACK TO THE COMMUNITY



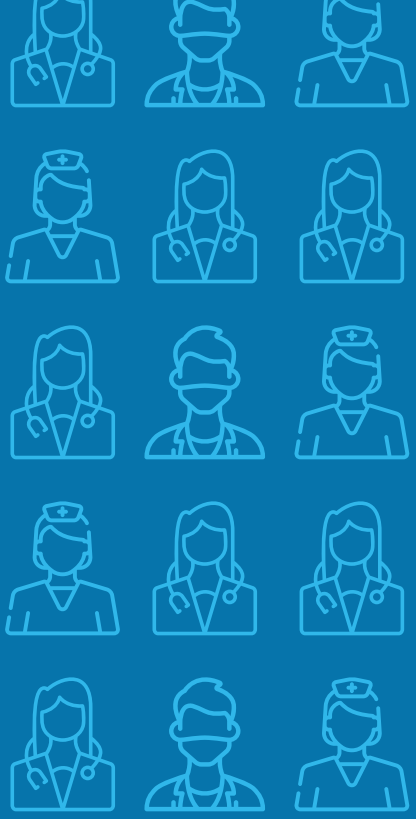
Healthcare systems around the world are under many stresses – waning staff resources, waxing population pressure, emerging and easily transmittable diseases, and new technology trends are perhaps the most significant.How are national and private healthcare systems dealing with these stresses and why is there a renewed focus on community-based healthcare?

To compensate, healthcare systems are renewing their focus on enabling healthcare in the community – emphasizing prevention instead of diagnosis and treatment. The rapid growth of technology is another reason for the growth of healthcare moving back into the community. Technology breaks down the walls of the hospital and extends the reach of healthcare professionals into the community and patient homes making it convenient, affordable and accessible.

WHERE HAVE ALL THE FAMILY DOCTORS GONE?

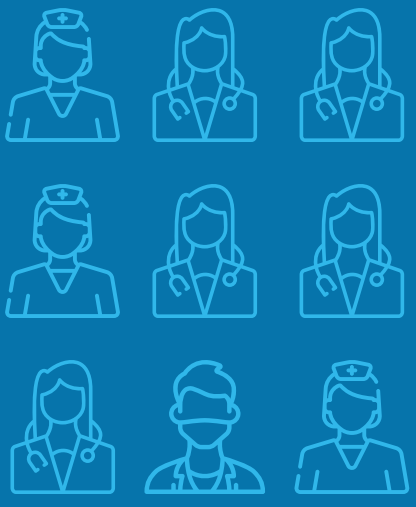
Over the last 30 years, many countries and regions around the world have seen a decrease in the availability of family doctors. There are many reasons behind this trend, the most common being the doctor's desire for better quality of life. Medical school graduates are choosing medical and surgical specialties over family medicine because of the higher salaries and lower amounts of administrative work. This is a significant issue in the U.S. where the average medical school debt at graduation is over $150K USD. Medical students are choosing higher paid specialties to maximize their income and repay their debts faster.

At the same time, challenges associated with remoteness, subpar infrastructure and poor working conditions are driving family doctors to setup practices in urban centres as opposed to rural locations. This trend magnifies the shortage of family doctors in the rural areas, increasing the doctor/patient ratio and making it an even harder choice for new doctors. For example, in urban India the patient to doctor ratio is close to the World Health Organization (WHO) standard of 1:1000[1], but rurally, it is more than four times as high. Unfortunately, unless new policies are enacted to make practicing family medicine more lucrative, or to increase government investment in rural healthcare infrastructure, the shortfall of primary care doctors is going to continue. According to the Association of American Medical Colleges (AAMC), the U.S. can expect a shortfall of 65,000 primary care physicians through 2025 and this shortage is not limited to physicians — nurses, physician assistants and other allied health professionals will be in short supply over the next 10 years.[2]



65,000

The U.S. projects a shortfall of 65,000 primary care physicians through 2025.



1. NCBI, September 2018
2. AAMC, June 2020

The United Nations estimates that by 2050 more than 1 in 6 persons (1 in 3 in more developed regions) throughout the world will be aged 65 and over.

3. United Nations World Population Prospects, 2019

GLOBAL POPULATION TRENDS IMPACT HEALTHCARE

At the same time that availability of primary care doctors is shrinking, demand for their services is growing. The global population is estimated to reach 9.7 billion by 2050, and a growing number of them will be elderly. Increased life expectancy and decreased birth rates are resulting in an older global population. Data from the United Nations estimates that by 2050 more than 1 in 6 persons (1 in 3 in more developed regions) throughout the world will be aged 65 and over.[3]

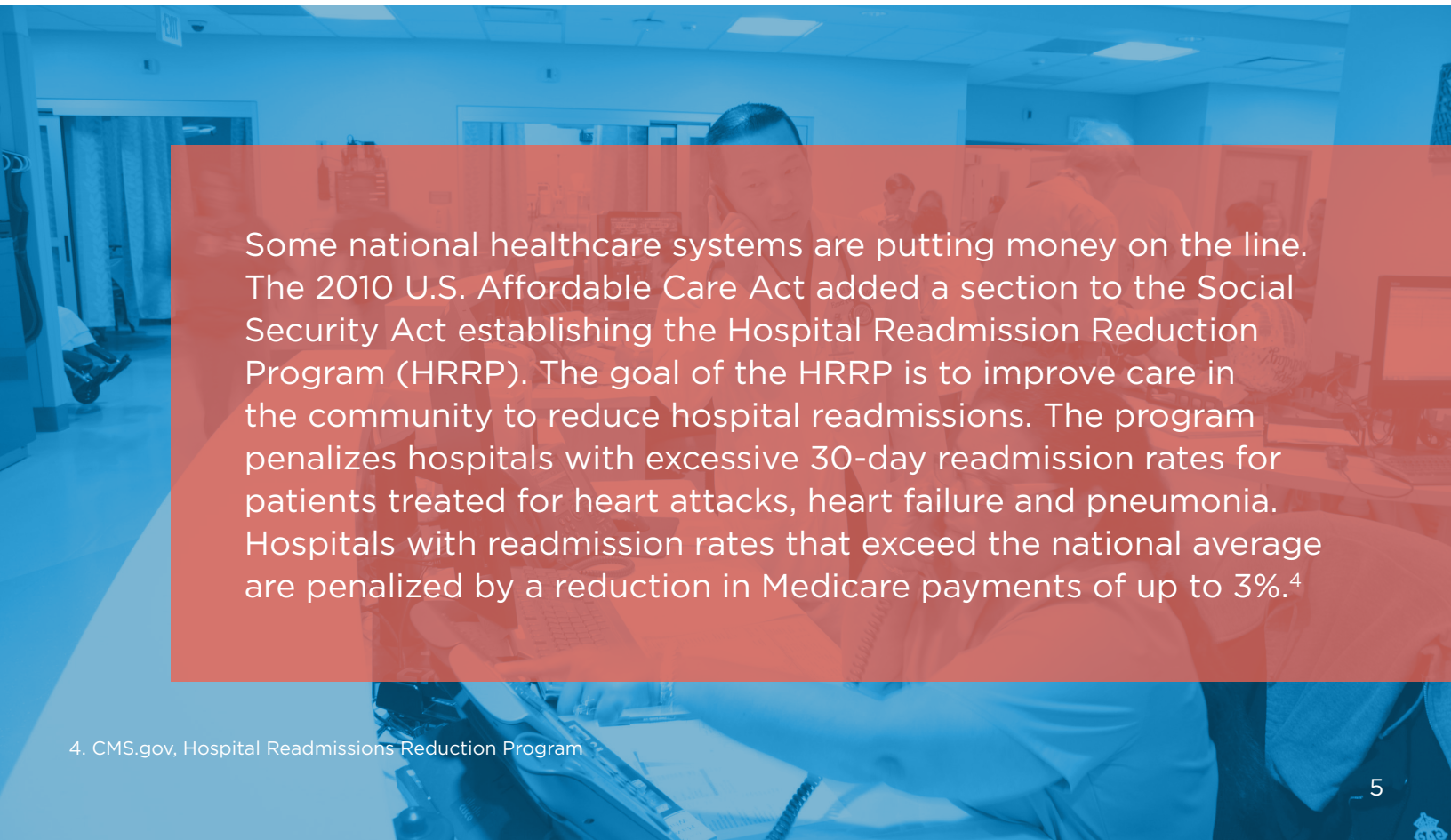
Age in itself is not a problem, but with advanced age comes an increased likelihood of chronic disease and disability. People aged 65 and older are two to three times as likely to suffer from chronic disease, such as: high blood pressure, arthritis, diabetes, osteoporosis and heart disease. Some of these diseases require constant management to maintain an adequate quality of life.

COMMUNITY HEALTHCARE BENEFITS EVERYONE

Community-based healthcare has many benefits over hospital-centric acute care. That is not to suggest that secondary and tertiary care are not required or effective, they are vital elements of the continuum of care. However, community-based primary care is more efficient and effective. Community care promotes wellness and prevention, as opposed to treatment or surgery. Community-based healthcare supports patients with chronic illness in their home and engages them in self-management and decision-making keeping them more involved and happier.

Studies have shown that countries and states that focus more on community-based primary care will see the following benefits.

BENEFIT	EXAMPLE
Decreased Costs	Medicare/NHS spending Inpatient reimbursements
Decreased Resource Inputs	Hospital/ICU beds Capital equipment Physician FTEs and allied health FTEs
Decreased Utilization Rates	Physician visits Days in ICUs Days in the hospital
Increased Quality of Care	Fewer ICU deaths Reduced Hospital acquired infections Higher composite quality score
Increased Patient Satisfaction	Reduce readmission rates Positive qualitative indexes and survey responses



Some national healthcare systems are putting money on the line. The 2010 U.S. Affordable Care Act added a section to the Social Security Act establishing the Hospital Readmission Reduction Program (HRRP). The goal of the HRRP is to improve care in the community to reduce hospital readmissions. The program penalizes hospitals with excessive 30-day readmission rates for patients treated for heart attacks, heart failure and pneumonia. Hospitals with readmission rates that exceed the national average are penalized by a reduction in Medicare payments of up to 3%.[4]

4. CMS.gov, Hospital Readmissions Reduction Program

MAKING COMMUNITY-BASED HEALTHCARE BETTER

If the shortage of community-based family doctors is here to stay, what can we do to shift the emphasis of healthcare from reactive to proactive, and make more efficient use of diminishing resources? We must facilitate primary care in the community and empower patients to participate in their own health and wellness at home.

ONLINE RESOURCES

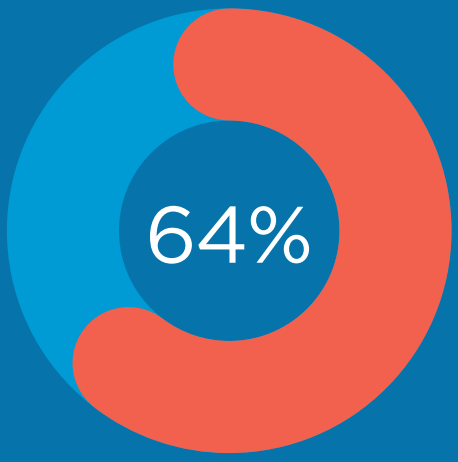
Increasingly, patients are consulting online health and wellness resources for medical information. Unfortunately, there are quite a few online sites that are not credible and may even be damaging to one's health. The next tier up is for patients to use self-service websites, such as WebMD in the U.S. and DrEd, in the UK to research symptoms and ask healthcare questions from their home. Another possibility is asking friends and family for support, or joining online patient communities such as PatientsLikeMe to discuss their condition with patients sharing the same diagnosis. When asked, doctors recommend the websites of national healthcare organizations (e.g. NIH, NHS and AIHW) as the most effective starting point for research.

MOBILE HEALTH AND WELLNESS APPLICATIONS

Another significant trend is the rising popularity and utility of mobile health applications. According to MobileHealthNews[5], over 400 million mobile healthcare apps were downloaded globally in 2018, while IQVIA[6] says there are over 318,000 health apps available via app stores. It is estimated that over 60% of smartphone owners have downloaded a mobile health application; mostly exercise and weight loss apps.[7] Doctors think that mobile health apps can benefit patients in a couple of ways – they can increase the doctor's knowledge of the patient's general health, encourage patients to take responsibility for their own health and reduce the number of visits to a doctor's office.

Over 60% of smartphone owners have downloaded a mobile health application.

5. MobileHealthNews, April 2019
6. IQVIA, November 2017
7. Mobius MD, March 2019



Due to the COVID-19 pandemic, telehealth is expected to experience 64% growth by the end of 2020 and seven-fold growth by 2025.[8]

HOME MONITORING

Remote patient monitoring is an effective way to extend the reach of the hospital outside of its walls and to engage patients as partners in their own care. Empowering patients to manage their own chronic conditions, such as diabetes or congestive heart failure, outside of the hospital can reduce readmissions and costly major medical episodes. In addition, monitoring activity and other wellness contributors can help change patient behaviour and proactively reduce medical needs.

Another use and benefit of remote monitoring is improving the quality of life for seniors living in their homes. Motion detectors or pendants with accelerometers for fall detection and movement tracking can monitor a senior's movement and generate an email or text message if there is an atypical, prolonged period of inactivity. The same device can include an emergency button that can alert a home monitoring service, family member or Emergency Medical Services (EMS).

TELEHEALTH AND MORE

Another way to extend the reach of the hospital into the community, or beyond, is the delivery of health related service via telecommunications technology. This is referred to as telehealth. Telehealth is comprised of many sub specialties, including:

TELEMEDICINE

Offers clinical healthcare via telecommunications. This includes the transmission of patient medical records, diagnostic image data and real-time patient data. This also includes physicians using videoconferencing and augmented reality for real-time clinical consultations.

TELETRIAGE

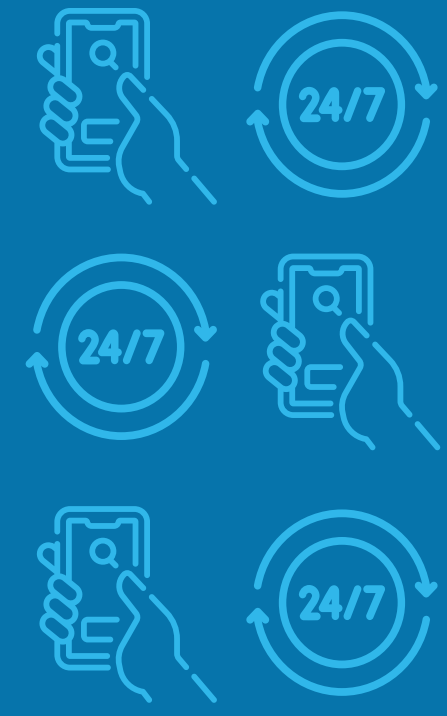
Is typically staffed by nurses and focused on remotely assessing a caller's condition and the severity of the issue. The goal is to help patients by answering their questions and to prevent unnecessary and expensive ER visits.

TELEPSYCHIATRY

Allows patients to communicate with registered mental health professionals, such as psychiatrists, psychologists and nurse practitioners, for a variety of reasons, including: medication consultation and management, as well as suicide prevention and counselling.

8. Frost and Sullivan, 2020

90% of smartphone users have their device within arm's reach 24/7 and check them within 15 minutes of waking up.



9. Healthcare Success, 2019

MOBILE TECHNOLOGY EMPOWERS HEALTHCARE IN THE COMMUNITY

Smartphones and tablets have become an integral part of peoples lives. According to Healthcare Success, over 90% of smartphone users say they have their phones within arm's reach 24/7 and that 80% check them within the first 15 minutes of waking up.[9] The growth of the Internet of Things (IoT) will see more devices and more types of devices and endpoints. In addition to smartphones and tablets there will be new "things" such as wearable monitors and sensors, digital scales and A/R headsets. How will all these mobile devices, wearable sensors and IoT endpoints contribute to community healthcare?

SMARTPHONES AND TABLETS AS APPLICATION PLATFORMS

In addition to mobile health and wellness applications for patients, smartphones and tablets are excellent platforms for medical apps. Every day physicians, nurses and other allied health professionals use mobile devices for email, voice and chat communications. They also search reference material and drug databases from anywhere, as well as access Healthcare Information Systems (HIS) to execute clinical workflows. Patients at home are able to use mobile devices running custom applications to interface with sensors, monitors and wearable endpoints. Mobile physicians, nurses and therapists take custom tablets into patient homes to update medical records, log therapy sessions, record patient progress and show educational videos.

REAL-TIME LOCATION SERVICES (RTLS)

Locating and tracking people and things can be a valuable tool for community healthcare. Different technologies provide different types of location services. For example, GPS integrated into smartphones or dedicated, GPS-enabled tracking anklets/pendants deliver macro-location capabilities. At a lower level, such as within a house or facility, Wi-Fi triangulation, Radio Frequency Identification (RFID) and Bluetooth Low Energy (BLE) deliver micro-location capabilities. Used together, these technologies can locate people or things within 10m accuracy around the city, or within centimetres inside the home.

MACRO-LOCATION SERVICES	MICRO-LOCATION SERVICES
• Tracking people as they move around a town/city. • Establishing a geofence to trigger a warning if a patient strays outside of a defined boundary. • Providing healthcare professionals navigation and wayfinding to a defined address.	• Tracking patients around their home and reporting unplanned inactivity. • Detecting patient proximity to important objects, such as pill bottles, to trigger medication reminders. • Tracking and locating key fixed assets within a community care facility.

WEARABLE MONITORS AND SENSORS

Portable monitors for healthcare are nothing new — portable electrocardiogram (ECG) monitors have been available for almost 20 years. However, it is only within the last few years that advancements in miniaturization, connectivity and battery life have enabled truly innovative wireless ECG monitors that are more accurate than the previous, more invasive units.

It is important to distinguish between medical grade monitors and the new fitness wearables that have become popular in the last few years. These fitness devices are heart rate monitors only, and even then only provide around 80% of the accuracy of the approved ECG devices. This is an important distinction as the heart rate data collected by fitness peripherals has no real diagnostic value to a physician, except to establish baseline activity levels and habits. The next generations of these devices will begin to blur the boundaries between consumer-grade and medical-grade.

It's estimated that by 2022, 25% of all adults will use a wearable healthcare device of some sort.[10] Some of these include:

1. Home Sleep Apnea monitors that measure and record heartrate, airflow and blood oxygen, while also detecting head position, movement and snoring.
2. Remote maternal and fetal heart rate monitors that can upload data in real-time to a fetal monitoring centre and provide physicians with web portal access. This is great for high risk pregnancies in situations with maternal diabetes, kidney disease or high blood pressure.
3. Continuous glucometers with Bluetooth capabilities that can display blood glucose levels for Type 1 Diabetes patients in real-time and allow transmission to medical professionals.

$46.6b USD

By 2025, the global wearable healthcare devices market is expected to be worth $46.6 billion USD.[11]

10. HealthInformatics, Big Data and Wearable Health Monitors: Harnessing the Benefits and Overcoming Challenges
11. Markets and Markets, Wearable Healthcare Devices Market

RISKS ASSOCIATED WITH MOBILE HEALTHCARE TECHNOLOGY

The rapid growth of the IoT in healthcare is not without its risks and challenges. With potentially tens of billions of IoT endpoints hitting the global healthcare market over the next five years[10], even the smallest risks become vitally important.

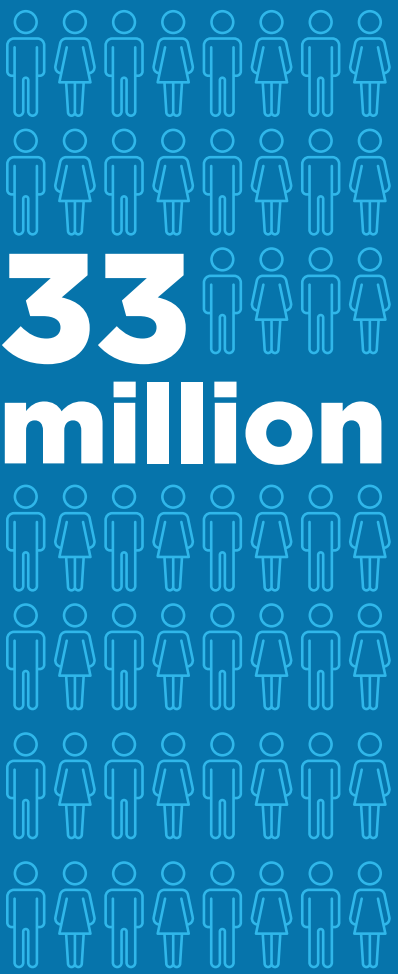
In October 2014, the U.S. Food and Drug Administration issued guidelines detailing what security features companies should include when they are seeking FDA approval for a new IoT medical device. Unfortunately, in its current state, the FDA guidelines are still optional and do not focus on the security of the device. They are primarily intended to ensure that the device has a clear clinical benefit.

MAKE SURE ONLY THE RIGHT PERSON CAN ACCESS AND CONTROL A DEVICE

In the new world of the IoT, healthcare will see billions of new devices and endpoints containing a diverse range of features, connections, standards and protocols. Some of these devices may be simple and any associated risk is low, such as a digital thermometer. However, others will not be as benign. Modern pacemakers include a wireless capability that could render them "hackable." The idea of hacking into someone's pacemaker to deliver an 830-volt shock is not completely science fiction. This highlights a very important aspect of IoT endpoint security – device security – making sure that only the appropriate person can access and control a device. This will be a critical issue when distinguishing "medical-grade" IoT endpoints from simple, "consumer-grade" devices.

THE IDEA OF HACKING INTO SOMEONE'S PACEMAKER TO DELIVER AN 830-VOLT SHOCK IS NOT COMPLETELY SCIENCE FICTION.

Combined, the 10 biggest healthcare data breaches in the first six months of 2019 alone resulted in nearly 33 million patient records lost.[12]



12. HealthITSecurity, The 10 Biggest Healthcare Data Breaches of 2019 So Far

KEEP PATIENT INFORMATION PRIVATE AND PROTECTED

Another critical area of security for IoT devices is keeping patient data and personal information private. In security terms, there are two issues at stake: data security – making sure that any data stored on the device is protected, and network security – making sure that any patient data transmitting to and from the device is encrypted. Whether it is the Health Insurance Portability and Accountability Act (HIPAA) in the USA or the General Data Protection Regulation (GDPR) in the EU, healthcare organizations are required by law to protect patient data. Data breaches can lead to government fines, litigation and bad press.

ADOPT FULL LIFECYCLE DEVICE MANAGEMENT

In addition to security, there is another challenge arising from the rapid onset of the IoT – device and endpoint management. Companies may now be dealing with thousands or tens of thousands of IoT endpoints, with a diverse array of features and different methods to communicate. In response to this, it becomes more important than ever that you manage these endpoints throughout their entire lifecycle, from deployment to retirement. This includes all of the traditional elements of mobility management, including:

- Deployment, enrollment and provisioning
- Physical security and asset tracking
- Application and content management
- Device retirement

THE FUTURE OF HEALTHCARE REQUIRES AN INTEGRATED MOBILITY STRATEGY

Industry analysts project healthcare to be one of the industries investing the most in the Internet of Things. The IoT has the potential to significantly improve the efficiency and effectiveness of healthcare inside the hospital and outside in the community. New devices and endpoints enable new types of medical applications and content, empowers employees and streamlines clinical and operational workflows. However, healthcare organizations must secure and manage the vast numbers of endpoints that they are deploying to keep patient data secure and private. Enterprise Mobility Management (EMM) is made for the IoT. But it goes beyond devices, applications and content to include people and processes. EMM manages the risks associated with the IoT, empowers workers and allows the company to transform their business while maintaining compliance and security. At the same time, EMM helps deliver lifesaving care to those who need it most.

Enterprise Mobility Management (EMM)

EMM is the industry term for the management of mobile devices and their applications, content and security. It goes beyond MDM by adding management for device ownership/deployment models, data at rest, data in transit and wireless network connections.

SOTI LEADS THE WAY WITH THE SOTI ONE PLAFORM

SOTI has been managing mobility for over two decades. We managed dedicated-purpose mobile devices before smartphones were introduced, and now we are leading the way to making the IoT manageable. We have a proven track record of delivering powerful, easy-to-use mobility management solutions for healthcare. The SOTI ONE Platform makes mobile and IoT business operations simpler, smarter and more reliable. Manage endpoints, applications, content, email and security, from a single, unified interface.

TO LEARN MORE:

Contact a SOTI sales representative: sales@soti.net or visit: soti.net/healthcare

SOTI is a proven innovator and industry leader for simplifying business mobility and IoT solutions by making them smarter, faster and more reliable. SOTI helps businesses around the world take mobility to endless possibilities.

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