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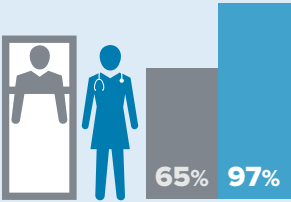
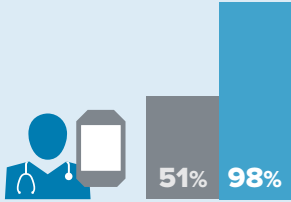
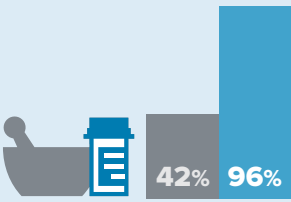

THE FUTURE OF HEALTHCARE:

2022 HOSPITAL VISION STUDY

**MOBILE TECHNOLOGY ELEVATES
PATIENT CARE, EMPOWERS CLINICIANS
AND ENHANCES WORKFLOWS**

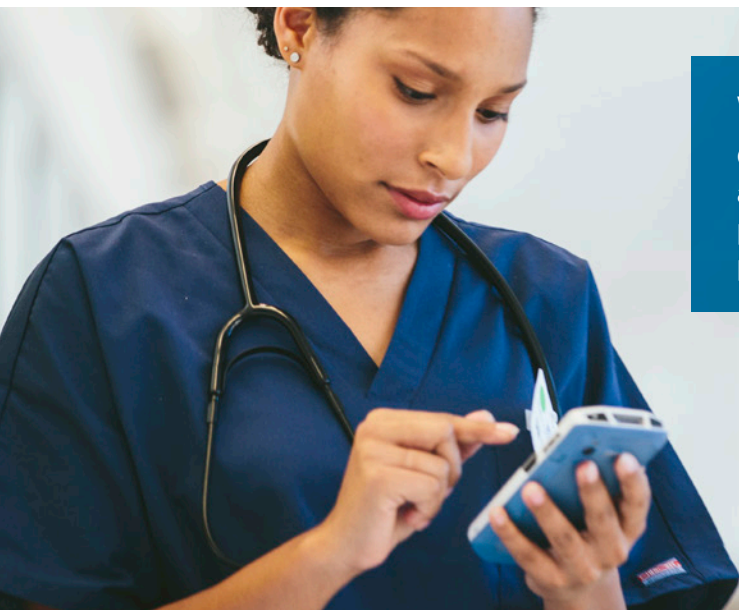
HEALTHCARE IN 2022

Respondents identified compelling shifts in acute care hospitals and their impact on quality, cost and outcomes.

GROWING USE OF MOBILE DEVICES	DELIVERING MEANINGFUL IMPROVEMENTS	EMERGENCE OF TECH-SAVVY PATIENTS	TRANSFORMATIVE TECHNOLOGY TRENDS
<p>2017 2022</p>  <p>65% 97%</p> <p>Bedside Nurses</p>  <p>51% 98%</p> <p>Physicians</p>  <p>42% 96%</p> <p>Pharmacists</p>	<p>CURRENT IMPACT OF MOBILE TECHNOLOGY:</p> <p>COST REDUCTION</p> <p>55% Of hospitals cite reduced cost of patient care</p> <p>QUALITY IMPROVEMENT</p> <p>72% Of hospitals highlight improved quality of patient care</p> <p>ENHANCED PATIENT SAFETY</p> <p>61% Of nurses report reduced medication administration errors</p> <p>96% Of nurses plan to access predictive analytics on mobile devices by 2022</p>	 <p>77% Of patients felt positive about clinicians using mobile devices in their care</p> <p>57% Currently use wearables to track health metrics</p> <p>95% Willing to share health metrics collected from wearables with clinicians</p>	<p>1 Remote patient monitoring</p> <p>2 Telehealth</p> <p>3 Artificial Intelligence</p> <p>83% Expanding use of Real-Time Locating Service (RTLS) for dynamic staff workflows</p>

Zebra's Healthcare Vision Study

Clinical mobility is transforming care at healthcare facilities around the world and is having a profound impact on nurses, doctors, IT executives and patients. Zebra commissioned three global research studies to better understand the role of technology in acute care hospitals. The studies focused on nurse managers, IT decision makers and recently hospitalized patients. *The Future of Healthcare 2022 Hospital Vision Study* summarizes the results of this analysis.



WHAT IS CLINICAL MOBILITY?

Clinical Mobility is the use of mobile devices (such as handheld mobile computers, tablets and mobile printers) by physicians, nurses and other healthcare professionals at the point-of-care.

FACTORS DRIVING INVESTMENT IN CLINICAL MOBILITY

- 1 IMPROVE PATIENT OUTCOMES
- 2 INCREASE STAFF WORKFLOW EFFICIENCY
- 3 REDUCE THE COST OF PATIENT CARE
- 4 COMPLY WITH NEW LAWS AND REGULATIONS
- 5 OPTIMIZE PAYER REIMBURSEMENT (IN U.S. ONLY)

EXECUTIVE SUMMARY

The global healthcare industry is facing a seemingly insurmountable number of challenges – from aging populations and staff shortages to rising costs – that are placing enormous pressure on institutions, doctors, workers, patients and communities. As a result, there is a higher demand for services and support that are not sustainable with existing resources and methods. Hospitals are increasingly turning to technology and automation to reduce the strain on an already fragile system.

CLINICAL MOBILITY IS THE ANSWER

The good news is that there is a solution that can help ease the stress on the system, improve patient care, create workflow efficiencies and better utilize limited resources. Thanks to the adoption of clinical mobility, hospitals around the world are eliminating manual, error-prone procedures and replacing them with digital solutions that increase the accuracy of patient identification, streamline processes, improve the quality of patient care and enhance overall visibility. By digitally capturing information, data can be transmitted in real time to clinical staff, reducing – even eliminating – errors and delivering critical time savings.

Expanding Use of Mobile Devices

Hospitals are already realizing gains in productivity by outfitting key personnel with mobile devices. The study showed that by 2022, 97% of nurses will use mobile devices at the bedside which will help instill greater patient confidence. The study also revealed an increase in the number of medical disciplines embracing clinical mobility solutions including emergency room nurses, pharmacists and lab technicians. In fact, by 2020, usage of mobile devices is expected to grow up to 40% for all hospital workers. Rich applications, remote patient monitoring and artificial intelligence will enliven the daily work experience and empower clinicians with greater insights and information to treat patients.

Enriching Staff Communications

According to The Joint Commission, 70% of medical errors are attributable to communication breakdowns.¹ By integrating clinical mobility throughout their organizations, hospitals will improve staff communication, make real-time access to medical records possible and ensure faster availability of lab results, to name just a few. Mobile devices enable nurses to spend more time at the patient's bedside. Over 65% of nurse managers and IT executives cite improved communication and collaboration as the primary benefit of clinical mobility in patient care.

Elevating Patient Care

According to the study, 72% of respondents cite improved quality of patient care as a direct result of clinical mobility. In addition, 61% of hospitals surveyed reported a reduction in medication administration errors, and 52% cited decreased specimen collection labeling errors, positively affecting patient care.

Rising Personalization of Healthcare

The digital hospital of the future won't just be more efficient, but it will also deliver better care, be more affordable and more deeply engage patients in their treatment and recovery. Most respondents expect analytics technology to improve the quality of healthcare globally. In addition, tech-savvy patients are finding comfort in technology and are, in fact, bringing their data with them to the hospital. Ninety-five percent of patients surveyed are willing to share electronic health metrics.

¹ The Joint Commission, <http://www.nursingcenter.com/cearticle?an=01271211-201401000-00005>

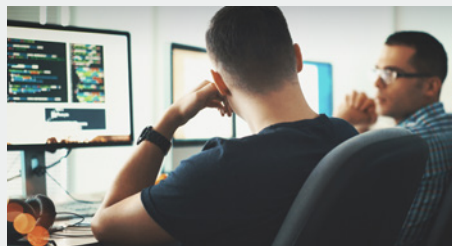
AN EVOLVING HEALTHCARE ECOSYSTEM

At the heart of creating a successful clinical mobility program is understanding the users who employ the devices in their day-to-day work environments as well as those they serve. These individuals include nurses, physicians, pharmacists, lab technicians, radiologists, patients and more. While nurses are actively engaged at the patient's bedside and use technology daily, it's the IT team that must implement and maintain the system while ensuring compliance with security and patient privacy requirements. Patients must grow accustomed to technology's evolving role in their care. For some, this will be extraordinarily difficult. For more technologically astute patients, clinical mobility will not be a leap but quite possibly a demand.



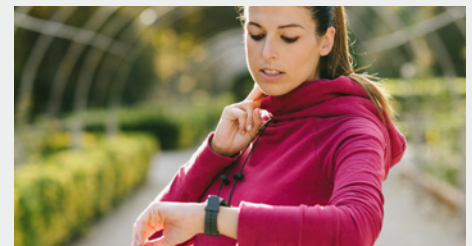
NURSES: TRADITIONAL HEALTHCARE HEROES

Nurses are the lifeline of the hospital. Nursing staff at 62% of hospitals surveyed currently access patient electronic health records on their mobile devices, followed by 57% who use mobile devices to access diagnostic lab results. By 2022, hospital staff anticipate using mobile devices and predictive analytics to improve diagnosis and personalize care.



IT PROFESSIONALS: THE GREAT FACILITATORS

As clinical mobility finds a home in acute care hospital settings, the IT department's role will become even more complicated as they work to block security intrusions and ensure systems and devices work seamlessly. Currently, 36% of hospitals are using mobile devices and that number is expected to double by 2022, dramatically increasing the number of devices IT will need to manage.



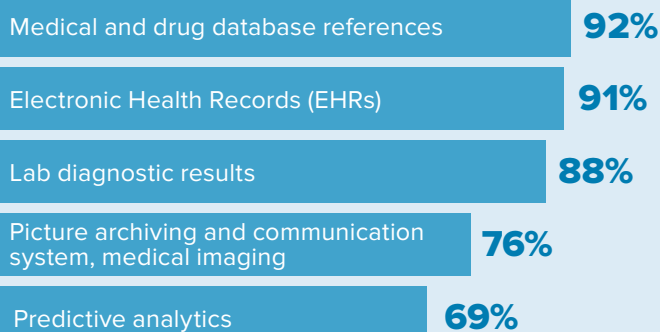
PATIENTS: EMERGING HEALTHCARE HEROES

Patients are embracing technology in healthcare. In particular, young, tech-savvy individuals are better informed and already using wearables to track their health data. The study reveals that patients are becoming better prepared for their hospital stay with 48% making a list of questions and 46% checking online sources. Of those responding in this manner, 68% were under 40 years of age.

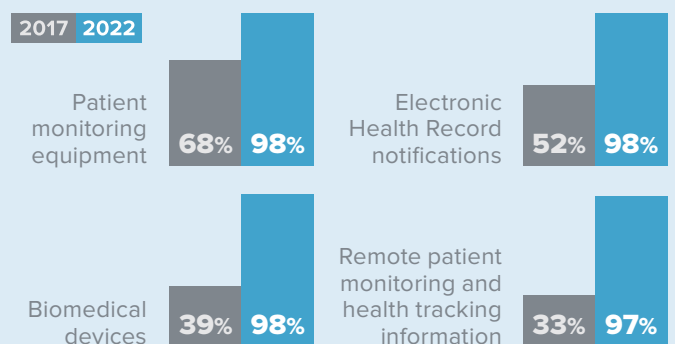


NURSES IN 2022

DATA ACCESSED ON MOBILE DEVICES



ALERTS/ALARMS ACCESSED ON MOBILE DEVICES



ADVANCING CARE AND INCREASING EFFICIENCY

The benefits of clinical mobility in patient care are clear. The average nurse walks four to five miles per 12-hour shift.² Mobile devices help nurses improve efficiency by increasing time at the bedside.

According to the study, by 2022 nurses across all disciplines – bedside, emergency room, operating room and intensive care – as well as physicians, pharmacists, and lab technicians will increasingly use mobile technology. In many cases, it is becoming an indispensable tool. Use cases include verifying the right medication is administered to the right patient; monitoring a patient’s vital signs while moving around the hospital, confirming a lab order before drawing a specimen; accessing health records and test results, and even locating supplies or tracking inventory.

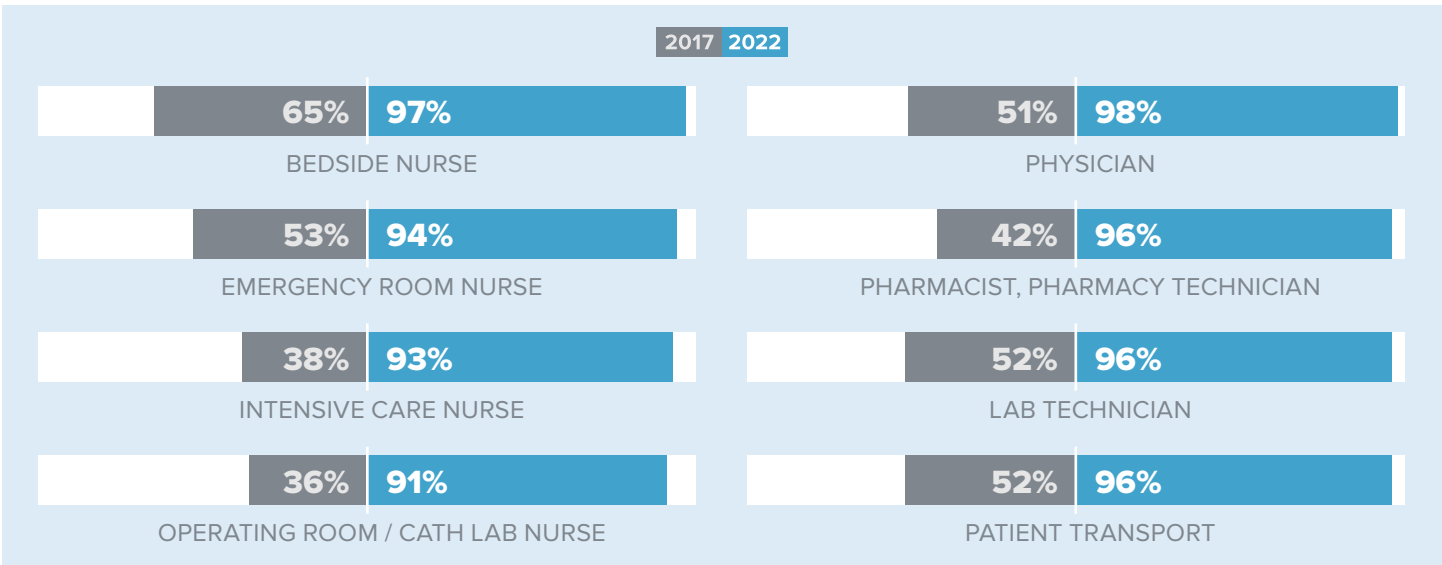
While access to this information advances the quality of care, it also presents additional security concerns related to patient privacy. That’s why securing data and devices is more important than ever. IT departments at 42% of hospitals surveyed are

looking to implement data encryption and remote device wiping on mobile devices within the next year.

HI-TECH DEMANDS

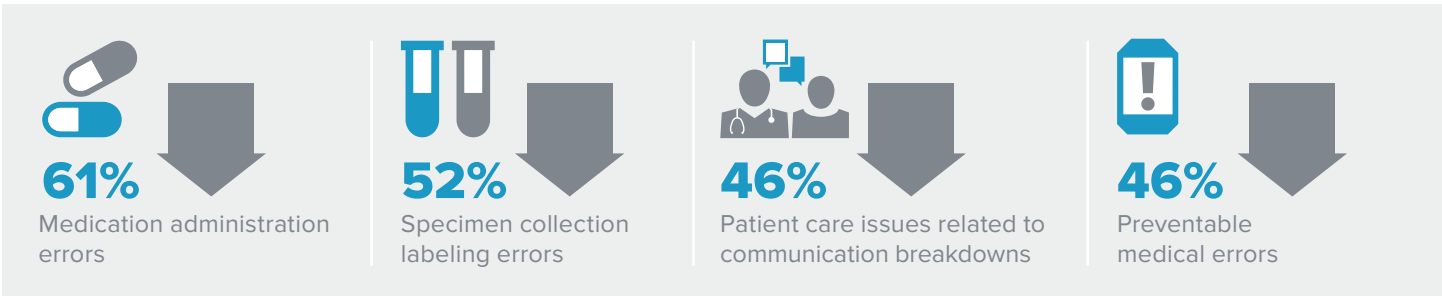
Clinicians are facing increasing pressure to be more technology savvy. From smart infusion pumps to handheld computers, technology must be easy and intuitive to use and adaptable for the highly-specialized requirements found in hospitals. Devices must support operation with gloved hands, scan right the first time and every time and vibrate alert so as not to wake sleeping patients. In addition, new technology must be able to withstand repeated cleaning and disinfection to eliminate the potential spread of bacteria.

MOBILE DEVICE USAGE IS EXPECTED TO INCREASE DRAMATICALLY



REPORTED BY IT EXECUTIVES

CLINICAL MOBILITY ELEVATES QUALITY OF PATIENT CARE



REPORTED BY NURSE MANAGERS

² <http://healthcare.areasvoices.com/2016/03/10/8-shocking-habits-of-nurses/>

INTENSIFYING USE OF MOBILE COMMUNICATION APPLICATIONS BY 2022



99%

SECURE TEXT
MESSAGING



98%

VOICE
COMMUNICATION



97%

PICTURE TAKING
OF WOUNDS/
SKIN CONDITIONS



96%

TELEHEALTH



94%

VOICE
RECOGNITION/
DICTATION

REPORTED BY NURSE MANAGERS

IMPROVING STAFF COMMUNICATION IS ESSENTIAL

Throughout the healing process, patients may require care from a broad range of medical practitioners, from nurses, physicians and specialists to technicians, therapists, pharmacists, and more. Communication between the disciplines is critical, but remains a pervasive problem. In fact, more than a quarter of hospital readmissions could be avoided with better communication among healthcare teams and between providers and patients.³



COMMUNICATION AREAS NEEDING IMPROVEMENT

1

Nurse-to-physician communication

2

Nurse-to-nurse communication

3

Nurse call and patient monitoring
alerts to mobile devices

4

Clinical decision support
(real-time information)

REPORTED BY NURSE MANAGERS

The study found that a lack of real-time patient health information at the bedside is the biggest barrier to achieving optimal patient care in hospitals globally.

Nurses armed with the most up-to-date information about patients can spend more time at the patient's bedside, better prioritize alarms and optimize workflows with improved communication among colleagues. According to the study, 67% of nurse managers credit clinical mobility with improving staff communication and collaboration as well as the quality of patient care.

Globally, 64% of IT executives identify nurse to physician communications as a top area needing improvement. Additionally, 60% conceded communication through the health system network to doctors needs improvement in hospitals. This data suggests that when implementing clinical mobility, IT leaders need to invest in the proper infrastructure, such as nurse call systems, VoIP and wireless local area networks (WLANs) for seamless communication.

CLINICAL MOBILITY ENHANCES COMMUNICATION

67%

Improved staff
communication
and collaboration



50%

Increased patient care
focus and attentiveness
(less non-critical interruptions)



44%

Increased medical
workflow accuracy
and precision



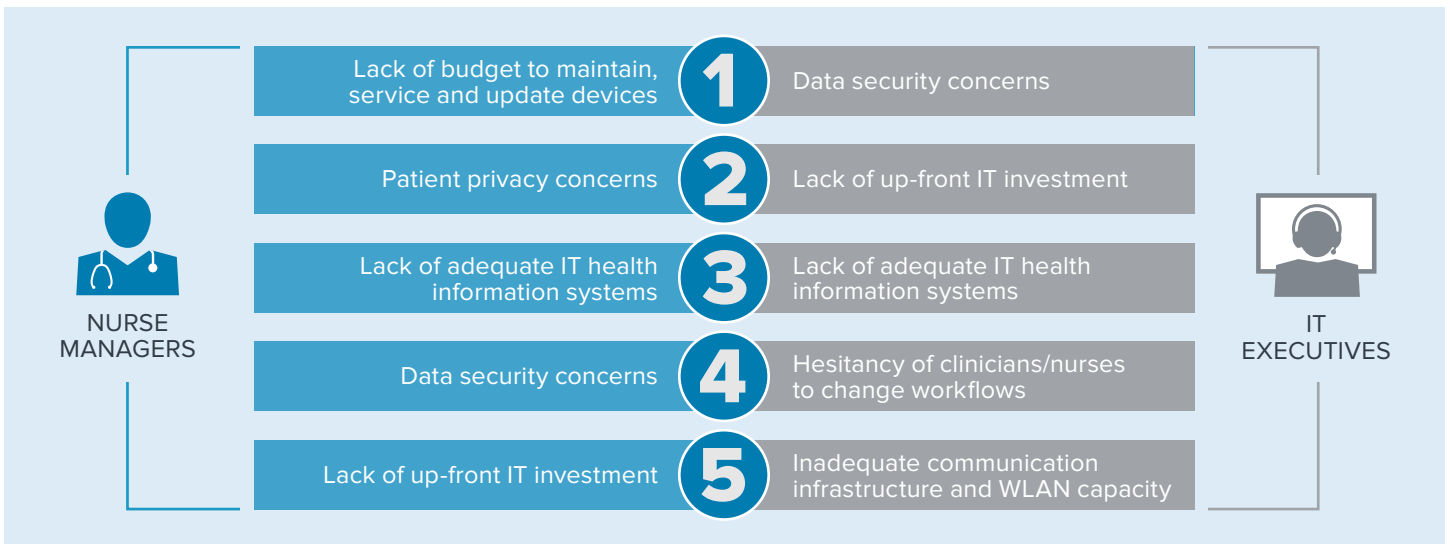
42%

Improved information
availability and point-of-
care decision making

REPORTED BY NURSE MANAGERS

³MPH, Andrew D. Auerbach MD. "Readmissions in a National Cohort of General Medicine Patients." *JAMA Internal Medicine*, American Medical Association, 1 Apr. 2016, jamanetwork.com/journals/jamainternalmedicine/fullarticle/2498846.

CLINICAL MOBILITY IS VITAL BUT MUST OVERCOME IMPLEMENTATION OBSTACLES NURSE MANAGERS AND IT EXECUTIVES RANK BARRIERS



MODERNIZING THE HEALTHCARE INFRASTRUCTURE

More and more, systems inside and outside the hospital are becoming connected and transforming the healthcare delivery system, creating high-efficiency workflows that minimize errors and reduce costs.

What does it take to reap these benefits and who is ultimately responsible for making the changes? Worldwide, healthcare facilities are starting to implement parts of these systems and are effectively leveraging best practices from the Healthcare Information and Management Systems Society (HIMSS) and GS1, the global business standards organization, throughout this transition. There is still a long way to go and IT departments will likely take on most of these tasks as their positions transition from supporting role to leading decision maker.

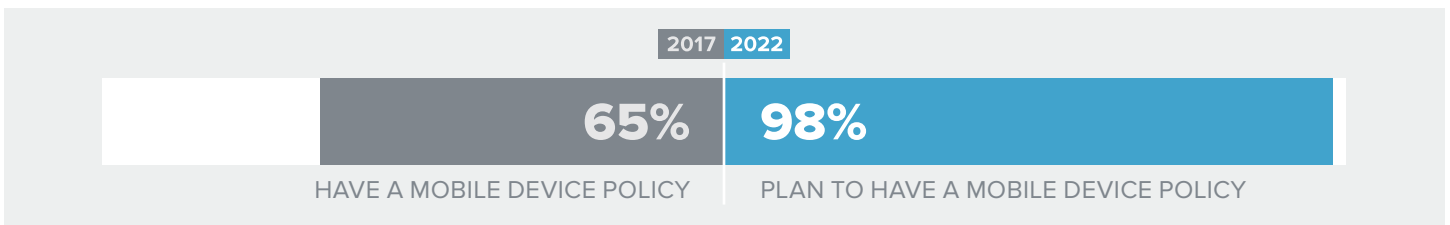
HEALTHCARE IT LEADS THE TRANSFORMATION

The role of the IT department is clearly evolving. Currently, hospitals' clinical mobility policies are primarily created by hospital administration, followed by IT management. In the future, respondents expect that dynamic to shift with IT executives taking a stronger leadership position in developing the actual policy rather than just in implementing the solution.

In some ways, the use of technology in the hospital setting is something that can bring IT and nurse managers together. For example, both nurse managers and IT executives see patient privacy concerns as well as a lack of adequate IT and health information systems as obstacles to attaining organizational approval to implement clinical mobility. As part of the increased level of collaboration in clinical mobility implementation, IT is involving key players from all departments and might be surprised to find an ally in the nursing staff.

Mobile devices, whether supplied by the hospital or those brought in by workers, require policies to ensure compatibility, security and proper uses. Today, only 65% of hospitals have a mobile device policy, with 53% defining specific data requirement and implementing authentication/authorization. By 2020, 42% of hospitals will add asset management/maintenance, mobile device management (MDM), data encryption and remote device wiping.

IMPLEMENTATION OF MOBILE DEVICE POLICIES WILL INCREASE BY 2022



REPORTED BY IT EXECUTIVES



77% of patients felt positive about their clinician using a mobile device in their care

THE CONSUMERIZATION OF HEALTHCARE

Society's adoption of technology is driving the digitization of hospital services. As a result, patients are taking greater advantage of services like telehealth to help limit the number of hospital visits. Technology is freeing up hospital staff to provide the proper level of care required in a more efficient manner.

The presence of technology and the skill of the clinician employing it in their treatment goes a long way in instilling patient confidence. In the study, 70% of patients saw their nurse or hospital staff using a mobile device and 77% felt positive about the experience.

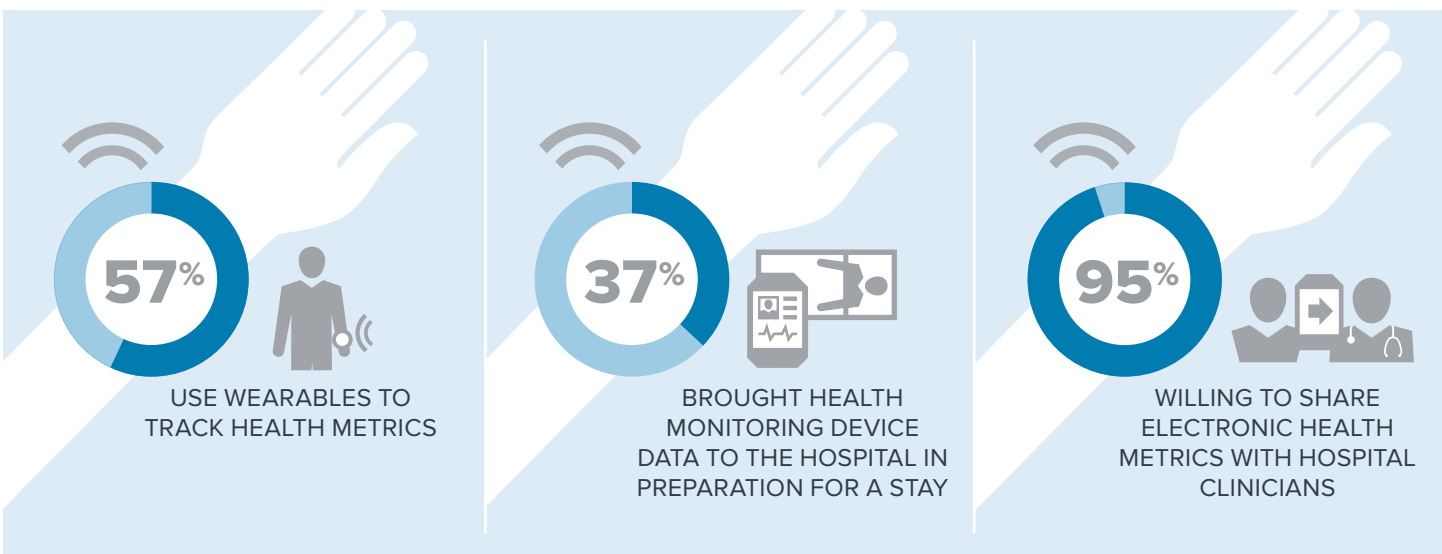
EMPOWERING DATA DRIVEN DIAGNOSIS

As hospitals contemplate clinical mobility, it's imperative that they consider the needs and habits of today's smartphone tethered, ever-connected patients. Hospitals that don't adopt

clinical mobility will likely have a difficult time attracting and treating patients who are beginning to expect technology to be a central part of their care.

This emerging generation of healthcare consumers have come to understand that if they give away their information the rewards are plentiful including time savings and even better care. Of surveyed patients, 57% use wearables to track health metrics, and 95% of those who use wearables are willing to share information with hospital clinicians.

PATIENTS ARE BECOMING ACTIVE PARTICIPANTS IN THEIR HEALTHCARE



REALIZING THE POWER OF DATA

Ninety percent of the world’s data was created in the last two years.⁴ Medical institutions are no exception, generating data from an ever-growing number of devices, sensors and emerging technologies. Maximizing the usefulness of these complex data streams requires an integrated systems approach that extends accessibility to a vast expanse of healthcare workers.

98%

By 2022, IT executives expect predictive analytics and early detection notification for life threatening conditions will be sent to clinicians’ mobile devices.

IT has the arduous task of ensuring that all data collection systems are compatible with each other. While this is a thorny process, there’s no denying how useful that data can be in the diagnosis and treatment of patients.

PREDICTIVE ANALYTICS IS THE FUTURE

These new sources of data are providing a new opportunity for physicians and nurses to provide unprecedented levels of care. Vital patient information, from prescriptions and lab results to

individual lifestyle data, can drastically improve the quality of healthcare. IT executives ranked artificial intelligence as one of the top technology trends most likely to impact the daily

work experience. Access to this type of data at the moment it’s needed, can help health professionals better analyze a situation, more accurately predict outcomes and take action.

STREAMLINING WORKFLOWS AND LIMITING OVERFLOWS

Predictive analytics – while in its infancy – is proving very powerful in streamlining hospital workflows and holds great promise in reducing patient readmissions.

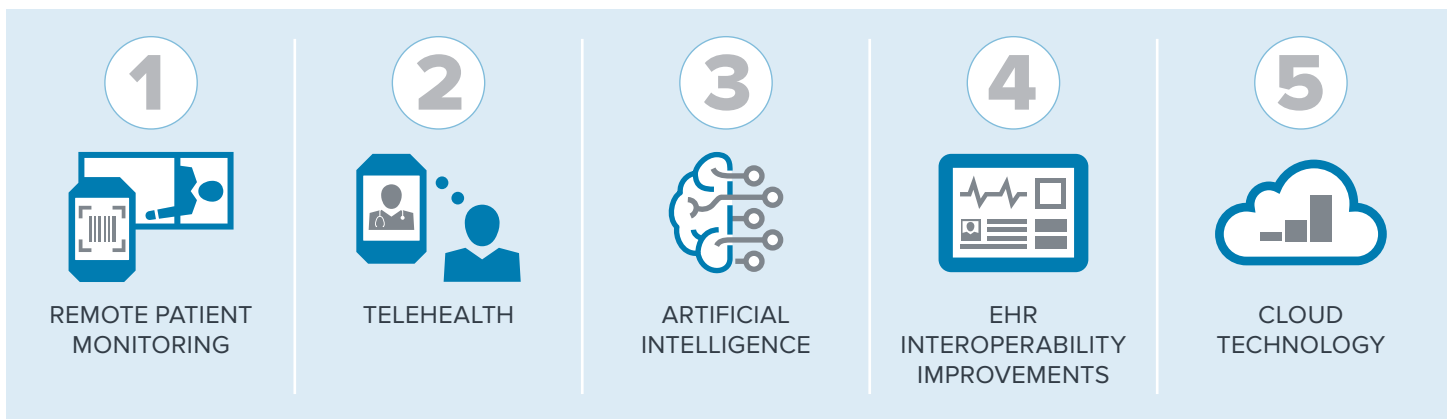
The key is aggregating the appropriate data and being willing to make changes based on the information that data provides. Hospitals are already on board with predictive analytics, and we’ll likely see this trend grow in the future. According to the study, nurse managers report that 50% of hospitals have had a clinical mobility and predictive data analytics policy in place for at least three years or more, while 42% have only had one for less than one year.

CLINICAL MOBILITY INVESTMENTS BY 2022



REPORTED BY IT EXECUTIVES

TRANSFORMATIVE TECHNOLOGY TRENDS



REPORTED BY IT EXECUTIVES

⁴IBM, <https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=WRL12345USEN>



97% of hospitals expect dynamic workflow notifications to be sent to mobile devices by 2022

REPORTED BY IT EXECUTIVES

STREAMLINING HOSPITAL OPERATIONS

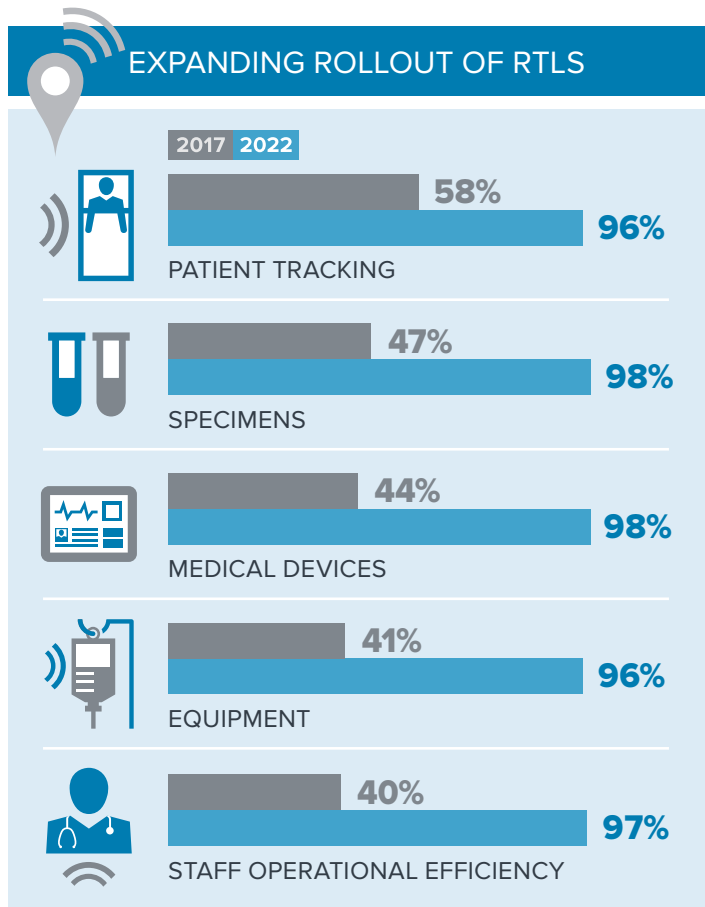
Hospitals are large, complex facilities that include miles and miles of similar looking hallways, offices, treatment areas and patient rooms. Keeping track of assets, staff and patients is a daunting challenge. Industry estimates suggest that these operational challenges contribute to delayed procedure start times, decreased clinician productivity, and lost medical equipment, specimens and supplies.

In an effort to curtail these losses and increase visibility, hospitals are adopting Real-Time Location Systems (RTLS) and mobile computing to automatically track the real-time geographic location of everything from equipment, supplies and pharmaceuticals to patients and staff.

APPLICATIONS ARE MANY AND DIVERSE

New RTLS applications are rapidly evolving:

- THROUGHPUT**
 Tracking patients – from admission to discharge. For a 275-bed hospital, reducing the average length of stay by four hours is the equivalent of increasing physical capacity by 10 beds.⁵
- PATIENT SECURITY**
 Monitoring labels on a baby’s wristband or a geriatric person’s hospital gown help ensure that only properly discharged patients have exit access.
- ASSETS**
 Tracking assets such as infusion pumps, heart monitors and wheelchairs so that they are ready and available when they are needed most.
- STAFF LOCATIONING**
 Identifying the physical location of a team member when they are needed strengthens patient care delivery coordination and improves staff collaboration.

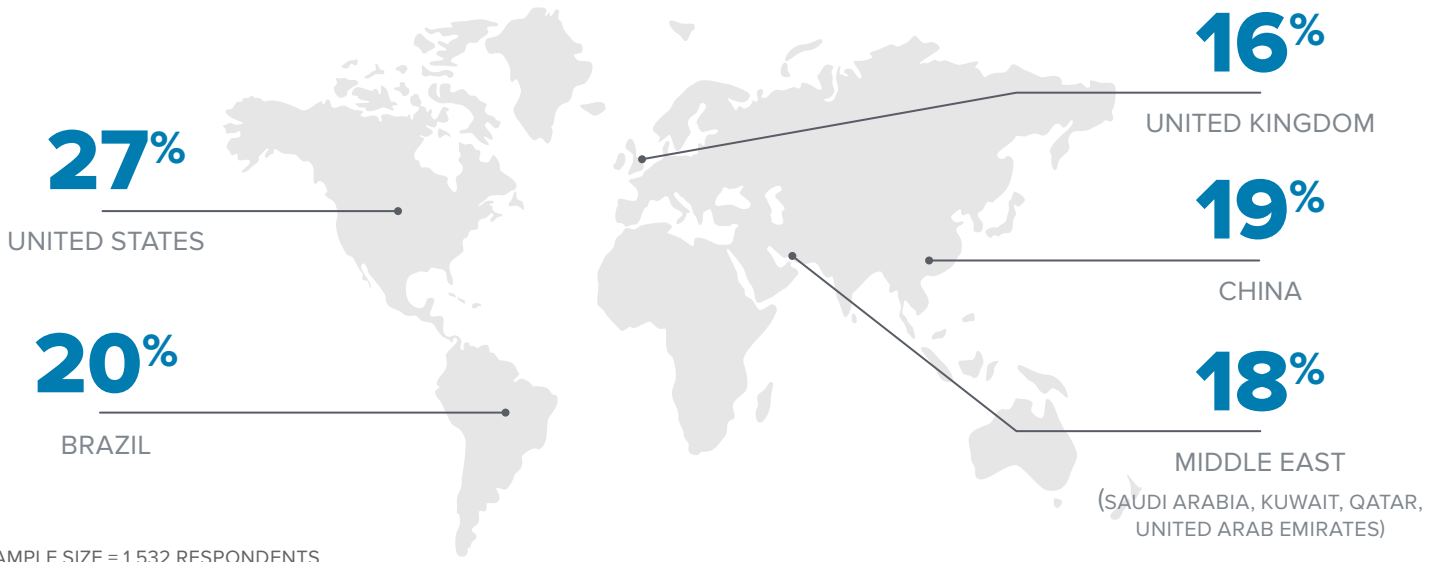


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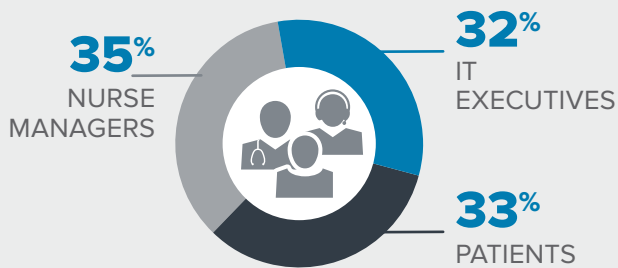
⁵ CDC, <http://www.chcf.org/~media/MEDIA%20LIBRARY%20Files/PDF/PDF%20U/PDF%20UsingPatientTrackingToolsInHospitals.pdf>

ABOUT THE STUDY

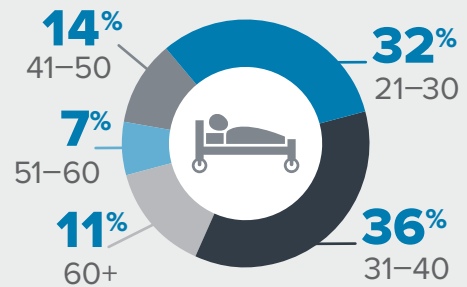
ALL RESPONDENTS BY GEOGRAPHY



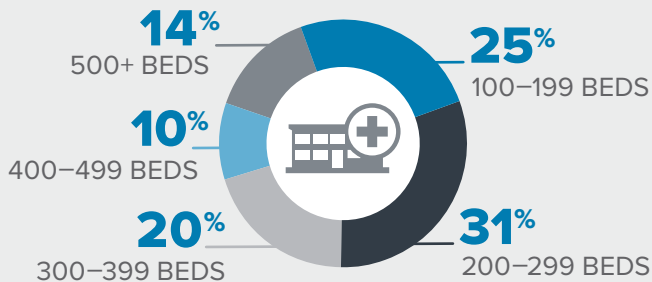
ROLE



PATIENTS BY AGE

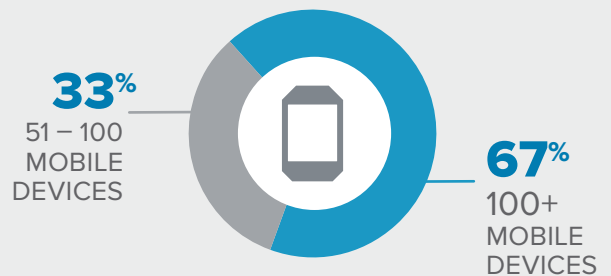


HOSPITAL SIZE



REPORTED BY NURSE MANAGERS AND IT EXECUTIVES

NUMBER OF MOBILE DEVICES



REPORTED BY NURSE MANAGERS AND IT EXECUTIVES



EMBRACING THE CLINICAL MOBILITY EVOLUTION

While it's clear that more and more hospitals are embracing clinical mobility, we are still at the beginning of this transformative aspect of healthcare. Hospitals have started to lay the groundwork for implementing clinical mobility by equipping bedside nurses with mobile devices and connecting data from equipment, supplies, and health information systems. Now is the time for widespread adoption in hospitals since not only nurses and IT decision makers see the benefits, but the new generation of patients that welcome and expect technology to be part of their healthcare treatment.

ABOUT ZEBRA TECHNOLOGIES

Zebra healthcare technology solutions connect medical providers to patient records, caregivers to colleagues and patients to practitioners for better care. We offer a full suite of technologies designed specifically for the unique needs of the healthcare industry – including wristband and label printers, scanners, mobile computers and software that provides visibility and creates efficiencies throughout the care environment. Zebra is a leader in patient identity, mobility and real-time locating and tracking.

For more information visit www.zebra.com/healthcare



NA and Corporate Headquarters
+1 800 423 0442
inquiry4@zebra.com

Asia-Pacific Headquarters
+65 6858 0722
contact.apac@zebra.com

EMEA Headquarters
zebra.com/locations
contact.emea@zebra.com

Latin America Headquarters
+1 847 955 2283
la.contactme@zebra.com