



MISSED CONNECTIONS:

A Nurses Survey on Interoperability
and Improved Patient Care



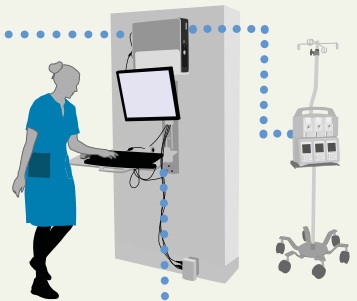
UNCONNECTED DEVICES **IMPACT**

NURSES*

* Nurses are defined as those employed full-time with a BSN or higher and a title of RN or higher who work in a non-school setting.

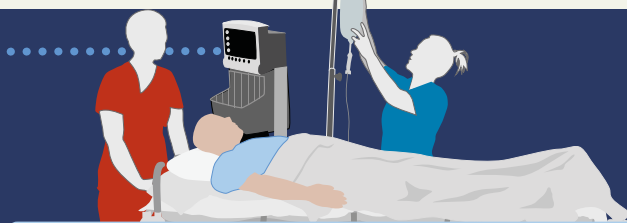


91% OF NURSES REPORT THAT IF THEY COULD SPEND LESS TIME DEALING WITH DEVICES, THEY WOULD SPEND MORE HANDS-ON TIME WITH THEIR PATIENTS.



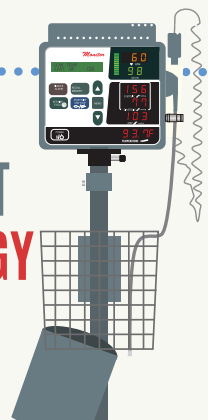
93% OF NURSES STRONGLY AGREED THAT MEDICAL DEVICES SHOULD BE ABLE TO SEAMLESSLY SHARE DATA WITH ONE ANOTHER AUTOMATICALLY.

3 IN 4 (74%) NURSES STRONGLY AGREED THAT IT IS BURDENSOME TO COORDINATE THE DATA COLLECTED BY MEDICAL DEVICES.



HALF OF NURSES (50%) SAID THEY HAVE WITNESSED A MEDICAL ERROR BECAUSE OF LACK OF DEVICE COORDINATION.

ALMOST ALL (99%) NURSES INTERACT WITH SOME TYPE OF TECHNOLOGY DURING A TYPICAL SHIFT.



Learn more at
www.westhealth.org/igniteinterop

Follow the conversation

#IGNITEINTEROP
@WESTHEALTH

CONTENTS

02	09
Infographic	Survey Findings
04	12
Introduction	Implications for Policy Makers
06	13
Impact	Quotes from the Frontlines
07	14
Methodology	Citations
07	15
Results Overview	Calls to Action

ABOUT THE WEST HEALTH INSTITUTE

The Gary and Mary West Health Institute is an independent, nonprofit medical research organization that works with healthcare providers and research institutions to create new, more cost-effective ways of delivering high-quality care. We're wholly funded by philanthropists Gary and Mary West as part of West Health, which includes the Gary and Mary West Health Policy Center, a nonprofit, non-partisan resource in Washington, D.C. that provides education, expertise and policy proposals to transform the American healthcare experience. Together we are pioneering new and smarter technologies, policies and practices to make high-quality healthcare more accessible at a lower cost to all Americans.

For more information, find us at www.westhealth.org and follow us @westhealth.

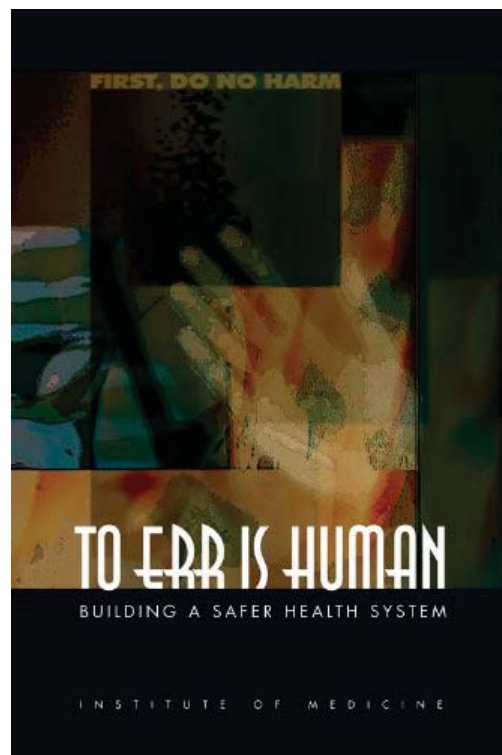


INTRODUCTION:

The Interoperability Opportunity

Overview

In 1999, the Institute of Medicine (IOM) drew national attention to a pervasive and deadly problem that has long plagued our healthcare system - medical errors. The IOM report, entitled “To Err is Human - Building a Safer Health System,” noted that preventable errors were responsible for as many as 98,000 hospital deaths in a single year.^{i, ii}



Fast-forward 16 years. Medical errors not only remain in the headlines, their numbers may have grown substantially. This is perhaps due, in part, to enhanced reporting owing to greater awareness generated by the original IOM report. Today, medical errors account for between 210,000 and 440,000 preventable deaths in hospitals annually, according to estimates published in the *Journal of Patient Safety*.ⁱⁱⁱ [This statistic elevates medical errors to the third leading cause of death in the United States after heart disease and cancer.](#)

A single life lost to preventable error is a tragedy. Tens of thousands of deaths are an indictment of the safety of our healthcare system. Hundreds of thousands of deaths are nothing short of a national crisis.

The increasing use of high-reliability devices in healthcare offers hope in addressing some sources of error, as hospitals and other healthcare delivery settings work to free busy clinicians of tasks best achieved by technology. It must be acknowledged however that we are currently in an awkward phase of technology adoption where clinicians are serving as a human “sneakernet,” connecting, coordinating and orchestrating the function of a myriad of

disconnected medical devices. A critically important next step toward significantly decreasing medical errors is to make medical devices and electronic health records (EHRs) interoperable. Medical device interoperability is the ability of medical devices and systems to seamlessly communicate and share data. Interoperable systems would allow medical devices to exchange data with patient data sources such as EHRs.

Several of the most common causes of medical errors could be mitigated by improved medical device interoperability, including drug errors (accounting for 20 percent of adverse events), diagnostic errors (17 percent) and failure to prevent injury (12 percent).^{i, ii}

These errors could be sharply reduced with improved medical device interoperability. For example, ordering errors account for 39 percent of all drug errors,^{iv} while transcription errors account for 12 percent of all drug errors, according to a study in *Health Affairs*. Drug errors can result when a prescribed medicine must be manually entered into an EHR or transcribed by another member of a patient’s healthcare team. There is also the possibility of physician ordering or dispensing mistakes. Ordering errors can occur when the most up-to-date test results and other data are not immediately available to the prescriber.

Diagnostic errors result from a variety of causes, such as a failure to account for symptoms, failure to order appropriate tests or a failure to consider all relevant diagnoses. Medical device interoperability can reduce such errors by making symptom readings available in real time and pushing test result to care providers in a timely and clear manner. It has been estimated that one in six missed emergency department diagnoses that harmed patients were due to a breakdown at the point of transmitting test results to the provider.^v By facilitating the immediate “push” of test results to the EHR, medical device interoperability can improve care by ensuring that the care provider has the right information to make appropriate diagnoses.

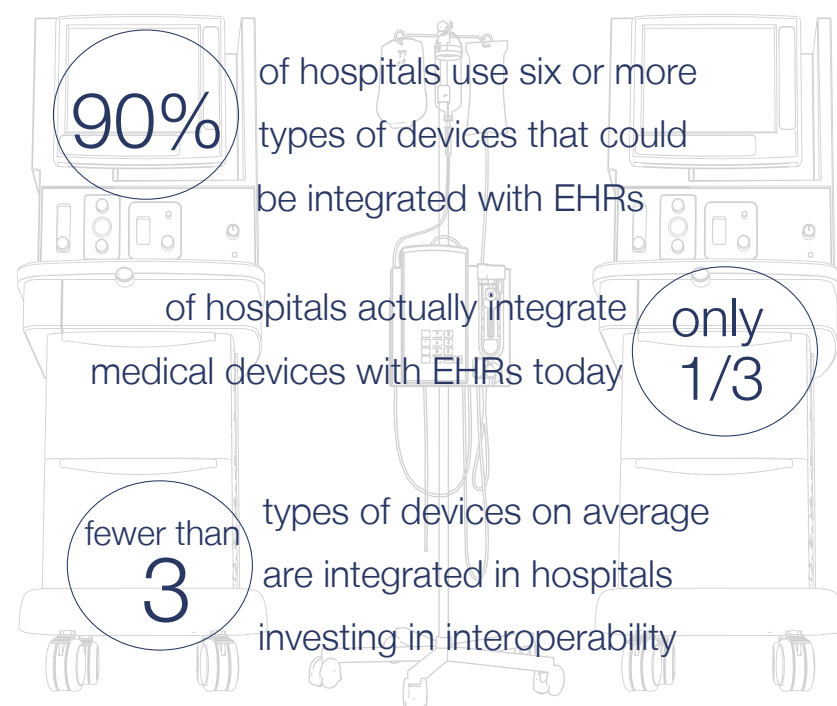
Medical device interoperability also has implications for “failure to prevent injury,” which encompasses a variety of potentially preventable conditions such as ventilator-associated pneumonia, rescue events and post-operative shock.^{vi}

A lack of medical device interoperability is one of the most significant impediments to unlocking health technology’s full potential. Meaningful progress in reducing medical errors requires using technology to create an automated, connected and coordinated healthcare system. And this is only possible when there is a seamless flow of information among all devices involved in caring for a patient.

How much impact could medical device interoperability have on improving safety?

We asked those on the frontlines: Nurses

According to a recent report by HIMSS Analytics,^{vii} while over 90 percent of the hospitals surveyed by HIMSS use six or more types of devices that could be integrated with EHRs (i.e. defibrillators, electrocardiographs, vital signs monitors, ventilators and infusion pumps), only a third of hospitals actually integrate medical devices with EHRs. Additionally, hospitals that are investing in interoperability integrate fewer than three types of devices on average, a far cry from the six to 10 devices that may be present around an intensive care unit bed. This lack of interoperability creates significant sources of waste and risk to patient safety because of incomplete or stale information clinicians must rely on for decision making.



Device connection to EHRs is important because it allows for enhanced record-keeping and data capture, but true functional interoperability requires device-to-device communication. Many medical devices commonly used in hospitals have the potential to be interoperable. Among them are bedside monitoring devices, imaging and diagnostic devices, surgical devices and therapeutic devices such as infusion pumps. All have the potential to connect with each other and with EHRs.

To gain a deeper understanding of the real day-to-day impact of the lack of connectivity among medical devices, [the Gary and Mary West Health Institute worked with Harris Poll to survey those who live each day at the intersection of patient care and technology – the nation’s nurses.](#)

Survey methodology

The West Health Institute Nurses Survey explored the opinions of 526 nurses (RN or higher with an education of BSN or higher) employed full time in a non-school setting regarding their experiences with medical devices/technology through a survey conducted online by Harris Poll between January 7 and 16, 2015. Survey questions delved into how nurses interact with technology in the workplace and the challenges they experience, as well as how these challenges could be alleviated. Participants answered 21 questions about the positive and negative aspects of working with medical technology in a hospital setting.

Figures for age, race/ethnicity, education, region, household income and occupational setting were weighted where necessary to bring them into line with their actual proportions in the population. Propensity score weighting was also used to adjust for respondents’ propensity to be online.

Respondents were selected from among those who have agreed to participate in Harris Poll surveys. The data have been weighted to reflect the composition of the U.S. adult population. Because the sample is based on those who agreed to participate in the panel, no estimates of theoretical sampling error can be calculated.

For the purposes of this report, nurses employed full-time with a BSN or higher and a title of RN or higher who work in a non-school setting will be referred to as “nurses.”

Survey results are clear: interoperability would help prevent medical errors

Hospital administrators, doctors, nurses and patients are frustrated by the many disparate and uncoordinated devices they rely on when caring for patients. No one knows better than the individual healthcare provider how vulnerable patients are to medical errors, and no one wants to prevent them more. According to the survey, a majority of nurses believe that medical device interoperability would add value to patient care and reduce medical errors.

A vast majority agree (93 percent strongly or somewhat agree) that medical devices should be able to seamlessly share data with one another automatically.

Virtually all nurses reported interacting with some type of medical device or technology during a shift, with most interacting, on average, with two or more devices and spending an hour or more working with them. Nearly half (47 percent) found handling or working with medical devices to be among the least productive ways they spend their time.

Among these nurses, two in five (39 percent) said the most challenging aspect of medical devices is that they don't communicate or share data with each other. About three quarters (74 percent) at least somewhat agree that it is burdensome to coordinate the data collected by medical devices, with 24 percent strongly agreeing. Nearly half of these nurses (46 percent) echoed this sentiment, noting that an error is extremely or very likely to occur when information must be manually transcribed from one device to another.

Half said they have witnessed a medical error because of lack of device coordination.

Among these nurses, three in five (60 percent) said medical errors could be significantly reduced if medical devices were connected in such a way that they shared data with each other automatically. Furthermore, nearly all (96 percent) agreed that errors could be reduced at least slightly by device coordination.

Almost half (48 percent) estimated that as many as one in four medical errors and adverse events might be prevented in a system where all hospital devices seamlessly shared information in an automatic, coordinated and connected fashion.

Key results

- Half said they have witnessed a medical error because of lack of device coordination.
- Three in five said medical errors could be significantly reduced if medical devices were connected in such a way that they shared data with each other automatically. Furthermore, nearly all (96 percent) agreed that errors could be reduced at least slightly by device coordination.
- Almost half (48 percent) estimated that as many as a one in four medical errors and adverse events might be prevented in a system where all hospital devices seamlessly shared information in an automatic, coordinated and connected fashion.

Survey findings

Here are survey results addressing the lack of interoperability and its impact on medical errors:

Have you ever witnessed a medical error due to a lack of coordination (i.e., data sharing) among devices?

Half (50 percent) said they have witnessed a medical error because of lack of device coordination.

How many different kinds of medical/electronic devices (e.g., monitoring devices, diagnostic devices, therapeutic devices, Electronic Health Records (EHRs) do you interact with or "touch" on average, per shift?

Almost three-quarters (72 percent) interact with or "touch" two or more kinds of medical/electronic devices on average, per shift. A minority state they interact with six to 10 (23 percent), more than 10 (15 percent) and fewer than two (14 percent).

How much time do you spend per shift, on average, working with medical devices (programming, setting up, transcribing data, etc.)?

More than two in five (41 percent) spend three hours or more (19 percent spend more than four hours). More than two-thirds (69 percent) of nurses spend an hour or more on average per shift working with medical devices, while 31 percent spend less than an hour. In all, 14 percent spend less than 30 minutes, 17 percent spend 30 to 59 minutes and 28 percent spend one to two hours.

In which of the following ways do you interact with technology during a typical shift? Please select all that apply.

Virtually all (99 percent) interact with some type of technology during a typical shift. About nine in ten (89 percent) interact by accessing electronic medical records, followed by two thirds (67 percent) interacting with medical devices at the bedside.

A majority also typically interact by troubleshooting to resolve malfunctions or other issues (63 percent), transcribing data (58 percent), teaching patients/families about medical devices (57 percent) and managing alarms (54 percent), while 6 percent interact in some other way.

Detailed findings continued

In your opinion, which of these is needed most in order to enhance patient safety and better outcomes?

Almost seven in 10 (69 percent) agree that bedside nurses focusing on patients' needs without distraction is most needed in order to enhance patient safety and better outcomes. This is followed by around one in five (19 percent) who believe that guidelines-based clinical support is needed most, and a minority (9 percent) stating that more connected/coordinated medical technology would be most useful, while 2 percent are not sure.

When manually transcribing information from one medical device to another, or to a chart/medical record, how likely is it that each of these issues would occur?

69 percent said it is extremely/very likely that manually transcribing information from one medical device to another would take time away from patients who need attention (32 percent said extremely likely).

Almost half (49 percent) find it extremely/very likely that a delay of important information being available to the rest of the care team would occur (17 percent said extremely likely).

Nearly half (46 percent) state it is extremely/very likely that potential for error would occur (15 percent said extremely likely).

What is the most challenging aspect of medical devices/technology today?

Almost two in five (39 percent) state the most challenging aspect of medical devices/technology today is that devices don't communicate/share data with each other. Two in five (40 percent) state the most challenging aspect of medical devices/technology today is that it takes too much time away from patient/family interaction.

How much do you agree or disagree with the following statements?

A vast majority (93 percent) strongly/somewhat agree that medical devices should be able to seamlessly share data with one another automatically, while 64 percent strongly agree. Roughly three quarters (74 percent) strongly/somewhat agree that it is burdensome to coordinate the data collected by medical devices, with 24 percent strongly agreeing.

Those who have witnessed a medical error are more likely than those who have not witnessed any to strongly/somewhat agree that medical devices should be able to seamlessly share data with one another automatically (97 percent vs. 90 percent).

How helpful would it be to you if devices around a patient's bedside could do each of the following things?

More than nine in 10 (91 percent) agree that it would be extremely/very helpful if devices around a patients' bedside could share data with one another, with 52 percent finding it extremely helpful.

Eighty-four percent would find it extremely/very helpful if devices could remove a source of error by eliminating the need to manually transcribe information, with 47 percent finding it extremely helpful.

Roughly three-quarters (76 percent) find it extremely/very helpful if devices could remove the need for oversight and/or correction, with one third (33 percent) finding it extremely helpful.

In your view, how much could medical errors be reduced if medical devices were connected so that they could easily and automatically share data with one another? Examples of connectivity can include an insulin pump already aware of a patient's glucose levels, or blood pressure readings adjusting the titration of morphine doses in real time.

Three in five (60 percent) said medical errors could be significantly reduced if medical devices were connected such that they shared data with each other automatically. Almost all (96 percent) believe medical errors could be reduced at least slightly.

Recent studies estimate that as many as 400,000 patients have their lives prematurely ended by medical errors in hospitals. In your opinion, what fraction of such errors and adverse events might be prevented by having all in-hospital medical devices seamlessly share information in an automatic, coordinated and connected fashion?

About half (48 percent) state that between 10 to 25 percent of errors/adverse events might be prevented if medical devices were connected to automatically share data with one another. Almost one in four (23 percent) say that between 26 to 50 percent of errors/adverse events might be prevented. Smaller minorities believe this could be reduced by less than 10 percent (18 percent), and more than 50 percent (12 percent).

Conclusion

The survey results demonstrate the toll the lack of interoperability takes on first-degree healthcare workers – the nurses who are responsible for both caring for patients and programming and monitoring the devices. Their perspective on the impact lack of interoperability has on their ability to care for patients; the potential for medical errors; how they spend their time; and, ultimately, satisfaction with their work provides critical context to an issue that appears to be simply technical in nature.

The adoption of commonly accepted standards for interoperability must be a national legislative priority. Widespread, open standards-based interoperability would improve efficiency as well as go a long way toward improving the quality of care and reducing costs. The lack of communication among medical devices results not only in adverse events and medical errors but also redundant testing and significant inefficiencies. Countless hours are wasted manually entering or transferring information from one device to another, which further increases the potential for error.

Implications for Policy makers

The Office of the National Coordinator for Health Information Technology’s (ONC) renewed focus on creating a national, interoperable healthcare delivery system is laudable, but it is essential that we specifically include medical devices in the conversation. Medical devices are likely the greatest source of objective clinically relevant information. To facilitate a learning healthcare system, we must capture, integrate, present and use the information flowing from all bedside medical devices. Without specifically including the wealth of information currently trapped in the individual silos of the separate medical devices, meaningful interoperability will be frustrated.

Going beyond the sharing of medical device information, it is only in its timely use that we will realize the full value. To achieve functional interoperability, it is essential that one medical device be able to act on the information received from another. Example: An infusion pump must be able to stop administering a narcotic given evidence of dangerously slowed respiration or falling oxygen concentrations. In order to create this functional interoperability between medical devices, it is essential that the Food and Drug Administration (FDA) recognize open standards for medical device communication and provide guidance for manufacturers regarding interoperability. Such draft guidance was to be issued by the FDA in 2014, and is now unfortunately overdue.

Finally, it will be insufficient to have interoperability without true interoperation as the benefits of interoperability only accrue when the data is actually used to drive better outcomes. Driving the adoption of medical device interoperability to create a more reliable, more automatic, connected and coordinated healthcare delivery system may require incentives. If needed, we believe such incentives should be linked to the prevalence of those errors linked to failure to adopt interoperable medical devices.

Quotes from the frontlines

“Most patients are on more than one medical device, and nurses care for five to six patients per shift. [The nurse has to manage \[the\] patient and machines, all while working with less support staff](#), more mandated overtime.” – Registered nurse in a hospital setting

“Devices that are connected to each other – such as a patient chart to vital signs machines, to blood-glucose monitors, etc. – would [eliminate data entry, which is a huge risk of error](#).” – Registered nurse in a hospital setting

“I have seen many instances where [numbers were incorrectly transcribed or put in reverse or put in the wrong column when typed manually, which can cause errors](#).” – Registered nurse in a physician’s office

“[\[Interoperable devices\] would reduce the lag time](#) between having the information and inputting it into another device.” – Registered nurse in a hospital setting

“[\[Transcribing data\] takes way too much time for the nurses to adequately care for the patient](#).” – Registered nurse in a hospital setting

Citations

ⁱ Jha AK, Chan DC, Ridgway AB, Franz C, Bates DW. Improving safety and eliminating redundant tests: cutting costs in U.S. hospitals. *Health Aff (Millwood)*. 2009;28(5):1475-1484.

ⁱⁱ Kohn LT, Corrigan JM, Donaldson MS, editors. *To err is human: building a safer health system* [Internet]. Washington: National Academy Press; 2000 [cited 2012 Oct 25]. Available from: http://www.nap.edu/catalog.php?record_id=9728.

ⁱⁱⁱ James, J. A New, Evidence-based Estimate of Patient Harms Associated with Hospital Care. *Journal of Patient Safety* 2013;9(3): 122-128.

^{iv} Poon EG, Keohane CA, Yoon CS, Ditmore M, Bane A, Levtzion-Korach O. Effect of bar-code technology on the safety of medication administration. *N Engl J Med*. 2010;362:1698-1707.

^v Callen J, Georgiou A, Li J, Westbrook, JI. The safety implications of missed test results for hospitalised patients: a systematic review. *BMJ Qual Saf* 2011;20:194-199.

^{vi} Taenzer AH, Pyke JB, McGrath SP. A review of current and emerging approaches to address failure-to-rescue. *Anesthesiology*. 2011 Aug;115(2):421-431.

^{vii} HIMSS Analytics. *Medical devices landscape: current and future adoption, integration with EMRs, and connectivity* [Internet]. Chicago: HIMSS Analytics; 2010 [cited 2012 Oct 25]. Available from: http://www.himssanalytics.org/docs/medicaldevices_landscape.pdf.



This survey of 526 nurses (RN or higher with an education of BSN or higher) employed full-time in a non-school setting regarding their experiences with medical devices/ technology, was conducted online by Harris Poll between January 7 and 16, 2015.

Calls to Action

Interoperability – the ability of health information to be shared seamlessly across medical devices and systems – is critical to transforming the delivery of healthcare to the automated, connected and coordinated future of care we all imagine.

Together, we can achieve interoperability by driving these key calls to action.

- Encourage the ONC to specifically include the capture, integration and sharing of medical device information in their Nationwide Interoperability Roadmap
- Encourage the FDA and Department of Health & Human Services to recognize open standards for medical device communication and provide guidance for manufacturers regarding the design, testing and labeling of interoperable medical devices
- Ensure there are adequate incentives included in any Congressional legislation for the development and use of interoperable medical devices moving forward



Learn more at www.westhealth.org/igniteinterop



@westhealth | #igniteinterop

westhealth.org

(858) 535-7000
info@westhealth.org