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Partnering for Transformation: Making a Positive Impact

Discussions, Tools, and Safe Practices from the
September 16, 2016 *Partnership* meeting
convened by ECRI Institute

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ECRI Institute, a nonprofit organization, dedicates itself to bringing the discipline of applied scientific research in healthcare to uncover the best approaches to improving patient care. As a pioneer in this science for nearly 50 years, ECRI Institute marries experience and independence with the objectivity of evidence-based research.

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Special thanks to our participating providers and attendees.

Organizations working together with the *Partnership:*

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Partnering for Transformation: Making a Positive Impact

Dear Colleagues:

Thank you to all who participated in the *Partnership for Health IT Patient Safety* and attended our September 16, 2016, meeting, *Partnering for Transformation: Making a Positive Impact.* This meeting was made possible through funding from the Jayne Koskinas Ted Giovanis Foundation for Health and Policy. Together, we are making a positive difference. We continue to blaze trails by combining applied research with the power of multi-stakeholder collaboration—all with a focus on solutions that make patient care safer.

The past year included many achievements:

- The *Partnership's* first set of safe practice recommendations, on copy and paste, underwent successful testing by the National Institute of Standards and Technology (NIST).
- Our second set of recommendations, on patient identification, was developed.
- New hospitals, new electronic health record (EHR) vendors, and new professional societies signed on.

We expect 2017 to be even better. With new funding from the Gordon and Betty Moore Foundation, the *Partnership* will scale up and expand its reach to make a bigger difference in safety. We are deeply grateful for this opportunity.

Like the *Partnership* itself, these Proceedings reflect an action orientation: we present discussion points but also provide tools and safe practices. By providing actual tools to support systems safety, we aim to accelerate uptake and spread improvements. That's what *Partnering for Transformation* is all about.

Now, more than ever, we need to continue our work as the private sector collaborative that exemplifies a shared vision for a health information technology (IT) culture of safety. With innovative approaches and the deep commitment of all stakeholders, we will undoubtedly be successful.

Sincerely,

Ronni P. Solomon

Ronni P. Solomon
Executive Vice President
General Counsel

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About the *Partnership*

In 2013, ECRI Institute convened the *Partnership for Health IT Patient Safety*, a multi-stakeholder collaborative whose purpose is to make health information technology (IT) safer together. In the short time since, the *Partnership* has become the focal point for the collaborative efforts of many groups, including healthcare providers, health IT developers and vendors, academic researchers, patient safety organizations, medical malpractice insurers, and professional societies.

The *Partnership* is proving successful at bringing together and engaging major stakeholders in collaborative efforts to make health care safer together. As part of these successes, the *Partnership* has established a stellar expert advisory committee, engaged providers, captured and analyzed reported data, prioritized health IT safety topics, formed specialized workgroups, developed a process for creating safe practices, and published recommendations and implementation strategies.

The *Partnership* strives to build upon the recommendations set forth by various reports:

- ONC [Office of the National Coordinator for Health Information Technology], Enhanced Oversight Final Rule (2016)
- ONC, Connecting Health and Care for the Nation: A Shared Nationwide Interoperability Roadmap (2015)
- ONC, Oversight of the Testing and Certification of Electronic Health Records (2014)
- FDASIA [Food and Drug Administration Safety and Innovation Act] (2014)
- BPC [Bipartisan Policy Center], An Oversight Framework for Assuring Patient Safety in Health Information Technology (2013)
- IOM (Institute of Medicine), Health IT and Patient Safety: Building Safer Systems for Better Care (2012)

The *Partnership* has no regulatory or enforcement powers. Rather, in a nonpunitive learning environment, the focus is on health IT patient safety and using health IT to provide enhanced quality and safer care.

To fulfill these goals, the *Partnership* is undertaking the following actions:

- Establishing a nonpunitive environment for sharing and learning
- Testing a collaborative model for collecting and analyzing safety issues
- Achieving robust stakeholder engagement
- Sharing safe practices and lessons learned
- Informing the national safety strategy for health IT

Meeting Agenda

Partnering for Transformation: Making a Positive Impact

SEPTEMBER 16, 2016

Welcome and Overview

Ronni Solomon, JD, ECRI Institute
Jeffrey Lerner, PhD, ECRI Institute
Tejal Gandhi, MD, MPH, National Patient Safety Foundation

Moderator

Janet Marchibroda, MBA, Bipartisan Policy Center

Patient Identification Safe Practices

Setting the Stage
William Marella, MBA, MMI, ECRI Institute
Using the Evidence
Amy Tsou, MD, MSc, ECRI Institute
Why Is a National Patient Identifier Important?
Leslie Krigstein, College of Healthcare Information Management Executives

Panel Discussion: Draft Patient Identification Toolkit

Hardeep Singh, MD, MPH, VA Medical Center
Mark Segal, PhD, GE Healthcare Digital
Lori Paine, DrPH, MS, RN, Johns Hopkins Hospital, Armstrong Institute for Patient Safety and Quality
Allen Chen, MD, PhD, MHS, Johns Hopkins Hospital, Armstrong Institute for Patient Safety and Quality
Michael Oppenheim, MD, Northwell Health
Andrew Gettinger, MD, Office of the National Coordinator for Health IT

Medication Reconciliation and Health IT Safety

Jeffrey Schnipper, MD, MPH, Brigham and Women's Health

Panel Discussion: Update on Copy and Paste Safe Practice Recommendations

Lana Lowry, PhD, National Institute of Standards and Technology
Caroline Keogh, RN, MS, athenahealth
Carrie Tuskey, MHSA, BSN, RS, Henry Ford Health System

Breakout Sessions

Automated End Times
Unexpected HIT System Downtime
HIT Safety Programs

Discussion: Envisioning and Planning

Christoph U. Lehmann, MD, Vanderbilt University Medical Center
Trish Lugtu, Constellation
Joan D. Williamson, MNH, RN, CPHQ, Virginia PSO

Concluding Remarks

J. Graham Atkinson, DPhil, JKTG Foundation
Janet Marchibroda, MBA, Bipartisan Policy Center

DESIRED OUTCOMES

Make healthcare safer together:

- Affirm the *Partnership's* safe practice recommendations for the use of health IT in patient identification
- Learn from reported patient identification safety events
- Reach agreement on topics of highest priority
- Identify high-impact interventions
- Inform the national strategy for health IT safety

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Partnering for Transformation: Collaboration and Common Goals

The *Partnership for Health IT and Patient Safety* convened its third annual meeting on September 16, 2016. Topics addressed at this meeting included an update on implementing and testing the recommendations included in the copy and paste toolkit, as well as the *Partnership's* new safe practice recommendations for the use of health information technology (IT) in patient identification and corresponding implementation toolkit. In addition, this year's breakout sessions led to the development of tools for assessing three common health IT safety issues: the uses of automated end times, preparedness for unexpected health IT system downtimes, and the development of a health IT safety program. Finally, the group focused on evaluating issues for future investigation.

The *Partnership* represents a wide range of health IT stakeholders. "We have many stakeholders here today," said Ronni Solomon, JD, ECRI Institute. "We have technology users, nurses, physicians, technology designers, developers, vendors, and implementers. We have safety scientists, professional societies, policymakers, and regulators. All of us are working to make healthcare safer together."

In welcoming participants, Jeffrey Lerner, PhD, ECRI Institute, reminded participants of the significance of their presence within the *Partnership*. "You have evidence of your effectiveness," he said. "Today, we'll be looking at what you've done, what you're doing, and where you're going."

Expert Advisory Panel member Tejal Gandhi, MD, MPH, President of the National Patient Safety Foundation (NPSF), greeted participants via recording. She cited the NPSF's 2015 publication "Free from Harm: Accelerating Patient Safety Improvement Fifteen Years After *To Err Is Human*," which outlines eight recommendations for achieving total system safety and culture of safety.

"One of those eight recommendations is to ensure that technology is safe and optimized to improve patient safety," Gandhi noted. "The work being done by this *Partnership* aligns very well with that recommendation, and I'm so pleased to be a part of this effort."

One of the strengths of this collaborative model is to hear and learn from multiple stakeholders, stated Gandhi. Over the course of the day-long meeting, participants reviewed and responded to the draft recommendations for the use of health IT in patient identification, learned about the findings from ECRI Institute PSO's *Deep Dive: Patient Identification* (Volume 1), ECRI Institute's special report: "Patient Identification Errors, and heard about CHIME's million-dollar challenge for the private sector development of a national patient identifier. Improving patient identification requires a multipronged approach with each of these projects laying a foundation and then building on that foundation."*

Upon hearing about the issues the organizations are working on and what is keeping them up at night, participants had the opportunity to investigate other issues, such as alerts and the concept of "closing the loop" when dealing with tests and referrals. Additionally, the importance of medication reconciliation and the role that health IT can play in improving the efficacy of the medication reconciliation process was discussed. Through the *Partnership*'s efforts, an opportunity exists to help clarify priorities for providers and vendors and to optimize health IT to improve patient safety and healthcare quality.

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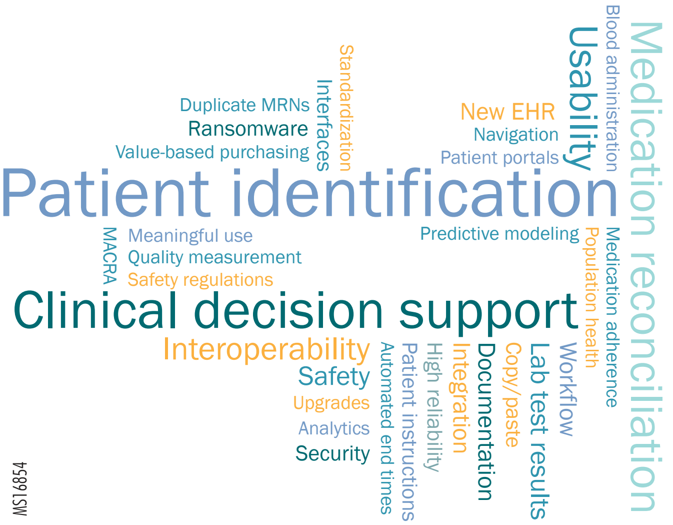
* For more information about ECRI Institute PSO and other ECRI Institute reports, contact clientservices@ecri.org

Spotlight on Participants' Safety Concerns

Participants were asked to share the health IT safety issues their organizations are facing as well as those that they were currently working on. Responses ranged from interoperability to patient identification to safe documentation (see "What Health IT Issues Are You Currently Working On?"). The most common answers included patient identification, usability, and clinical decision support.

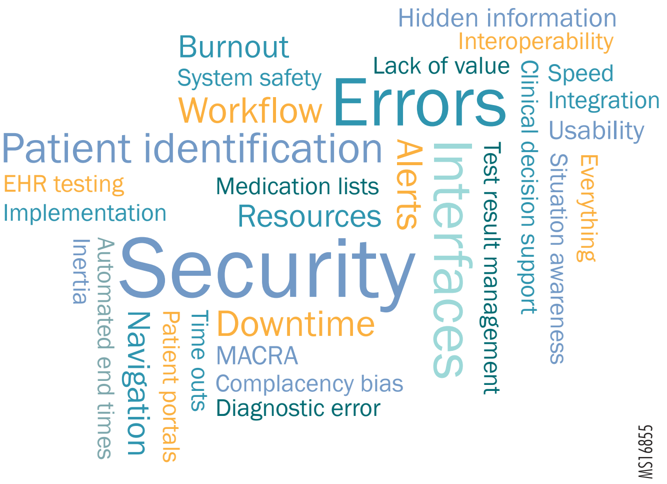
Another question that ECRI Institute PSO's Robert Giannini, BS, NHA, CHTS – IM/CP, posed to participants related to their biggest concerns. Participants indicated that their biggest concerns included limited resources, interoperability, cyber security, poor workflows, safety design, and worker burnout. Most common was the broad category "errors," followed by usability and security concerns. (See "What Health IT Issues Are Keeping You Awake at Night?")

What Health IT Issues Are You Currently Working On?



The first poll of the *Partnership* meeting identified issues currently facing participants. The size of each term indicates how frequently it was mentioned.

What Health IT Issues Are Keeping You Awake at Night?



The second poll of the *Partnership* meeting addressed participants' most pressing safety concerns. The size of each term indicates how frequently it was mentioned.

The Safe Use of Copy and Paste: *Partnership* Recommendations Substantiated

The *Partnership* issued safe practice recommendations for copy and paste, as well as the final implementation toolkit in February 2016.* Since then, the toolkit has been downloaded more than 3,500 times. The National Institute of Standards and Technology (NIST) assessed the recommendations by developing test cases in which users were observed performing various tasks in EHR systems. “What we discovered,” said Lana Lowry, PhD, NIST, “is that all four recommendations were right on the spot. They are very much valid.”

Lowry underscored the complexity of the issues surrounding copy and paste. “The interface is so complex, and there’s already so much information on it. So now you add additional information, forms, history—that [surpasses] the limit of human comprehension.” The potentially time-saving efficiencies, compounded with the need to include complete documentation in abbreviated timeframes, encourages the use of this functionality.

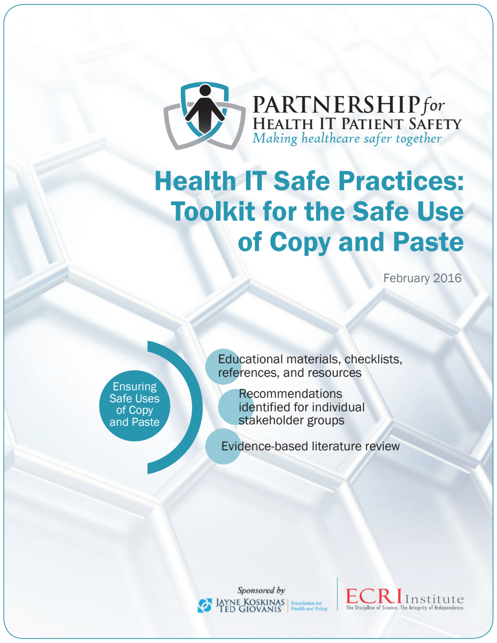
NIST identified areas of absolutes in which copy and paste should never be permitted, Lowry said. However, NIST also identified “gray areas, where the user interface features can support the user interaction in a safer way,” said Lowry. Formal evaluation and discussion of these results will be available upon release of a report issued by NIST later this year.

In addition to Lowry, this panel discussion included Caroline Keogh MS, RN, athenahealth, and Carrie Tuskey, MHSA, BSN, RS, Henry Ford Health System, who shared findings from their organizations.

Recognition of the issue was a key first step for Keogh’s group. “Actually, we started out with what the problem is—telling stories of copy and paste issues that have led to patient harm, then really getting [staff] buy-in on what the safety problem is.” From there, it was possible to identify business opportunities and potential barriers, to review input from developers and designers, and to develop a strategic plan.

Tuskey discussed her organization’s process: “We went through each of the recommendations, and everybody supported them,” said Tuskey. “The big question was: So how are we going to be able to do this?” They worked through each of the recommendations, how they would apply them, and what would need to be done, until finally, “we’re implementing these functionalities with our regular upgrade.”

One participant shared that their organization had recently experienced a Sentinel Event related to the reuse of information; the information in question was copied forward. In this event, “the hospital found that the nurses had been copying forward the pressure ulcer assessments. All of a sudden, they were presented with an unstageable pressure ulcer,” the participant said. “So, it raised the question of copy-forward: should we be doing that? For what? So, this past summer, when we implemented a number of things that will ‘never be.’ We turned off the functionality to be able to copy forward. We think it will help a lot.”



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Health IT Safe Practices: Toolkit for the Safe Use of Copy and Paste

February 2016

Ensuring Safe Uses of Copy and Paste

- Educational materials, checklists, references, and resources
- Recommendations identified for individual stakeholder groups
- Evidence-based literature review

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Panelist Jeremy Michel, MD, MPH, ECRI Institute and Children’s Hospital of Philadelphia (CHOP), described the metrics being used at CHOP to determine success. “We now have the ability to see where a note came from. I can see whether something was written by a template or free-texted by an author,” he explained. “These recommendations are making a difference.”

He also highlighted that clinician resistance is a potential barrier to adoption of the copy-paste recommendations. Tuskey noted that vendor capabilities will play a role as well, especially in attributing pasted material. Said Keogh: “We’ve really come across that this is a difficult thing to implement and get right. We want to understand where we can get it right.”

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* For more information about the toolkit, contact hit@ecri.org

Part One: The Impetus for Correct Patient Identification

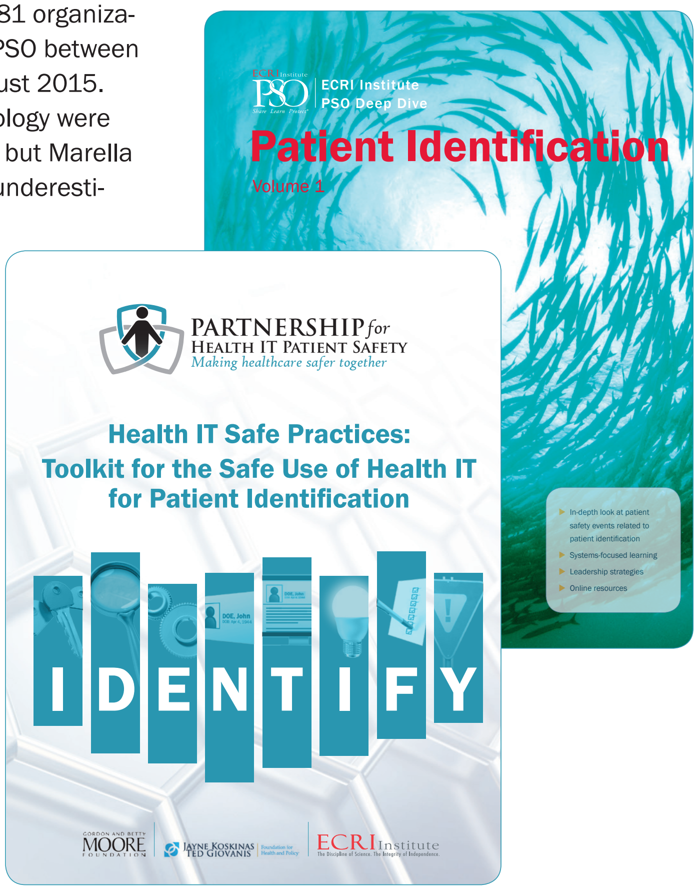
In 2016, ECRI Institute PSO studied more than 7,500 errors related to wrong patient identification. Based on this and other studies, the *Partnership* focused on the issue of patient identification over the course of the past year.

Patient Identification Events: Everyone Is at Risk

"No one is immune [to patient identification events]," stated William Marella, MBA, MMI, executive director, operations and analytics, patient safety, risk and quality, ECRI Institute. He gave a presentation about ECRI Institute PSO's *Deep Dive: Patient Identification* (Volume 1).* The effects of incorrect patient identification can be devastating. One striking event reported to ECRI Institute PSO was that a patient was not resuscitated during a cardiac arrest because staff adhered to a do not resuscitate (DNR) order for a different patient. Yet another report indicated that the wrong patient received a peripherally inserted central catheter intended for another person with a similar name.

The Patient Identification Deep Dive analyzed more than 7,600 wrong patient events, including near miss events, submitted by 181 organizations to ECRI Institute PSO between January 2013 and August 2015. Errors related to technology were the minority of reports, but Marella indicated that may be underestimated, because events were coded as technology-related only if technology was specifically mentioned in the report. However, Marella commented: "The human processes around identifying the patient are just as, if not more, significant than the IT-related ones."

It was quickly evident that patient identification events submitted to ECRI Institute PSO did not fit into typical patient safety "buckets," such as the Agency for Healthcare Research and Quality's Common Formats categories; therefore, the ECRI Institute PSO team


ECRI Institute PSO Deep Dive

Patient Identification

Volume 1

- In-depth look at patient safety events related to patient identification
- Systems-focused learning
- Leadership strategies
- Online resources

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Health IT Safe Practices: Toolkit for the Safe Use of Health IT for Patient Identification

IDENTIFY
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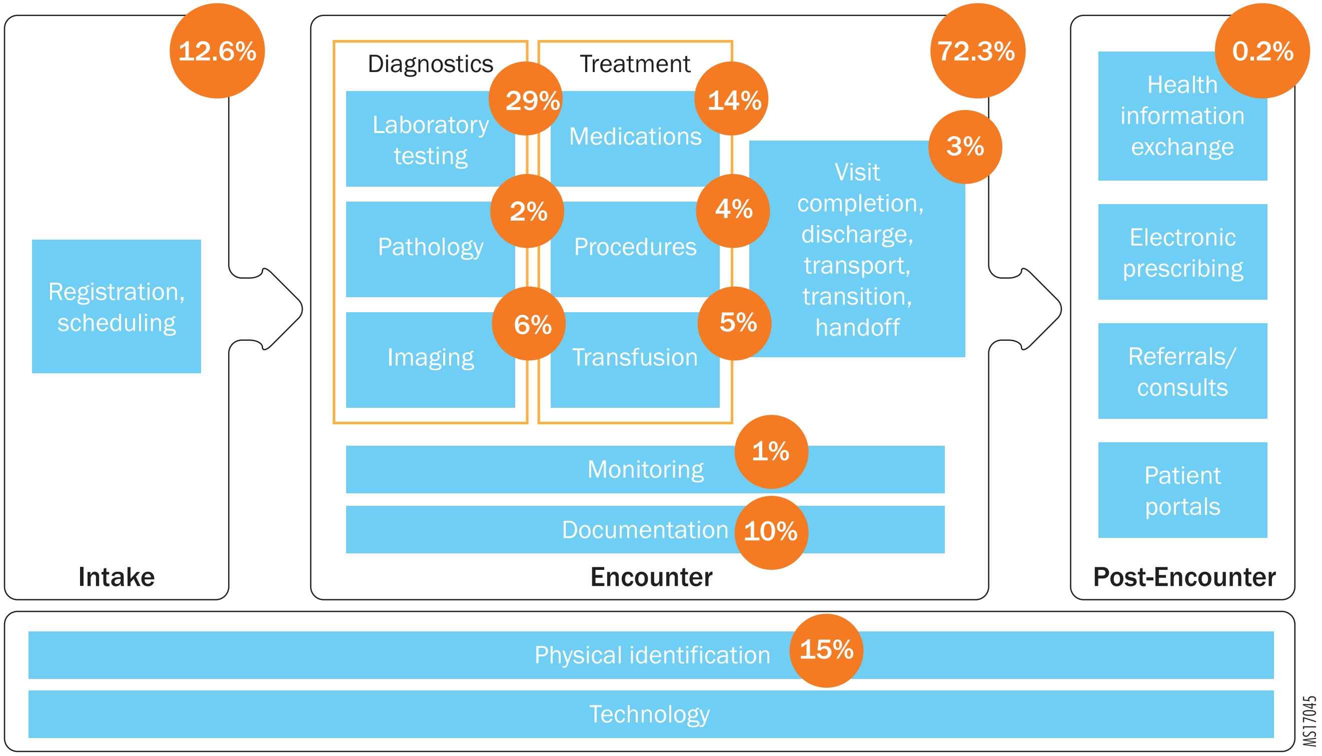
* An executive summary is publicly available on ECRI Institute's website at https://www.ecri.org/Pages/Patient-Identification-Deep-Dive.aspx

Figure. Patient Identification Care Process Map


12.6%
Registration, scheduling
Intake
72.3%
Diagnostics
Laboratory testing
29%
Pathology
2%
Imaging
6%
Treatment
Medications
14%
Procedures
4%
Transfusion
5%
Visit completion, discharge, transport, transition, handoff
3%
Monitoring
1%
Documentation
10%
Encounter
0.2%
Health information exchange
Electronic prescribing
Referrals/ consults
Patient portals
Post-Encounter
Physical identification
15%
Technology
MS17045

developed a taxonomy for this project. An overview of the classification system is presented in “Figure. Patient Identification Care Process Map,” which was created to trace the patient experience, beginning with registration and continuing after the medical encounter.

This process map shows that nearly three-quarters of identification events occur during the patient encounter, with much of that focused in diagnostic and treatment areas; about 13% occur during intake, and very few occur after the encounter.

Marella recounted surprise that many of the treatment errors that reached patients “started all the way back at the registration and scheduling process . . . The patient-access area is rife with failure modes.”

Additionally, many of the events are related to workarounds that bypass the technology intended to prevent them (such as barcoding systems) or shortcuts in the registration process that could become habitual.

Technology that can be used to prevent these patient identification errors include use of patient pictures to verify identity; however, while most electronic health record (EHR) systems have this capability, it’s still in the “early adopter” phase. Additional technologies are mentioned in the report, such as iris scanning or palm vein scanning and using radiofrequency identification chips in patient badges and wristbands.

Marella shared a story about the lessons learned from one facility’s review of its processes after a fatal wrong-patient error.

“What they found was people were pretty complacent. And it was cultural issues… [such as the commonplace practice of] identifying patients solely by room number… [which have] to be addressed by leadership,” said Marella. To break the “this will never happen here” mindset, the organization was transparent about the fatal wrong-patient event and other events related to patient identification. Sharing this information allowed for widespread acknowledgement that the facility had these types of problems, thus making the importance of identification practices, such as asking for two patient identifiers, more widely recognized.

Since the time of this writing, the workgroup has accepted these recommendations.

"There are so many opportunities for [health] IT to prevent these errors," said Marella.

Discussion: Eight Draft Recommendations to Improve Patient Identification

A *Partnership* workgroup developed safe practice recommendations for the use of health IT in patient identification with a corresponding patient identification toolkit, and at the September 16, 2016, meeting, these recommendations and toolkit were presented to the *Partnership* at large. Workgroup chair Hardeep Singh, MD, MPH, Michael E. DeBakey VA Medical Center and Baylor College of Medicine, explained how the group undertook its examination of patient identification safety issues and health IT's ability to reduce risk in this area. "Essentially, we took a three-pronged approach," he said. The group looked at this complex topic, improving patient identification, through three lenses:

- Catching. How do you capture and record patient data effectively?
- Matching. Am I the same person who was here six months ago?
- Display. How is this data displayed at the front end?

The group relied on a targeted systematic review of the literature in addition to the evidence obtained from reported events to bolster the recommendations issued in the toolkit. For an inside look at how a systematic review of the literature is performed, see "The Literature Review: A Crucial Step When Developing Clinical Practice Guidelines."

EIGHT DRAFT RECOMMENDATIONS*

Attributes

A1. Use standard identifier conventions in electronic fields containing patient identification data

A2. Use a confirmation process to help match patient and documentation

A3. Use standard attributes and attribute formats in all transactions to improve matching

A4. Use a standard display of patient attributes across various systems

Technology

T1. Include distinguishing information enhancing identification on screens, printouts, and those areas that require intervention

T2. Integrate new technologies to facilitate and enhance identification

T3. Implement monitoring systems to readily detect identification errors

T4. Include high-specificity active alerts and notifications to facilitate proper identification

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* Since the time of this writing, the workgroup has accepted these recommendations.

The eight recommendations to improve patient identification consider the various aspects of the sociotechnical model, explained Singh. It is important to monitor any changes that are made in the patient identification process. See "Eight Draft Recommendations."

The recommendations include eight steps that may be summarized by the acronym IDENTIFY; see Appendix A for information on this mnemonic device, the recommendations, and their rationales.

Through focused questions, the panel reviewed each of the eight safe practice recommendations for using health IT in patient identification in detail, focusing not only on the recommendation itself, but also on the barriers to implementation, the ways vendors could work with customers to develop and implement these functionalities, and areas in which uses of technology in patient identification will continue to be focused. Four of these recommendations focus on attributes, and four focus on technology.

Attributes

A1. Use Standard Identifier Conventions in Electronic Fields Containing Patient Identification Data

During the meeting, *Partnership* participants identified three sample areas for which standardized identifier conventions would improve patient identification and safety: keeping information from appearing in the wrong record, facilitating matching to be certain that the correct patient is receiving the correct care, and providing clear identification of neonatal patients. Capturing information using the greatest level of granularity in distinct fields and

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THE LITERATURE REVIEW: A CRUCIAL STEP IN DEVELOPING CLINICAL PRACTICE GUIDELINES

The literature review—a process during which evidence is systematically searched for, collected, synthesized, and appraised—is a crucial element when establishing clinical practice guidelines. It not only helps to establish and support where problems exist, but the information gathered during the review also acts as a springboard for determining recommendations for best practices.

During a presentation at the *Partnering for Transformation: Making a Positive Impact* meeting on September 16, 2016, Amy Tsou, MD, MSc, ECRI Institute, emphasized the importance of conducting a systematic literature review process when developing clinical practice guidelines.

"Performing a systematic literature review is really central to this process," explained Tsou. "When it's properly performed, a systematic literature review is in fact an explicit, transparent process with its own methodology . . . [It] involves a comprehensive gathering of all the relevant evidence, and it's a reproducible process."

The systematic literature review process begins with identifying a guideline development work group, typically comprising key stakeholders who are experts in the field. From there, the group formulates specific key questions and then conducts a comprehensive literature search based on these questions. The group can then appraise and synthesize the evidence to formulate its recommendations.

This process has become essential to creating good practice guidelines. A 2011 report from the Institute of Medicine (IOM, now the Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine) titled "Clinical Practice Guidelines We Can Trust" stated that all clinical practice guideline developers "should use systematic reviews that meet standards set by the Institute of Medicine's Committee on Standards for Systematic Reviews of Comparative Effectiveness Research."

The *Partnership for Health IT Patient Safety* followed the steps of the systematic literature review process when determining its safe practice recommendations for the use of health IT in patient identification. First, the *Partnership* convened a workgroup consisting of experts to work on the problem of patient identification errors. The workgroup then enlisted the help of ECRI Institute's Health Technology Assessment Information Service to conduct a systematic review of the clinical literature. The literature review sought to address key questions about the prevalence and causes of patient identification errors and to identify effective interventions for decreasing wrong-patient mistakes.

Through the literature review, the patient identification workgroup sought to address the following key questions:

1. What is the prevalence of patient identification (ID) errors in clinical care?
2. What are causes of patient ID errors in clinical care?
3. What interventions are effective for decreasing patient ID errors in clinical care?

Overall, the search included 106 relevant studies published between January 2009 and January 2016. Of these studies, 39 described the prevalence of patient ID errors, 44 described problems contributing to patient ID errors, and 40 assessed interventions.

Analysis of the literature revealed five overarching themes related to patient identification errors:

1. Improving design of physical, electronic, and assigned patient identifiers can decrease misidentification
2. Providing identification alerts during order entry can decrease wrong-patient orders
3. Using new technology and safety checks at automated-systems level can reduce errors and improve monitoring
4. Improving registration measures can help protect against identity theft
5, Gaining local cultural acceptance of processes is needed to provide feedback, monitor processes, and avoid workarounds

These themes were translated into recommendations, forming the core of the *Partnership*'s safe practice recommendations.

Tsou applauded the *Partnership's* patient identification workgroup for choosing to use the rigorous methodology of a systematic literature review process when developing its guidelines for patient identification. "Moving forward, continuing to incorporate evidence in a rigorous, reproducible, comprehensive, and transparent way is really essential to producing high-quality recommendations," said Tsou.

abiding by the standard treatment of such things as apostrophes and the use of legal names will facilitate identification.

Record duplication. "We have multiple different registration platforms. And we have very solid policies—we have clear guidelines on how to manage hyphenated names, [suffixes like] junior or senior, or punctuation in names," noted Michael Oppenheim, MD, of Northwell Health. "But when you do the math on points of entry across our system, it's probably well over 1,000 points of entry," without accounting for the multiple staff members positioned at each point. "For us, one of our most important efforts is continued reeducation and reinforcement: What are the identification conventions?"

The challenge that faces Northwell is one of record duplication. For example, he says that in the average month, 60 patients will have an inpatient stay at two Northwell's campuses. "So the imperative for us is getting the [identification] matched up front correctly so that we can keep the record cohesive." Currently, a common medical record is created for each patient and accessible at any location in the health system. However, because so many facilities within the health system are located close together, and because each one has so many points of entry, creating additional records on each patient is a risk that the health system is striving to mitigate. The goal for the healthcare system, said Oppenheim, is to transition to a single registration platform. "We will be able to enforce the rules a little more aggressively," he said, noting that a single platform would allow the health system to use a more active patient indexing strategy.

Unidentified patients. Another factor in applying patient identifier conventions is the unidentified patient. As highlighted by Lori Paine, MS, RN, Armstrong Institute for Patient Safety and Quality and the Johns Hopkins Hospital, registrars may not be consistent in their use of naming conventions (e.g., John Doe or Jane Doe). Therefore, patient identification conventions must address this situation as well.

Similarly, what happens when the unidentified patient is pregnant? Paine underscored the need for policies and conventions that can streamline the process in such complex situations: "While it's infrequent in nature, when you see these situations, the circumstances are dire. Trying to get the patient into the system can mean seconds and minutes in delays of care."

As one participant noted, situations in which names change can become complicated; identifying and tracking such changes in the health IT system is valuable. "When a name does change, from unidentified patient to Doe to someone else, or when a name changes because of marriage, or when the patient is born and the parents decided to give the baby a different name, it's important to have a historical record of those names and to be able to tie them together in the patient record."

Neonatal naming conventions. A third situation that requires careful and consistent naming conventions, *Partnership* participants identified, is the naming of newborn patients within the EHR. Participants shared methods of naming neonatal patients in ways that are intended to be more effective than "Babygirl Jones" in preventing identification errors. One such method, as presented in a 2015 study, is to use the mother's name and the child's gender followed by the surname, explained Oppenheim—for example, Janesgirl Smith (Adelman et al.). Participants noted that some proposed neonatal naming conventions could not function within older patient registration systems—barriers they identified included the system's inability to allow numerals in the name field and character limits.

A2. Use a Confirmation Process to Help Match Patient and Documentation

Addressing confirmation processes, Singh asked: "How will your organization respond to being required to do this?" Panel member Allen Chen, MD, PhD, MHS, Armstrong Institute for Patient Safety and Quality and Johns Hopkins Hospital, noted that physicians have responded positively to confirming the patient's initials at the beginning of the session—but not at the end of the session: "Definitely not when you'd like to find out that you've entered orders on the wrong patient.

Chen explained further that confirmation at the beginning of a session with a patient has a significant effect. "In one or two percent of sessions, physicians actually backed out [of the electronic record] because they were in the wrong chart," he said. "This was most prevalent in intensive care units or in walkrounds, where you're going from patient to patient and entering orders as you go, only to realize that you haven't changed the context when you start talking to the next patient." Interruptions are a common culprit, he added.

Participants' concerns focused on the number of patient records allowed to be open on one terminal at the same time. Chen responded that the number differs—anesthesia, for example, is allowed only one open record at a time, while other settings are limited to three. Chen also highlighted the risks posed by patients with similar names, but stressed the need to balance more complex confirmation strategies with the practical aspects of implementation and use.

A3. Use Standard Attributes and Attribute Formats in All Transactions to Improve Matching

Andrew Gettinger, MD, Office of the National Coordinator for Health Information Technology (ONC), emphasized the importance of useful and actionable regulations. "We are very sensitive to doing anything in a regulatory sense that isn't evidence-based and value-proposition tested," he explained. "In my personal practice, it is not uncommon for me to take care of a trauma patient with zero identity—all I know is the gender and approximate age. Yet, I have to provide sophisticated care in the operating room. So, systems that identify patients have to have the flexibility to proceed absent any or some of those identification characteristics."

Gettinger also emphasized the concern about over-regulating. "We want to make sure that the requirements we identify have very solid scientific evidence behind them."

Mark Segal, of GE Healthcare Digital, agreed. "Focusing on a uniform set of discrete data elements with associated definitions is one of those areas where both standards and certification actually works really well—particularly when you need to have consistency across systems." Segal likewise emphasized the need to ensure that recommended solutions have been proven useful. "We have a great opportunity here," he said. "I'd urge ONC and others in the field to evaluate the extent to which those additional data elements actually enhance the accuracy of patient matching."

A4. Use a Standard Display of Patient Attributes Across Various Systems

Regarding standard displays of patient attributes across systems, Paine said, "Where we started, very basically, was standardizing how our wristband printed. What we were seeing was if we had patients who moved between our facilities, it was not easy for the staff to distinguish the origin of the band. It was one very basic thing that was necessary."

Chen also noted how the complexity and variability of the EHR display could lead to confusion. "In our EMR [electronic medical record], every provider type and every entity could have their own version of the patient header. There was so much diversity, including how the same elements were displayed," he noted. "Things that you think of as standard were not."

Chen explained how Johns Hopkins took steps to standardize. "It took us about nine months to standardize the patient header—to create a consistent header that could be used by all applications in all of our entities. We have also standardized the printing on specimen labels, but we have not yet standardized the display of patient information identifiers on our reports yet. It's a very large iceberg."

Participants pointed to the standards published by NIST as the most specific regarding how information should be displayed.

Gettinger highlighted the plight of providers or students who practice in multiple organizations: "It's incredibly draining for them to have to remember that 'In this institution, I look here for this data. In this institution, it's not there, it's over here. And in the third institution, it's not on this screen at all—I have to click three times.'"

Nevertheless, other participants emphasized a need for specialization in areas such as the record header. As one participant commented, "We got to the point where about 80% of the header is standard. We had to keep the rest to be specialized by medical specialty—not as much by facility." The participant expressed this concern: "That's something to pay attention to in the standards: Where do we allow for flexibility?"

Technology

T1. Include Distinguishing Information Enhancing Identification on Screens, Printouts, and Those Areas That Require Intervention

Segal emphasized the difference between theory and practice in including patient-identity enhancing information in various formats. Meeting the recommendation to include distinguishing information, he said, “is not hard in principle, but varies by both the technology and platform.” Such major updates, he clarified, “don’t happen very often—they’re disruptive, and people get used to [the current layout].”

Complicating such standardization goals is the fact that banners, EHR layout, and more vary by product, Segal noted further. He also shared insights about vendor processes regarding system modifications with participants. “We try to be most responsive to demands from our customers—those that are regulatory squeeze out other things we have to do,” he said. “We have to prioritize those because they’re direct impacts on us as a vendor. And we also have to be aware of direct impacts on our customers. So, that affects the pace of such changes.”

Nevertheless, Segal emphasized that vendors want to work with customers to implement standardization initiatives, wanting customers “to work with us in detail on design—for example, on banners.” All vendors, he explained, should “work very deeply with customers at multiple levels, both on what should be in the system and critically, on priorities.”

T2. Integrate New Technologies to Facilitate and Enhance Identification

In the area of new technologies for patient identification, biometric solutions are in the pipeline for many organizations, while immediate efforts are being focused on patient record duplication and name consistency (see the discussion “Implement Monitoring Systems to Readily Detect Identification Errors”). Panel members described their organizations’ plans in this area: one is implementing photo identification for patients and another is pilot testing a palm scanning solution that will link to the registration system.

Participants generally agreed that they are in the early stages of planning or testing such biometric solutions but are not yet ready to implement them widely. Participants also noted that they are looking to the evidence for guidance on which practices are strongest, but that in some cases, evidence or published literature may be lacking.

T3. Implement Monitoring Systems to Readily Detect Identification Errors

Participants noted that they are focusing on enhancing the accuracy of patient nomenclature and the ability to safely and promptly modify patients’ names when patients indicate a change, as well as methods of identifying inadvertent record duplication—for instance, when a new patient record is created and the patient’s name is spelled differently.

Panelists discussed the complicated nature of correcting orders placed on wrong patients as well as correcting identification errors in the EHR.

One measure from the National Quality Forum (NQF) deals with retract and reorder; its goal is for organizations to track when orders are deleted from one patient’s record and entered on another within 10 minutes. Other related concerns highlighted by the NQF include duplicate records, “which can confuse clinicians because important information may be missing from some of the accounts” (NQF).

“We monitor duplicates extremely closely and have done interventions,” said Oppenheim.

Chen agreed and noted that it’s more than just monitoring. “It’s more of a challenge to know how many [duplicate records] are because of errors or when patients say ‘I want to change my name.’ Distinguishing errors from life changes is relatively difficult to put on a dashboard.”

T4. Include High-Specificity Active Alerts and Notifications to Facilitate Proper Identification

“How can vendors work with their customers to develop and implement this functionality [high-specificity alerts and notifications]?” Singh asked panelists.

The answer: collaboration. As Segal explained to participants, “That happens at multiple levels. A customer may be a deep development partner. There are user groups. Clients are brought in for specific user-centered design sessions. Getting the use of alerts optimized so that you don’t have alert fatigue and so they achieve the intended purpose is critical.”

Collaboration will also lead to the creation of alerts that will meet the unique needs of the organization. “You need to take into account formal usability expertise to be able to customize for the needs of the particular institution,” said Segal. “It needs to be done in a formal, collaborative way that takes into account multiple perspectives: the end user, the designers, the developers. That’s really the way to approach it.”

For another approach to patient identification that’s garnering national attention, see “A National Patient Identifier: Crowdsourcing via Competition.”

A NATIONAL PATIENT IDENTIFIER: CROWDSOURCING VIA COMPETITION

Patient matching is the act of correctly matching a patient to his or her medical record, both within a single healthcare organization and across organizations. Healthcare organizations focus significant efforts on ensuring that patients are matched with the correct medical record. However, mismatches and duplicates still occur and can compromise patient safety and quality of care.

"It's a safety issue. It's a quality-of-care issue," said Leslie Krigstein, vice president of congressional affairs at CHIME. "We often refer to Maria Garcia in Harris County, Texas: There are 230 [patients named Maria Garcia] in the same system with the same birth date. Who's diabetic? Who's allergic to penicillin? You don't want to be the wrong Maria Garcia."

Krigstein also cited a large healthcare system that spends $4 million to $5 million annually to improve patient matching. The organization achieved a 95% matching rate internally. However, this rate decreases significantly—to between 50% and 60%—when matching with external providers in local communities.

"What can we do to bridge that gap between really great internal processes that still leave 5% of patients out?" asks Krigstein. "Do you really want your loved one to be part of that 5% that isn't matched, that isn't identified?"

Krigstein highlighted CHIME's initiative to develop a national patient identifier (NPI), which would allow healthcare systems to share information more smoothly. Krigstein acknowledged that a national patient identifier "isn't a silver bullet" to solve all patient identifier problems, but that CHIME believes it to be a necessary component of an effective solution.

CHIME, together with the HeroX Foundation, launched the CHIME National Patient ID Challenge (http://herox.com/patientID-challenge), a global competition designed to accelerate the creation and adoption of a solution for ensuring easy, accurate patient identification in the United States. It must protect patient privacy and identity and be able to be adopted by the vast majority of the U.S. healthcare industry and its patients. The winner will be awarded $1 million. The results of this competition are anticipated in mid-2017.

There are hurdles to adopting an NPI, however. Since 1998, the U.S. Department of Health and Human Services (HHS) has included the following language in its Proposed General Provisions prohibiting the establishment of an NPI:

None of the funds made available in this Act may be used to promulgate or adopt any final standard under section 1173(b) of the Social Security Act providing for, or providing for the assignment of, a unique health identifier for an individual (except in an individual's capacity as an employer or a health care provider), until legislation is enacted specifically approving the standard.

Nevertheless, many groups have voiced support for various iterations of an NPI concept, including the National Patient Safety Foundation, the American Health Information Management Association, the Healthcare Information Management and Systems Society, and CHIME (Terry).

Additionally, a recent report from the House Committee on Appropriations encouraged HHS to examine the issues about patient matching. The report calls for the Secretary of HHS, acting through the Office of the National Coordinator for Health Information Technology and the Centers for Medicare and Medicaid Services, "to provide technical assistance to private-sector led initiatives to develop a coordinated national strategy that will promote patient safety by accurately identifying patients to their health information." (U.S. House of Representatives Committee on Appropriations)

According to Krigstein, ensuring that the healthcare community gets patient identification right is a critical first step toward solving the problem of patient matching. Krigstein states that to achieve success, everyone—from healthcare providers to patients—must be on board.

References

Terry K. National patient identifier struggles for life. CIO 2015 Aug 18 [cited 2016 Oct]. Available at: http://www.cio.com/article/2972266/healthcare/national-patient-identifier-struggles-for-life.html

U.S. House of Representatives Committee on Appropriations. Report 114: Department of Labor, Health, and Human Services, and Education, and Related Agencies Appropriations Bill 2017. [cited 2016 Oct].Available at: http://appropriations.house.gov/uploadedfiles/hrpt-114-hr-fy2017-laborhhsed.pdf

Part Two: Collaboration Yields Actionable Insight

Part of the day's work for *Partnership* participants was to identify areas of focused concern on selected topics, to create tools that could be used by the various stakeholders in their organizations to review and assess these health IT-related safety issues.

Participants divided into three groups and focused on three specific patient-safety issues: automated end times, the establishment of a health IT safety program, and unanticipated system down times.

Many of these issues were first mentioned and highlighted by participants in the first face-to-face *Partnership* meeting, *Partnering for Success*, held on September 23, 2014.*

Each of the following self-assessment questionnaires is prefaced by an Executive Brief that may serve to summarize the issue for administrators and committee leadership. These Executive Briefs include background information on the issue at hand, key questions drawn from the self-assessment, and a snapshot of survey responses from *Partnership* participants.

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* For more information about this report, contact clientservices@ecri.org

Executive Brief

Automated End Times for Orders

PARTNERSHIP *for*
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Why Are Automated End Times Valuable?

Automatic end times or stop orders may be implemented and useful in any care setting. The goal of automatic end times—also referred to as autostops, automatic stops, or automated stop orders—is to reduce unnecessarily prolonged treatment or medication regimens in order to prevent unintended consequences from lack of appropriate therapeutic reevaluation. Recently, autostops have increased in prevalence in an effort to limit the exposure of patients to unnecessary and prolonged treatment with addictive medications. In an effort to reduce over-prescribing, for example, New York state has implemented an initial limit for opioid regimens: a seven-day automated end time for opioids used to treat acute pain.*

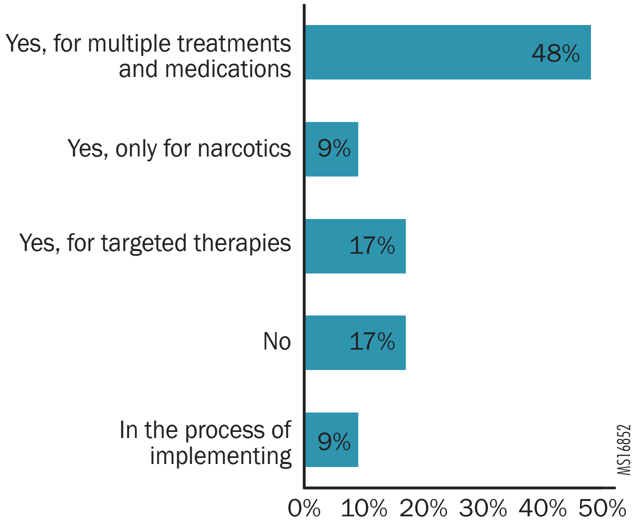
This goal is supported by the Medicare Conditions of Participation. Guideline § 482.25(b)(5) requires that the hospital "medical staff, in coordination and consultation with the pharmacy service, determines and establishes the reasonable time to automatically stop orders for drugs and biologicals not specifically prescribed as to time or number of doses. The hospital must implement, monitor, and enforce this automatic stop system."** In other care settings, such stops are determined by clinicians and coordinated with information technology (IT) implementation of these recommendations. However, automatic termination of therapies without the appropriate notice can also create hazards.

When a medication is coded with an automated end time in an order-entry system, medication administration record, or electronic health record, a risk exists that the therapy will be automatically discontinued without the awareness of the appropriate provider. Similarly, the stop order may not be presented in such a way that the provider can adapt it or efficiently continue the medication regimen when needed.*** Moreover, depending on the medication in question, it may be more harmful to stop the medication abruptly than to give it for an extra day.

WHAT PARTICIPANTS ARE SAYING

During the meeting, "Partnering for Transformation," held September 16, 2016, at ECRI Institute, participants were asked whether they use automatic end times. Nearly half stated that they do, while fewer stated that they have been implemented for narcotics or targeted therapies. A significant portion of respondents do not use automatic end times, and a smaller portion are in the process of implementing automatic end times.

Figure. Do You Currently Use Automated End Times?



Did You Ask?

- Is the automatic end time policy updated and in accordance with federal, state, and regulatory requirements?
- Is it obvious to providers that the medication or therapy that they're ordering has or will have an automatic end time?
- Are providers able to extend the medication or treatment regimen when appropriate, thus overriding the automatic end time?

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* New York State Department of Health. Laws and Regulations. New York State P.H.L. § 3331, 5(b)(c). Revised 2016 Aug [cited 2016 Oct 14]. Available at: https://www.health.ny.gov/professionals/narcotic/laws_and_regulations/

** Centers for Medicare and Medicaid Services. Revised hospital guidance for pharmaceutical services and expanded guidance related to compounding of medications. 2015 Oct 30 [cited 2016 Sep 30]. Available at: https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/Survey-and-Cert-Letter-16-01.pdf

*** ISMP. Let's put a stop to problem-prone automatic stop order policies. 2000 Aug 9 [cited 2016 Sep 30]. Available at: https://www.ismp.org/newsletters/acutecare/articles/20000809_2.asp

Self-Assessment Questionnaire: Automated End Times for Orders

Use this self-assessment questionnaire in conjunction with the following resources to review your automated end time policies and procedures. Then, use the attached action plan template to track resulting projects, initiatives, and reviews.

- ECRI Institute guidance article: High-alert medications https://www.ecri.org/components/HRC/Pages/Pharm1_2.aspx*
- ECRI Institute guidance article: Implementing computerized provider order entry https://www.ecri.org/components/HRC/Pages/Pharm6.aspx*
- ECRI Institute guidance article: Pain medications and PRN orders https://www.ecri.org/components/HRC/Pages/Pharm3.aspx*
- Office of the National Coordinator for Health Information Technology (ONC). SAFER guide: computerized provider order entry with decision support https://www.healthit.gov/sites/safer/files/guides/SAFER_CPOE_sg007_form.pdf

Criteria for Automated End Times	yes	no	n/a	in progress	notes
1. Is the automatic end time for a medication or therapy reviewed prior to implementation?	☐	☐	☐	☐	
a. Is there a set of criteria that providers and others can use to determine a medication's or therapy's candidacy for an automated end time?	☐	☐	☐	☐	
b. Are the appropriate individuals consulted prior to determining automated end times?	☐	☐	☐	☐	
c. Are these criteria and resultant consequences from the use of automated end times reviewed regularly for accuracy and appropriateness?	☐	☐	☐	☐	
2. Is the automated end time policy compliant with federal or state requirements and recommendations?	☐	☐	☐	☐	
a. Are federal or state requirements reviewed and evaluated regularly to see whether they have been updated?	☐	☐	☐	☐	
3. Is the list of medications (or other items) with automated end times reviewed regularly and assessed for accuracy, efficacy, and appropriateness?	☐	☐	☐	☐	
End-User Visibility and Actionability					
4. Are providers aware of what medications and therapies do and can have automatic end times?	☐	☐	☐	☐	
a. Are staff members informed when automatic end times are created or updated?	☐	☐	☐	☐	

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* Some materials are included in memberships to ECRI Institute products and services. For information about these reports, contact clientservices@ecri.org

	yes	no	n/a	in progress	notes
5. When an order is entered, is the associated automatic end time prominently visible to the provider?	☐	☐	☐	☐	
a. Is the end time presented in plain, understandable language (i.e., Thursday, January 24, at 11:00 p.m.)?	☐	☐	☐	☐	
6. Are alerts regarding automated end times delivered to appropriate staff (e.g., doctor, pharmacist, nurse, patient)?	☐	☐	☐	☐	
a. Do these staff members have the knowledge and authority to act on the alert?	☐	☐	☐	☐	
b. Are alerts presented in an appropriate context and at an appropriate time based on provider's activity (e.g., when reviewing that patient's record or when the end of the treatment is imminent)?	☐	☐	☐	☐	
c. Are providers warned of a scheduled end time early enough that any necessary action (e.g., regarding the continuation of the medication or therapy) can be taken?	☐	☐	☐	☐	
d. Is the alert presented in a way that allows the provider to take action?	☐	☐	☐	☐	
e. Are alerts regarding the end time categorized by severity according to condition or medication?	☐	☐	☐	☐	

Reporting and Analysis

	yes	no	n/a	in progress	notes
7. Does the system collect data on automated end times, including–					
a. The number of times a medication or therapy with an automated end time is prescribed?	☐	☐	☐	☐	
b. How often the end time is overridden?	☐	☐	☐	☐	
c. Why the end time is overridden?	☐	☐	☐	☐	
8. Is this data accessible?	☐	☐	☐	☐	
9. Is this data used to review appropriate use of automated end times?	☐	☐	☐	☐	
10. Are hazardous conditions, near misses, or adverse events involving automated end times reported and reviewed?	☐	☐	☐	☐	
11. When a patient safety event involving an automated end time occurs, does that trigger a review of the event and similar events?	☐	☐	☐	☐	
12. Does this review include analysis of the criteria that were addressed when the automated end time was put in place?	☐	☐	☐	☐	

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Action Plan

Automated End Times for Orders

Assessment completed by: ______________________________ **Date:** ________________________

QUESTION NO.	ACTION REQUIRED	RESPONSIBILITY	TARGET DATE	ACTION COMPLETED	
				DATE	INITIALS

Executive Brief

Establishing a Health Information Technology Safety Program

Why Is a Formal Health Information Technology Safety Program Important?

The success of a health information technology (IT) safety program hinges on the ability of system users to recognize, react to, and report health IT-related events for analysis and action (e.g., vendor reporting, PSO reporting, vendor modifications). Two overarching factors support a health IT safety program: the organization's culture of safety and the ability to "do the right thing, even if it's not standard procedure," Christoph Lehmann, MD, FACMI, FAAP, professor of pediatrics and biomedical informatics, Vanderbilt University School of Medicine, said to participants at the September 16, 2016, meeting of the *Partnership for Health IT Patient Safety*.

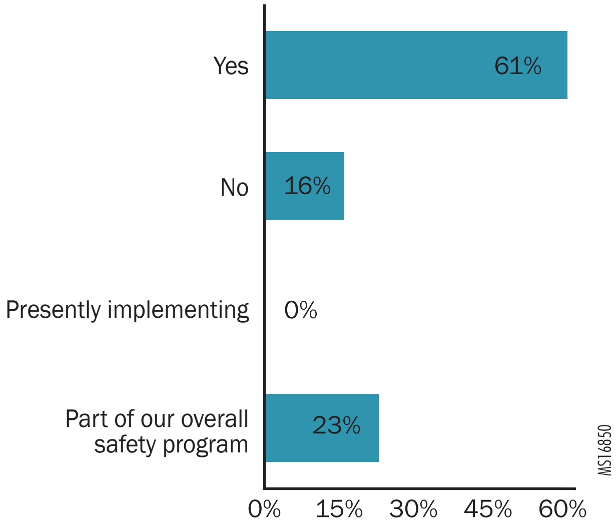
Once an event is identified and reported to the appropriate parties, it can be analyzed and solutions can be developed. A health IT safety program also allows for feedback, which meeting participants identified as a key component to the safe and effective implementation and use of health IT. The provision of feedback about health IT-related issues and the actions taken within a provider organization can be accomplished in different ways; for example, two methods mentioned during the meeting were communication by managers to staff and the distribution of information on a dashboard. Vendors typically distribute information in regular or special publications, as appropriate.

A health IT safety program within a provider organization requires support from all levels of the organization, including leadership and patients, as well as vendors. Executive walkrounds and proactive patient queries can help crystallize staff members' reported concerns or demonstrate the effects of implemented solutions. Such proactive knowledge can help prioritize safety interventions and vendor actions.

WHAT PARTICIPANTS ARE SAYING

When *Partnership* participants were asked whether they have a health IT safety program, more than half responded that they do. An additional one-quarter responded that it is part of their larger safety program, while the rest of respondents indicated that they do not have a health IT safety program.

Figure. Do You Have a Health IT Safety System in Place?



Did You Ask?

- Does the health IT safety program incorporate the electronic health record (EHR), networked equipment, and all other technologies used and interactive with systems throughout the organization?
- Are members of the executive team, senior leadership, and/or clinical care teams accountable for and engaged in health IT system safety as an integrated part of a safety strategy and safety program? And are there provisions for evaluating and testing when new systems, equipment, or upgrades occur?
- Is feedback provided to staff members who report health IT safety concerns either internally or externally to the vendor?

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Self-Assessment Questionnaire: Establishing a Health Information Technology Safety Program

Use this self-assessment questionnaire in conjunction with the following resources to review and further develop an effective health information technology (IT) safety program. Then, use the attached action plan template to track resulting projects, initiatives, and reviews.

- ECRI Institute guidance article: Health information security standards https://www.ecri.org/components/HRC/Pages/LawReg19_1.aspx*
- ECRI Institute PSO Deep Dive: Patient identification https://www.ecri.org/Pages/Patient-Identification-Deep-Dive.aspx
- Office of the National Coordinator for Health Information Technology (ONC) SAFER guide: organizational responsibilities https://www.healthit.gov/sites/safer/files/guides/safer_organizationalresponsibilities_sg002_form_0.pdf

Foundation

	yes	no	n/a	in progress	notes
1. Does the organization rely on a standard definition of health IT safety?	☐	☐	☐	☐	
a. Does this definition include safe use of the technology?	☐	☐	☐	☐	
b. Does this definition include the equipment itself?	☐	☐	☐	☐	
c. Does this include using health IT to improve safety?	☐	☐	☐	☐	
2. If there is no freestanding health IT safety program, is the health IT safety program integrated into other existing and maintained programs (e.g., patient safety, quality, risk, or others)?	☐	☐	☐	☐	
3. Is the organization alert for health IT safety events as well as events in which health IT safety plays a role?	☐	☐	☐	☐	
4. Does the health IT safety program incorporate the electronic health record (EHR), all networked equipment, and all technologies used?	☐	☐	☐	☐	
5. Does the health IT safety program address or support IT security measures?	☐	☐	☐	☐	
a. Does the health IT safety program address or support equipment security measures?	☐	☐	☐	☐	
b. Does this program address personal device use (e.g., bring-your-own-device policies)?	☐	☐	☐	☐	
6. Is the health IT safety program or program component reviewed regularly for effectiveness?	☐	☐	☐	☐	

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	yes	no	n/a	in progress	notes
7. Is education provided to staff as a part of the health IT safety program?	☐	☐	☐	☐	
a. Does this education occur upon hire and whenever new upgrades, systems, modifications, or other system changes occur?	☐	☐	☐	☐	
b. Is this education documented?	☐	☐	☐	☐	
c. Does this education include the importance of awareness, reporting, and security practices?	☐	☐	☐	☐	
8. Does the organization use evidence-based assessments, such as those included in the ONC SAFER guides?	☐	☐	☐	☐	
9. Are human-factors specialists part of health IT evaluations and health IT safety and usability considerations?	☐	☐	☐	☐	
10. Are clinicians engaged in health IT safety practice development and assessment?	☐	☐	☐	☐	
11. Are proactive failure modes and effects analyses (FMEAs) conducted for health IT-related issues?	☐	☐	☐	☐	
12. Are designated resources regarding health IT safety identified and made available to staff?	☐	☐	☐	☐	

Using Leadership Roles to Champion Health IT Safety

13. Are sufficient resources dedicated to health IT safety?	☐	☐	☐	☐	
14. Are experts available as part of health IT safety program resources?	☐	☐	☐	☐	
15. Do executives and senior leaders participate in walkrounds?	☐	☐	☐	☐	
a. Do these walkrounds include consideration of health IT safety-related issues?	☐	☐	☐	☐	
b. Do these walkrounds include consideration of workflow (i.e., are leaders asked to be aware of the potential for—and reasons behind—workarounds and to attempt to resolve the need for them)?	☐	☐	☐	☐	
16. Is a member of the executive team or senior leadership accountable for and engaged in health IT safety?	☐	☐	☐	☐	

	yes	no	n/a	in progress	notes
17. Is patient feedback sought regarding health IT system use or concerns?	☐	☐	☐	☐	
a. Is this feedback brought to the attention of the health IT safety committee?	☐	☐	☐	☐	
b. Is this feedback, when appropriate, brought to the attention of the vendor?	☐	☐	☐	☐	
c. Is it used to analyze and implement improvements to the health IT system?	☐	☐	☐	☐	

Event Reporting and Analysis

18. Does the organization have a surveillance mechanism (automatic or manual) in place to identify and flag health IT–related issues (e.g., patient queries, failure modes and effects analysis, root-cause analysis, walkrounds, PSO reporting, feedback loops, or vendor-provided safety information)?	☐	☐	☐	☐	
19. Does this method of identifying health IT–related issues include—					
a. Review of relevant adverse-event report data by a designated staff member?	☐	☐	☐	☐	
b. Coordination as appropriate with internal IT staff and the vendor?	☐	☐	☐	☐	
c. Reviewing equipment failures?	☐	☐	☐	☐	
d. Identifying and reviewing the source of use errors or workaround?	☐	☐	☐	☐	
e. Encouraging staff to report technology hazards, such as difficult interfaces or confusing elements that may lead to potential errors or workarounds?	☐	☐	☐	☐	
f. Review of safety committee findings?	☐	☐	☐	☐	
g. Tracking compliance with equipment inspection and preventive maintenance schedules?	☐	☐	☐	☐	
h. Monitoring downtime and the impact it has on health IT-related issues?	☐	☐	☐	☐	
i. Reviewing relevant patient complaints and concerns?	☐	☐	☐	☐	
j. Looking for workarounds?	☐	☐	☐	☐	
k. Raising awareness of vendor-reported issues?	☐	☐	☐	☐	

	yes	no	n/a	in progress	notes
l. Are health IT-related events reported to the appropriate individual (e.g., risk manager, IT staff, vendor, medical director)?	☐	☐	☐	☐	
20. Does the organization analyze the frequency and severity of identified health IT-related safety problems?	☐	☐	☐	☐	
a. Does this evaluation include review of the factors contributing to the health IT-related safety problem?	☐	☐	☐	☐	
b. Does this evaluation include comparing typical work practices (i.e., actual practices, including potential work-arounds) with current standards and procedures (i.e., recommended or ideal practices)?	☐	☐	☐	☐	
21. Are the findings of analyses communicated to the appropriate individuals (e.g., the safety committee, risk manager, IT leadership, chief medical informatics officer, designated safety representative, department leaders, vendors)?	☐	☐	☐	☐	
22. When conducting a root-cause analysis (RCA) for a safety event, are health informatics personnel, IT, and clinicians part of the process?	☐	☐	☐	☐	
23. Does the organization share its learnings—					
a. Within the reporting facility?	☐	☐	☐	☐	
b. Across the organization?	☐	☐	☐	☐	
c. With the vendor?	☐	☐	☐	☐	
d. Outside the organization?	☐	☐	☐	☐	
e. Through a relationship with a patient safety organization (PSO)?	☐	☐	☐	☐	
24. Does the organization use data from its PSO for further learning?	☐	☐	☐	☐	
25. Does an event trigger a search for previous or other potential similar events?	☐	☐	☐	☐	

Engaging Providers, Staff, and Patients

26. Are clinicians aware of and engaged in health IT safety practices?	☐	☐	☐	☐	
27. Do patients have access to their information?	☐	☐	☐	☐	
a. Do they have a way to indicate the information's validity or error?	☐	☐	☐	☐	

	yes	no	n/a	in progress	notes
b. Are potential security issues with patient access to information addressed?	☐	☐	☐	☐	
c. Are staff aware of the risk of IT security breach from:	☐	☐	☐	☐	
d. Computer viruses?	☐	☐	☐	☐	
e. Phishing, spamware, or other malware attacks?	☐	☐	☐	☐	
f. Equipment theft or loss?	☐	☐	☐	☐	
g. Intentional or unintentional HIPAA [Health Insurance Portability and Accountability Act] violations?	☐	☐	☐	☐	
28. Is the reporting of health IT safety events, near misses, or hazardous conditions encouraged and supported?	☐	☐	☐	☐	
29. Is feedback provided to those who do report?	☐	☐	☐	☐	
a. Is a dashboard used to provide feedback?	☐	☐	☐	☐	
b. Are safety-reporting feedback and updates provided to staff members?	☐	☐	☐	☐	

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Action Plan

Establishing a Health Information Technology Safety Program

Assessment completed by: ______________________________ **Date:** ________________________

QUESTION NO.	ACTION REQUIRED	RESPONSIBILITY	TARGET DATE	ACTION COMPLETED	
				DATE	INITIALS

Executive Brief

Unplanned Downtime of Health Information Technology Systems

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Why Is Preparing for Unplanned Downtime Important?

"The more sophisticated the electronics, the less familiarity people have with doing calculations or writing notes on paper, and the harder it's going to be to prepare for and to cover [during a downtime]," explained Ellen Deutsch, MD, medical director of patient safety, risk, and quality, ECRI Institute, to participants at the daylong *Partnership for Health IT Patient Safety* meeting "Partnering for Transformation," held September 16, 2016, at ECRI Institute.

Unplanned system downtime should be treated like any emergency. It will have a significant effect on workflows from registration through discharge. Therefore, the organization should prepare for such an event like it prepares for other emergencies, with backup plans, drills and simulated scenarios, and other proactive risk assessments and tools.

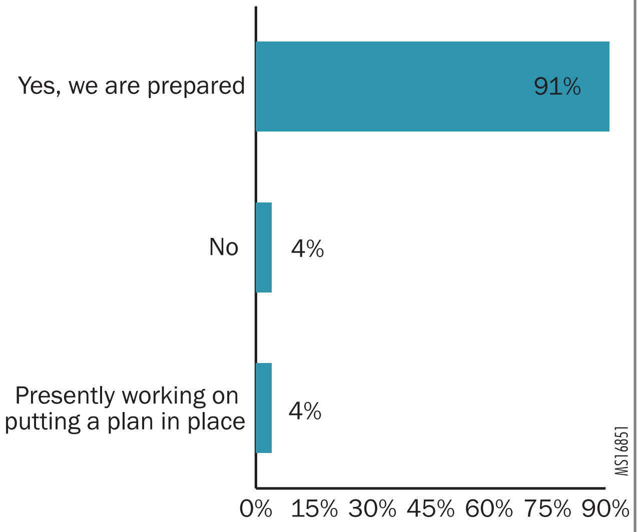
Did You Ask?

- Is downtime treated like and prepared for like an emergency?
- Do staff receive training and education regarding policies, protocols, and procedures for unplanned health information technology (IT) system downtimes?
- Are unplanned downtimes investigated and debriefed, and are findings and responses shared throughout the organization?

WHAT PARTICIPANTS ARE SAYING

When *Partnership* participants were asked about their perceived readiness for unplanned downtime, the vast majority responded that they are prepared for such an event. A small percentage of participants responded either that they are not or that they are developing a plan.

Figure. Do You Have Practices in Place for an Unanticipated Downtime?



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Self-Assessment Questionnaire: Unplanned Downtimes of Health Information Technology Systems

Use this self-assessment questionnaire in conjunction with the following resources to review your unplanned downtime policies and procedures. Then, use the attached action plan template to track resulting projects, initiatives, and reviews.

- ECRI Institute guidance article: Emergency management https://www.ecri.org/components/HRC/Pages/SafSec6.aspx*
- ECRI Institute guidance article: Technology acquisition and management https://www.ecri.org/components/HRC/Pages/MedTech1.aspx*
- Office of the National Coordinator for Health Information Technology (ONC). SAFER guide: contingency planning https://www.healthit.gov/sites/safer/files/guides/safer_contingencyplanning_sg003_form_0.pdf
- U.S. Department of Health and Human Services. Breach notification rule http://www.hhs.gov/hipaa/for-professionals/breach-notification/

Organization Preparation

	yes	no	n/a	in progress	notes
1. Is an unplanned downtime treated like and prepared for like any other emergency?	☐	☐	☐	☐	
a. Is consideration of unplanned system downtimes part of the organization's emergency planning and preparation?	☐	☐	☐	☐	
b. Does leadership support and champion preparation for unplanned system downtimes?	☐	☐	☐	☐	
c. Is downtime preparation overseen by a multidisciplinary team so that all staff roles are spoken for, understood, and specifically considered?	☐	☐	☐	☐	
d. Are considerations tailored to specific departments or areas as needed?	☐	☐	☐	☐	
e. Is there a system in place for appropriate notifications when one area is experiencing an unplanned downtime?	☐	☐	☐	☐	

Staff Training and Education

2. Do staff receive training and education regarding policies, protocols, and procedures for unplanned health information technology (IT) system downtimes?	☐	☐	☐	☐	
a. Does training and continuing education include regular updates and reviews?	☐	☐	☐	☐	

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* Some materials are included in memberships to ECRI Institute products and services. For information about these reports, contact clientservices@ecri.org

	yes	no	n/a	in progress	notes
b. Does training and education include items such as ransomware, malware, phishing, and other extraneous disruptions (e.g., items that not only impact the safety but also in the integrity of systems)?	☐	☐	☐	☐	
c. Are staff members trained in use of paper or alternative system use?	☐	☐	☐	☐	
d. Are paper or alternative systems and protocols available?	☐	☐	☐	☐	
e. Does training cover all staff on all shifts, as appropriate, including evenings and weekends?	☐	☐	☐	☐	
3. Are simulated downtimes used as ways to prepare for an actual event?	☐	☐	☐	☐	
a. Are opportunities for simulation training extended to staff on all shifts and in all departments?	☐	☐	☐	☐	
b. Does debriefing after simulation training occur?	☐	☐	☐	☐	
c. Are changes to downtime policies, procedures, and protocols made as a result of concerns identified during simulation training?	☐	☐	☐	☐	
4. Does debriefing occur after downtime incidents to identify issues that should be addressed in future training or in amendments to policies?	☐	☐	☐	☐	
a. Are changes to downtime policies, procedures, and protocols made as a result of concerns identified during unplanned downtimes?	☐	☐	☐	☐	
b. Do preparations for downtimes include preparations and protocols for such times as when staff levels are at their lowest, such as overnight, on weekends, and on holidays?	☐	☐	☐	☐	
c. Are tools, such as the SAFER guides, used to measure an organization’s preparedness for unplanned system downtimes?	☐	☐	☐	☐	

Backup Systems and Equipment

	yes	no	n/a	in progress	notes
5. Are unplanned downtime policies, procedures, and protocols available for reference in a location and format that is accessible during an unplanned system downtime?	☐	☐	☐	☐	
a. Do staff know where items are located and how to access them when needed?	☐	☐	☐	☐	
b. Is the location of materials in a place that is convenient and known to all staff?	☐	☐	☐	☐	

	yes	no	n/a	in progress	notes
c. Is there someone available within the organization at all times who has access to this location?	☐	☐	☐	☐	
d. Is the content and location of available materials standardized across the organization?	☐	☐	☐	☐	
6. Is there a tool box with available tools, forms, and other backup items needed for periods of unplanned downtimes?	☐	☐	☐	☐	
a. Do staff know where these tools and items are located?	☐	☐	☐	☐	
b. Do staff know how to use these tools and materials and how information will be re-incorporated into the record?	☐	☐	☐	☐	
c. Are these tools and items easily accessible?	☐	☐	☐	☐	
d. Are there sufficient supplies for all staff who may be working when the system goes down?	☐	☐	☐	☐	
e. Are these backup items regularly assessed for appropriateness, efficacy, and usability?	☐	☐	☐	☐	
f. Are batteries or backups regularly tested or replaced?	☐	☐	☐	☐	
g. Is the location and content of such tool boxes standardized?	☐	☐	☐	☐	
7. Do forms meant for use during system downtime match the system they're replacing as closely as possible?	☐	☐	☐	☐	
8. Are staff roles during unplanned downtimes clearly defined?	☐	☐	☐	☐	
a. Are staff aware of their roles during unplanned downtimes?	☐	☐	☐	☐	
b. In the acute care setting, are certain staff members designated as "runners" for pharmacy, blood bank, laboratory, and other departments?	☐	☐	☐	☐	
c. Do non-critical providers have designated supporting roles during downtimes?	☐	☐	☐	☐	
d. Are these roles reviewed regularly for accuracy and appropriateness?	☐	☐	☐	☐	
e. Is a list of these roles included with the reference documents and tool box?	☐	☐	☐	☐	

Communication and Notification

9. Are "command center" principles used to manage unplanned downtimes?	☐	☐	☐	☐	

	yes	no	n/a	in progress	notes
10. Is there a rapid notification system in place to inform staff (including those in IT) of unplanned system downtimes and disruptions, and alerting staff to what systems are impacted?	☐	☐	☐	☐	
a. Is this notification system tested regularly?	☐	☐	☐	☐	
b. In the acute care setting, are staff in all departments who might be affected by downtime notified, even if the downtime occurs in a separate department (e.g., if a lab system goes down, are staff in the emergency department, intensive care unit, and others notified)?	☐	☐	☐	☐	
11. Are appropriate forms and notifications in place to inform all stakeholders of the downtime (e.g., in the event of a ransomware breach)?	☐	☐	☐	☐	
a. Does this notification include which system is down and which are impacted?	☐	☐	☐	☐	
b. Does this notification include which areas are directly and indirectly affected?	☐	☐	☐	☐	
c. Does this notification include an estimate, if at all possible, of when the system will be restored?	☐	☐	☐	☐	
d. Does this notification include information on what actions should be taken in the meantime?	☐	☐	☐	☐	
e. Are staff designated to speak with the media when appropriate?	☐	☐	☐	☐	
f. Are these staff provided with talking points and resources for additional information?	☐	☐	☐	☐	
g. Are other staff trained to refer all inquiries to the appropriate designated staff?	☐	☐	☐	☐	
h. If a breach is involved, are the assessment, notification, and disclosure steps taken, as required by regulations (i.e., HIPAA [Health Insurance Portability and Accountability Act] and privacy and security rules)?	☐	☐	☐	☐	
i. Is a staff member designated and authorized to coordinate assessments and disclosures?	☐	☐	☐	☐	
j. Does this staff member communicate with the media when appropriate?	☐	☐	☐	☐	
k. Are all staff members and those impacted (e.g., including those whose information may have been compromised) promptly informed of the breach?	☐	☐	☐	☐	
l. Is the extent of the breach disclosed as it is identified?	☐	☐	☐	☐	

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Recovery

	yes	no	n/a	in progress	notes
12. Is a method in place to inform staff when the system has safely come back online?	☐	☐	☐	☐	
13. Is a procedure in place for synchronizing information recorded via backup methods when the health IT system is restored?	☐	☐	☐	☐	
a. Is a procedure in place to ensure that data entered via backup system is transcribed or scanned into the primary system?	☐	☐	☐	☐	
b. Are the effectiveness, accuracy, and safety of this procedure ensured?	☐	☐	☐	☐	
c. Is any data lost made known to the risk manager or designated staff member and documented appropriately in the primary system?	☐	☐	☐	☐	
d. Is the loss of data investigated and origins of the loss reviewed?	☐	☐	☐	☐	
e. Does the electronic health record (EHR) allow postadministration documentation with distinct “time of entry” and “time of administration” entries?	☐	☐	☐	☐	
14. Is a procedure in place for the safe handling, receipt, and incorporation of any hardcopy information generated during system unplanned downtimes?	☐	☐	☐	☐	
15. Is a method in place to ensure that billing for care provided during unplanned system downtimes can be managed and documented?	☐	☐	☐	☐	

Investigation

16. Are unplanned downtimes investigated?	☐	☐	☐	☐	
17. Are findings about unplanned downtimes shared throughout the organization?	☐	☐	☐	☐	

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Action Plan

Unplanned Downtime of Health Information Technology Systems

Assessment completed by: ______________________________ **Date:** ________________________

QUESTION NO.	ACTION REQUIRED	RESPONSIBILITY	TARGET DATE	ACTION COMPLETED	
				DATE	INITIALS

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Part Three: Setting Goals and Taking Aim

Looking forward, many areas of health IT may benefit from closer analysis. The *Partnership* relies on input from its multi-stakeholder participants to determine topics to expand upon in its toolkits and safe practice recommendations, such as its publications on copy and paste and patient identification. Topics highlighted as potential future areas for analysis by the *Partnership* include alerts, closing the loop (evaluating test and referral tracking and the impact on missed or delayed diagnosis), medication reconciliation, and clinical decision support.

Medication Reconciliation

Work on medication reconciliation and the safety implications encountered with various health IT systems has begun. Jeffrey Schnipper, MD, MPH, Brigham and Women's Health, highlighted the AHRQ-funded program led by Society for Hospital Medicine: the Multi-Center Medication Reconciliation Quality Improvement Study (MARQUIS). (Society for Hospital Medicine) In his report on this project, Schnipper emphasized the importance of ensuring patient safety during transitions in care. "When people go into and out of the hospital, it's a really vulnerable time for them. And it's a particularly vulnerable time when it comes to medication safety," he noted. "Usually, about 40% of their medication regimen may be rearranged before a typical average elderly patient leaves the hospital, and the discharge process itself is often rushed. There's often inadequate patient education." Such changes can result in hazards or patient safety events.

There can be disjointed communication among the providers during the handoff process and culminating with discharge and follow up, and Schnipper highlighted the risks of medication discrepancies during such transitions. These risks result from "an unexplained difference among documented regimens across different sites of care." Basically, he explained, a patient's pre-hospital regimens, in-hospital regimens, and post-discharge regimens are often not reconciled or appropriately managed because of process complications. These can include inadequate access to pre-admission medication resources, lack of staff to perform discharge medication reconciliation and patient counseling, complications from implementation of new electronic medical records, and missing or nonexistent improvements to existing medication reconciliation health information technology. "This often results in adverse drug events, subsequent patient harm, and increased healthcare utilization." This is a large effort, and the focus cannot be just on medication reconciliation; rather, it involves a combination of EHR design, local implementation, and actual use in practice.

What can be done? Schnipper presented detailed findings from MARQUIS. (Society for Hospital Medicine) "What we found at baseline was that the average patient has 3.3 unexplained discrepancies in their admission or discharge orders because of errors in the medication reconciliation process," he said.

Schnipper also pointed out that errors are divided roughly evenly between errors that originate in the admission process and those that arise during discharge.

"Medication reconciliation is supposed to fix these problems," he said. As defined in a tool offered by the Institute for Healthcare Improvement, medication reconciliation "is a process of identifying the most accurate list of all medication a patient is taking—including name, dosage, frequency, and route—and using the list to provide correct medications for patients anywhere within the healthcare system" (Midelfort).

Schnipper posited that there's an avenue for health IT technology to improve the safety and efficacy of medication reconciliation. "We have a good idea of what best practices are in medication-reconciliation health IT. But I think this list needs to be refined and a consensus generated among stakeholders, to [determine] what are the best practices in medication reconciliation software." The ideal group to continue to address this problem is a multi-stakeholder collaborative performing an analysis in a nonpunitive forum, to identify and share best practices and recommendations with the broader healthcare community.

Envisioning the Future

"What's next for the *Partnership*?" asked Janet Marchibroda, MBA, of the Bipartisan Policy Center, who moderated the meeting.

Christoph U. Lehmann, MD, Vanderbilt University Medical Center, answered with a question of his own to all of the *Partnership* participants: "How are we going to make the world better?" Lehmann presented a smorgasbord of topics and areas of concern that the *Partnership* could focus on. Lehmann began this discussion by first looking at some historical issues involving patient safety concerns. This list of historical and potential areas of focus included the following:

- M-health and the use of new devices in gathering and sharing information, which presents new kinds of risks
- Software errors
- Human-machine interface issues
- Display issues that could result in the incorrect dosage of drugs or incorrect treatments
- Juxtaposition errors—when an incorrect item is selected because of its proximity to the intended item
- Wrong time or clock errors as they relate to default settings and the inability to recognize text entry corrections
- Clinical decision support and alerts—increased number of alerts (e.g., drug-drug interaction in addition to high safety alerts)
- Closing the loop and following up with order or laboratory results (differences in push/pull systems)
- Cognitive overload and burnout (forcing providers to encode data)
- Workflow—specifically, the ability to override hard stops in urgent cases or initiate the necessary task without a prior action (lack of "break the glass" functionality)
- Automation bias—failure to perform actions because the system did not prompt them

It is important to look at the failure modes and identify their causes and effects, to prioritize issues for evaluation. Lehmann questioned the group as to whether the focus should be on deriving recommendations, investigating implementations, or evaluating other avenues of evaluation.

Participants discussed their interests and concerns for *Partnership* focus moving forward. As one participant noted, "What keeps me up at night is the potential for errors that we don't even know about. We've configured these systems in very customized and complex ways, and I don't think we tap into one of our resources to help us [identify concerns]: the end users. One thing we [as an organization] built was a button on the top bar that the end user could click at any time" to enter a category and free text regarding the issue a user is addressing. "We got so much great information from them right at the time they had the issue."

Trish Lugtu, Constellation, drew upon her background in medical-malpractice claims analysis and identified diagnostic error as the result of failure to follow up on testing and consultations as another potential topic for consideration. "In our diagnostic-error-related allegations, about 40% involve communication or [EHR] field follow-up system failures," she noted. "We also found that it was especially at risk in ambulatory care—and there's so much to improve there."

Errors related to imaging were also highlighted by participants—specifically, issues involving closing the loop regarding radiology findings for patients in the emergency department. One participant explained their organization's policy: results are to be communicated to the ordering provider via phone call, and the ordering provider is required to document the follow-up discussed with the patient. "When we first started doing this, we found that only 46% of our patients were actually returning for follow-up appointments based on life-threatening situations," the participant said. "Now, we've gotten it up to about 78%."

Other areas of concern were brought to the group's attention and would benefit from further investigation. One participant commented on the significant risk of alert fatigue and the ability to leverage multiple viewpoints on this topic because of the *Partnership*'s unique reach and viewpoint. From the vendor's perspective, this participant noted, "Understanding the content, the usefulness, and how alerts and warnings can be best used to inform clinical decision-making is an important project that can happen with this group."

To conclude the meeting, Giannini again asked participants what issues they were focused on now that they had heard from the day's presenters. The most common responses were medication reconciliation, delayed or missed diagnosis, and wrong-patient errors (see "What Health IT Concerns Will NOW Keep You Awake").

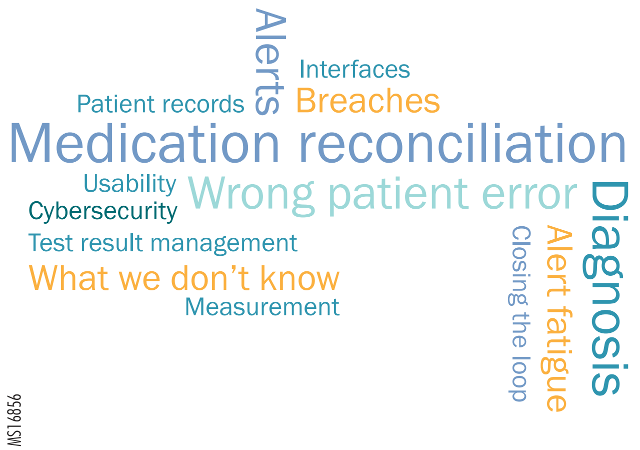
Partnership participants will continue to identify topics for future workgroups and development of safe practice recommendations.

Making a Positive Impact

"We started out hearing some of the horrendous problems that have occurred as a result of mistaken patient identification, which set the scene nicely for ongoing discussion" recapped Graham Atkinson, DPhil, Jayne Koskinas Ted Giovanis Foundation. Later, "the panel discussion provided an opportunity to hear from various providers and vendors how they are dealing with problems that have occurred and to share different solutions." Atkinson applauded the joint efforts of the *Partnership*.

"We will continue to make care safer together," said Solomon. "That's what we've been doing, and we will continue to do that through analysis, safe practice recommendations, and implementation strategies as we make a positive impact."

What Health IT Concerns Will *NOW* Keep You Awake?



The third and final poll of the *Partnership* meeting addressed participants' safety concerns. The size of each term indicates how frequently it was mentioned.

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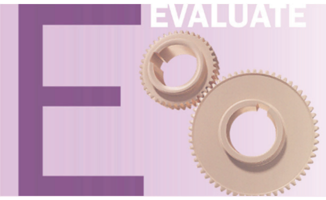
Appendix A: Draft Patient Identification Toolkit Recommendations

Electronic fields containing patient identification data should consistently use standard identifier conventions.

- Rationale: To promote patient safety, avoid duplicate record creation, keep information from appearing in the wrong record, and facilitate matching and interoperability, the fields containing patient identification data should consistently use standard identifier conventions to capture information using the greatest level of granularity.

Use a confirmation process to help match the patient and the documentation.

- Rationale: A confirmatory step is necessary to facilitate a match between the patient and the documentation used throughout the encounter. Attributes such as a patient's name and date of birth, initials, photo, or medical record number, when entered and/or viewed at various stages in the care process, can provide an opportunity to confirm that the information being entered is for the correct individual.



Use standard attributes and attribute formats in all transactions to improve matching.

- Rationale: The use of standard attributes and attribute formats should be part of all transactions in order to improve patient matching. Patient demographic elements should be captured and stored in the same format. The lack of a standard data set can lead to records not being correctly linked to one another, impeding proper identification.

N
DOE, John
DOB: Apr 4, 1944
(73 yo M)
NORMALIZE

Use a standard display of patient attributes across the various systems.

- Rationale: For accurate identification, the patient's attributes should be displayed and represented in a standard format across the various health IT systems. The information should appear in the same format regardless of where the information is being displayed (e.g., on headers, wristbands, lists) throughout an organization or across organizations.

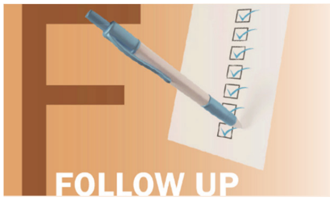
T
DOE, John
TAILOR

Include distinguishing information enhancing identification on screens, printouts, and those areas that require interventions.

- Rationale: Visual displays, including screens and printouts, should provide distinct clues. The appearance of the attribute information (font, order, type of information), the use of white space, the location of identifying information, and the incorporation of technology (e.g., photographs), in conjunction with attributes, can aid in distinguishing patients and improve identification.

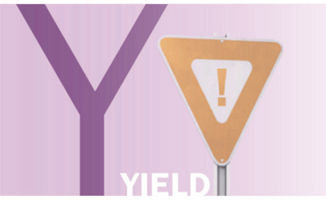
Integrate new technologies to facilitate and enhance identification.

- Rationale: New technologies and new uses of technology should be evaluated and incorporated into patient identification processes. New technologies, once appropriately vetted and sufficiently mature, can facilitate accurate and timely identification. The improved use of technology facilitates matching of the appropriate patient with the correct treatment, diagnostic, or other modality.



Implement monitoring systems to readily detect identification errors.

- Rationale: Automated monitoring of current systems, whether used to detect errors in patient identification before they are propagated (proactive) or to provide additional checks, detect inconsistencies, and aid in confirming identity (reactive), can prevent duplication and record overlay.



Include high-specificity active alerts and notifications to facilitate proper identification.

- Rationale: Highly specific alerts and notifications can be used to alert users when they attempt to create a new record for an individual who has a current record, select an incorrect individual, or enter a name that may contain typos, transpositions, or misspellings. Monitoring how alerts are used and providing direct feedback will improve proper identification.

PARTNERSHIP *for*
HEALTH IT PATIENT SAFETY
Making healthcare safer together

Appendix B: ECRI Institute Health IT Safety Resources*

- Alarm Safety Resource Center. https://www.ecri.org/alarmsafety
- Copy/paste: prevalence, problems, and best practices. https://www.ecri.org/Resources/HIT/HTAIS_Copy_Paste_Report.pdf
- ECRI Institute PSO Deep Dive: Health information technology. https://www.ecri.org/components/PSOCore/Pages/DeepDive0113_HIT.aspx
- ECRI Institute PSO Deep Dive. Laboratory-related safety events. https://eshop.ecri.org/p-171-pso-deep-dive-laboratory-related-safety-events.aspx
- ECRI Institute PSO Deep Dive: Medication safety events. https://eshop.ecri.org/p-142-pso-deep-dive-medication-safety-events.aspx
- Electronic health records. https://www.ecri.org/components/HRC/Pages/MedRec1_1.aspx
- Implementing computerized provider order entry. https://www.ecri.org/components/HRC/Pages/Pharm6.aspx
- Medical identify theft. https://www.ecri.org/components/HRC/Pages/SafSec12.aspx
- Patient identification. https://www.ecri.org/components/HRC/Pages/RiskQual16.aspx
- Patient identification and security systems. https://www.ecri.org/components/HRC/Pages/SafSec14.aspx
- Patient safety at intersection of medical and information technology. https://www.ecri.org/components/PSOCore/Pages/PSONav0811.aspx
- Risk managers' 10 strategies for health IT success. https://www.ecri.org/components/HRC/Pages/RMRep0613_Focus.aspx
- Top health technology hazards for 2017. https://www.ecri.org/Pages/2017-Hazards.aspx
- Top 10 patient safety concerns for 2016. https://www.ecri.org/Pages/Top-10-Patient-Safety-Concerns.aspx
- Top 10 patient safety concerns for healthcare organizations: 2015 https://www.ecri.org/components/HRC/Pages/RMRep0415_Focus.aspx

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* Some materials are included in memberships to ECRI Institute products and services. For more information about these resources, contact clientservices@ecri.org

Appendix C: About Our Speakers and Panelists

J. Graham Atkinson, DPhil, Executive Vice President for Research and Policy, Jayne Koskinas Ted Giovanis Foundation

Allen Chen, MD, PhD, MHS, Health IT Patient Safety Office, Johns Hopkins Hospital, Armstrong Institute for Patient Safety and Quality; Vice Chair for Quality, Safety, and Service, Oncology; and Director, Patient Safety and Bioinformatics

Ellen S. Deutsch, MD, MS, FACS, FAAP, CPPS, Medical Director, Patient Safety, Risk, and Quality, ECRI Institute; Medical Director, Pennsylvania Patient Safety Authority; Senior Scientist, The Children's Hospital of Philadelphia

Tejal Gandhi, MD, MPH, President of the National Patient Safety Foundation and the Lucian Leape Institute

Andrew Gettinger, MD, Chief Medical Information Officer (CMIO) at the Office of the National Coordinator of Health IT (ONC), Professor of Anesthesiology and Adjunct Professor of Computer Science, Dartmouth College & the Geisel School of Medicine at Dartmouth

Robert C. Giannini, BS, NHA, CHTS – IM/CP, Patient Safety Analyst and Consultant, ECRI Institute

Caroline Keogh, RN, MS, Patient Safety Manager, athenahealth

Leslie Krigstein, Vice President, Congressional Affairs, College of Healthcare Information Management Executives

Christoph Lehmann, MD, Professor for Pediatrics and Biomedical Informatics at Vanderbilt University and founder and Editor-in-Chief of *Applied Medical Informatics*

Jeffrey C. Lerner, PhD, MA, MPhil, President and Chief Executive Officer, ECRI Institute

Lana Lowry, PhD, Health IT Usability Project Lead, National Institute of Standards and Technology

Trish Lugtu, BS, CPHIMS, CHP, Associate Director of Research at Constellation

Janet Marchibroda, MBA, Director of the Health Innovation Initiative and Executive Director of the CEO Council on Health and Innovation at the Bipartisan Policy Center (BPC)

William M. Marella, MBA, MMI, Director of Operations and Analytics for the ECRI Institute Patient Safety Organization (PSO) and the Pennsylvania Patient Safety Authority (PSA)

Jeremy Michel, Senior Clinical Informatics Advisor, ECRI Institute, Clinician-Informaticist, Department of Biomedical and Health Informatics, The Children's Hospital of Philadelphia

Michael Oppenheim, MD, Chief Medical Information Officer, Northwell Health

Lori Paine, RN, MS, Director of Patient Safety at the Armstrong Institute for Patient Safety and Quality and the Johns Hopkins Hospital

Lorraine Possanza, DPM, JD, MBE, Senior Patient Safety, Risk, and Quality Analyst and Health IT Patient Safety Liaison, ECRI Institute

Jeffrey Schnipper, MD, MPH, BA, associate physician at Brigham and Women's Hospital and Associate Professor of Medicine, Harvard Medical School

Mark J. Segal, PhD, Vice President of Government and Industry Affairs, GE Healthcare Digital

Hardeep Singh, MD, MPH, Chief of the Health Policy, Quality & Informatics program, VA Health Services Research Center for Innovations based at the Michael E. DeBakey VA Medical Center and Baylor College of Medicine, Houston

Ronni Solomon, JD, Executive Vice President and General Counsel, ECRI Institute

Amy Tsou, MD, MSc, Senior Research Analyst, ECRI Institute and Neurologist, the Corporal Michael J Crescenz VA Medical Center

Carrie Tuskey, RN, BSN, MHSA, Director of Risk Management, Office of Clinical Quality and Safety, Henry Ford Health System

Joan D Williamson, RN, MNH, CPHQ, Director of the Virginia Patient Safety Organization

GORDON AND BETTY MOORE FOUNDATION

JAYNE KOSKINAS TED GIOVANIS Foundation for Health and Policy

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