EHR Alerts
Facilitator Guide

Purpose of this guide

The EHR Alert offline materials are provided in two parts:

- A slide deck that contains the core material from the website to allow offline use.

- A case study which can be used by a facilitator to engage groups in a more in-depth discussion of the materials.

Who should use this guide

Frontline Managers, Infection Preventionists, Clinical Leaders and/or Administrative Leaders, patient education departments, patient experience departments.

How to use this guide

Present the information in the Facilitator Slides to those in your hospital who are responsible for generating or receiving EHR alerts.

Using the Case Study

The Case Study is intended as a group exercise grounded in discussion. Individuals participating in a group where the Case Study is being used should be given a copy of the materials. The Case Study slide deck presents the questions from the Case Study for use during meetings.

Facilitator Guide Script

Use the Facilitator Guide Script to support the presentation of the Facilitator Slides.

SAY:

This tool discusses designing effective EHR alerts. Specifically, it addresses why alerts should be built into the EHR, the five rights of clinical decision support, and the roles of various champions for change.

Slide 1

SAY:

Question: Which type of system has been found to have the lowest number of errors: human-led systems, human-machine systems, or machine-led systems?

Slide 2

SAY:

Human-machine systems seek to leverage the strengths of both people and machines, while providing a buffer against the weaknesses. Well-designed human-machine systems can leverage the machine to cue the human to consider important information when making a clinical decision. The human takes information provided by the machine and, combined with their clinical expertise, makes an informed decision. Human-machine systems in the infection prevention context can include tools such as clinical decision support and EHR alerts.

Slide 3

Machines are imperfect decision-makers, particularly because they are unable to gather the nuance of the human experience. As tools, machines are exceptionally capable of storing and retrieving data from multiple sources, at an instant. Further, machines can be built to leverage multiple simultaneous sources of data. However, machines can be data rich and information poor. They can be home to vast quantities of data, but fail to manage the subjective well.

Humans are imperfect decision-makers, particularly during complex or stressful situations. Biases of all sorts have been documented by researchers, with negative effects on the quality of decision making. For example, confirmation bias, the dynamic that makes one see patterns in the data that reinforce a currently held belief, is just one of the factors that can reduce the quality of decision making. Biases, limitations in memory, the demand to multi-task: These all can contribute to poor decision making. On top of that, the particularly challenging environment of healthcare, including factors such as high workload, high stakes, long hours, and fragmentation of care, also contributes to difficulty making decisions.

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SAY:

In this discussion about designing effective EHR Alerts, we will consider the following topics:

- Introduction to EHR Alerts
- Five Rights of Clinical Decision Support
- Scenarios and EHR Alert design
- Champions for Change and their roles

Slide 4

Topics: Designing effective EHR Alerts

| Introduction to EHR Alerts |
| Five Rights of Clinical Decision Support |
| Scenarios and EHR Alert design |
| Champions for Change and their roles |

SAY:

To begin, I'll offer an introduction to EHR Alerts.

Most Electronic Health Records (EHRs) have the ability to display alerts and reminders to end users. Numerous studies have evaluated the use of EHR Alerts and how they impact the way clinical care is delivered. The result is clear:

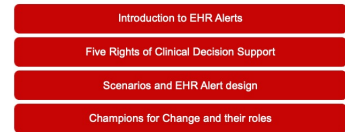When EHR Alerts are well designed, they work.

For example, an EHR Alert has been used at some hospitals to identify when patients are at risk for sepsis. Some display it as a banner.

Slide 5

Introduction
to EHR Alerts

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Slide 6

Introduction to EHR Alerts and their impact

✓ Most Electronic Health Records (EHRs) can display alerts and reminders to end users.
✓ Numerous studies have evaluated use of EHR Alerts and how they impact the way clinical care is delivered.

When EHR Alerts are well designed,
they can positively impact patient care by
helping personnel make appropriate decisions.

SAY:

EHR Alerts are a form of Clinical Decision Support (CDS) and include technology-mediated reminders, advisories and alerts. However, Clinical Decision Support can help or hurt clinical practice.

While EHR Alerts have been used to reduce the prevalence of HAIs, poorly designed alerts have also been identified as contributing to alert fatigue and overload, which can lead to clinician frustration with the EHR.

This module offers a standardized language to allow individuals impacted by EHR Alerts to articulate issues that can be resolved through a robust design process. Effective EHR Alerts require collaborative efforts before, during and after their design. High-quality EHR Alerts involve leadership and end users throughout the organization to ensure that the design process weighs the costs and benefits of the choices required to develop an effective EHR Alert.

Slide 7

EHR Alerts as CDS

✓ EHR Alerts are a form of Clinical Decision Support (CDS) and include technology-mediated:
  ✓ reminders
  ✓ advisories
  ✓ alerts
✓ They have been used to reduce HAI prevalence.
✓ Poorly designed alerts contribute to alert fatigue and overload.
✓ Effective EHR Alerts require collaborative efforts before, during and after their design.

SAY:

When humans and machines work together, each using their strengths toward a common goal, they create the most resilient systems. Researchers who specialize in human-computer interactions have noted that systems where humans or computers make decisions without the benefit of the other can result in outcomes that are less than ideal.

Slide 8

Humans and machines together

✓ When humans and machines work together, they create the most resilient systems.
✓ Researchers note that systems in which humans or computers make decisions without the benefit of the other can result in outcomes that are less than ideal.
   ✓ Humans are imperfect, particularly during complex or stressful situations.
   ✓ Machines are imperfect, particularly because they are unable to gather the nuance of the human experience.

SAY:

EHR alerts are one way in which humans and machines can work together to reduce HAIs. EHR Alerts should not be expected to replace clinical decision making, rather they are tools that support clinicians in making evidence-informed decisions in the care of their patients. The important thing to note is that a well-designed Alert can result in improved outcomes, and a poorly designed one can not only yield poor outcomes, but can impact the outcomes of the well designed ones too.

Slide 9

Working together to reduce HAIs

✓ EHR Alerts are one way in which humans and machines can work together to reduce HAIs.
✓ EHR Alerts are tools that can support clinicians in making evidence-informed decisions in the care of patients.
✓ A well-designed alert can result in improved outcomes.
✓ A poorly designed alert can not only yield poor outcomes, but it can also impact the outcomes of the well-designed ones.

SAY:

Next, let's go over the Five Rights of Clinical Decision Support.

The most powerful tool in developing and improving an EHR Alert is attention to design. One of the best frameworks for thinking about the design of EHR Alerts is the Five Rights model for Clinical Decision Support. This framework was developed in 2009. It is focused on improving medication use through the use of CDS systems and has been refined since its initial design.

Slide 10

Five Rights of Clinical Decision Support

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Slide 11

The five rights are:

- The right information
- To the right person
- In the right intervention format
- Through the right channel
- At the right time in the workflow
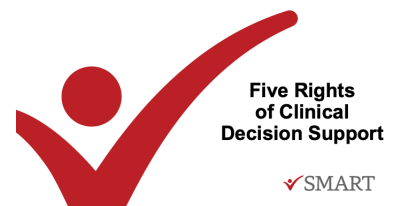
The Five Rights of Clinical Decision Support framework

✓ The Five Rights of Clinical Decision Support framework focuses on improving medication use through the use of CDS systems.
✓ The Five Rights can be used to design effective EHR Alerts.

The Five Rights are:
✓ The right information
✓ To the right person
✓ In the right intervention format
✓ Through the right channel
✓ At the right time in the workflow

SAY:

An EHR Alert should be evidence-based, derived from a set of recognized guidelines, or based on a national performance measure. As hospitals start their EHR Alert deployment, they should focus on alerts that have established best practice and are based on high level clinical evidence. When EHR Alerts derive from evidence that is of lower quality, their implementation can be contentious and may undermine trust in both the particular alert as well as Alerts, more generally.

In accordance with CDC recommendations, one hospital set an alert every 24 hours after the insertion of a Foley as a reminder for nursing staff to ensure the catheter is only in place as long as needed.
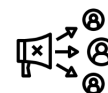
Slide 12

The right information

- ✓ An EHR Alert should be:
  - ✓ evidence-based,
  - ✓ derived from a set of recognized guidelines, or
  - ✓ based on a national performance measure
- ✓ When EHR Alerts derive from lower-quality evidence:
  - ✓ implementation can be contentious
  - ✓ they may undermine trust in alerts

SAY:

To create an environment where individuals are working at the highest level of their licensure, EHR Alerts should be directed to individuals with the minimum licensure required to address the alert. As a result, designing EHR Alerts protocols can change care team roles, especially in the context of team approaches to care. The use of team-based alerts can seem like a good idea but they can contribute to alert fatigue.

Slide 13

To the right person

- ✓ EHR Alerts should be directed to those with the minimum licensure required to address the alert.
- ✓ Designing EHR Alert protocols can change care team roles.
- ✓ Team-based alerts can seem like a good idea, but they can contribute to alert fatigue.

SAY:

EHR Alerts can be delivered in a variety of formats: break the glass, hard stop alerts, slowdown alerts, banners, reminders, and many others. Each of these formats offer different behavioral nudges. For instance, hard stop alerts that require entry to move beyond have been shown to be very effective at shaping behavior but are also unpopular because of their impact on workflow. Effective EHR Alert design requires that implementers understand what formats are in their arsenal, the potential impact on clinical workflow, and take these into account when selecting the right tool for the problem.

An analysis of view times on click through alerts (e.g., a banner that requires acknowledgment) have shown that clinicians can spend less than 0.1 seconds on the notice, suggesting they may be less effective.

Slide 14

In the right intervention format

- ✓ Each EHR Alert delivery format offers different behavioral nudges.
- ✓ Effective EHR Alert design requires that implementers:
  - ✓ understand what formats are in their arsenal
  - ✓ understand the potential impact on clinical workflow
  - ✓ take those into account when selecting the right tool for the problem

SAY:

EHR Alerts are often associated with other systems. For instance, patient portals and EHR-tethered smartphone apps for clinical and patient care, can be used to convey messages to patients about their need to practice good hygiene. While EHR Alerts are generally targeted to members of a patient's care team, effective Alerts need not be limited to the EHR. The goal of an alert is to raise awareness on the right technology to make a difference.

Slide 15

Through the right channel

- ✓ EHR Alerts are often associated with other systems.
- ✓ Effective alerts do not need to be limited to the EHR.
- ✓ The goal of an alert is to raise awareness on the right technology to make a difference.

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SAY:

One of the hardest parts of building effective EHR Alerts is mapping them into the workflow. Further, it can be more difficult because the act of building an Alert can change the workflow itself. Designers have to be sensitive to the timing in the workflow to ensure that the alert is presented in a context-aware form. This principle has implications because timing can mean time in the process or time in the day.

Slide 16

At the right time in the workflow

✓ One of the hardest parts of building effective EHR Alerts is mapping them into the workflow.
✓ Building an alert can change the workflow itself.
✓ Designers have to be sensitive to the timing to ensure the alert is presented in a context-aware form.
✓ Timing can mean time in the process or time in the day.

SAY:

Let's go through some scenarios and additional considerations when it comes to EHR Alert design.

In both of these cases, timing is everything: A physician is trying to prescribe a medication that interacts with the patient's existing medications. The alert only appears after entering the pertinent information for the prescription, when the physician attempts to send the script to the pharmacy. An appropriately timed alert would present as soon as the medication is selected. Later alerts mean wasted effort.

Can you offer an example that you have experienced of when alerts came too late in the process?

Facilitator Notes: The goal here is to have a discussion about when alerting is too late. Use this slide to foster a discussion and understand people's experience.

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Scenarios and
EHR Alert design

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Slide 18

**Scenario: Alerting too late
in the process**

A physician is trying to prescribe a medication that interacts with the patient's existing medications. The alert only appears after entering the pertinent information for the prescription, when the physician attempts to send the script to the pharmacy. An appropriately timed alert would present as soon as the medication is selected. Later alerts mean wasted effort.

Can you offer an example that you have experienced of when alerts came too late in the process?

SAY:

A reminder to remove a Foley might be triggered for only one shift to isolate responsibility and ensure that the question is asked at a time when the appropriate clinical team is available to make that decision.

Can you offer an example that you have experienced of when alerts came too late in the day?

Facilitator Notes: The goal here is to have a discussion about when alerting is too late. Use this slide to foster a discussion and understand people's experience.

Slide 19

Scenario: Alerting too late in the day

A reminder to remove a Foley might be triggered for only one shift to isolate responsibility and ensure the question is asked at a time when the appropriate clinical team is available to make that decision.

Can you offer an example that you have experienced of when alerts came too late in the day?

SAY:

A common tension with health technology is between the desire to introduce new technology and its impact on current clinical processes. When considering the implementation of a CDS system, clinical workflows must be both understood and documented to ensure that the right information is delivered to the right person at the right time. As EHR Alerts are designed, getting them as close to the point where the least amount of effort is wasted should be the goal.

EHR Alerts should be built around specific goals and aims. Individuals designing alerts should do so with emotional intelligence, the input of the planned recipients of the alert and with particular attention to ensuring that the clinician recognizes their responsibility to make the decision. Flow charts and swimlane diagrams can be used to illustrate how the alert can fit into the clinical workflow.

Slide 20

Health technology tension

✓ A common tension is between the desire to introduce new technology and its impact on clinical processes.
✓ During EHR Alert design, the goal should be for the alert to deploy at the point where the least amount of effort is wasted.
✓ Individuals designing alerts should do so with:
  ✓ emotional intelligence
  ✓ the input of the planned recipients of the alert
  ✓ particular attention to ensuring the clinician recognizes their responsibility to make the decision

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SAY:

EHR Alerts should be monitored to assess their impact and value, both quantitatively (measured against desired outcomes) and qualitatively (in terms of clinician adoption and utilization). If an alert triggers too many irrelevant interventions, the designer may need to go back to the drawing board and redesign the scope of the alert in the context of new information. The designer must also be cognizant of the unintended consequences of alert design. Finally, successful EHR Alerts should be celebrated; they are hard to build, hard to get right, and are the results of significant efforts to help patients and clinicians receive and deliver the best care possible.

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Monitoring EHR Alerts

✓ EHR Alerts should be monitored to assess their impact and value, both quantitatively and qualitatively.
✓ If an alert triggers too many irrelevant interventions, the designer may need to redesign the alert's scope.
✓ The designer must be cognizant of unintended consequences of the alert's design.
✓ Successful EHR Alerts should be celebrated.

SAY:

Finally, let's discuss Champions for Change and their roles.

Frontline Managers play a crucial role in ensuring that each alert is well received. They serve as clinical practice champion, educator, and clinical advocate to the designers. An EHR Alert designer wants their Alert to function well. Frontline Managers are positioned to provide feedback about the way an alert is implemented by using the Five Rights to express how they are or are not met in practice.

Frontline Managers are in a unique position to provide 360-degree feedback on making alerts effective. In some cases, they may need to provide coaching to the clinical staff on the rationale and use of the alert. In others, a Frontline Manager may need to reach out to the Infection Preventionist to discuss concerns related to the implementation of the alert recommendations or in response to questions on best practice.

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Champions for Change and their roles

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Champions for Change: Frontline Managers

✓ Play a crucial role in ensuring an alert is well-received
✓ Serve as clinical practice champions, educators, and clinical advocates to the designers
✓ Are responsible for providing feedback about the way an alert is implemented by using the Five Rights to express how they are or are not met in practice

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The Frontline Manager is the voice of the clinical team in ensuring that the alerts are their most effective.

Frontline Managers have first hand knowledge of what works — and what doesn't — in the real world, they play a critical role in the success of high quality alerts. Frontline Managers can help EHR Alerts gain the staff buy-in needed to be effective by creating a process where alerts are validated with the frontline clinical care team and incorporating staff input. Without buy-in of both design and implementation, the effect (and intent) of the alert may be reduced. Frontline staff need a champion through which they can channel their issues and concerns because when individuals believe their concerns are heard, systems are more successfully adopted.

SAY:

The identification of best practices that are well established, particularly in the context of HAIs, is an ideal role for Infection Preventionists. As clinical professionals with specialized knowledge about HAIs, as well as site specific knowledge about the hospital itself, Infection Preventionists play a critical role in the identification, design and evaluation of effective EHR Alerts. Infection Preventionists keep up on the latest research and clinical practice guidelines for the organization and can provide the recommendations necessary to outline the proactive steps that a healthcare organization should be taking to reduce CAUTIs and CLABSIs.

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Champions for Change: Infection Preventionists

✓ Have specialized knowledge about HAIs, as well as site-specific knowledge about the hospital itself

✓ Play a critical role in the identification, design and evaluation of effective EHR Alerts

✓ Have a particular responsibility to identify and follow the evidence to guide clinical practice

Reducing HAIs to zero is the mission of every Infection Preventionist.

High-quality EHR Alerts can augment clinical decision making with helpful, timely and directed guidance concerning specific policies and procedures that contribute to improved patient care. They aim to promote and facilitate positive change or recognize excellence rather than merely to codify current accepted practice. The Infection Preventionists have a particular responsibility to identify and follow the evidence to guide clinical practice.

SAY:

Poorly designed advisories provide little to no clinical value. As the impact of specific EHR Alerts are evaluated and subsequently adapted, clinicians can feel like they are trying to hit a moving target. Clinical Leaders play a critical role in ensuring the message is heard — that the organization places a premium on reducing HAIs and that EHR Alert adaptation is simply part of the process. EHR Alert designers need to work with leadership to identify goals, understand the current state of the world, define what success in this area looks like, create solutions that bridge this gap, and test these solutions with actual users of the system.

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Champions for Change: Clinical Leaders

✓ Play a critical role in ensuring the message is heard – that the organization places a premium on reducing HAIs and that EHR Alert adaptation is simply part of the process

✓ Identify goals, consider current evidence and best practices, create and test solutions, heighten awareness, and facilitate acceptance

In this context, leaders can heighten awareness, work to facilitate acceptance and reinforce that the design process is informed by those who experience the alerts.

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SAY

Hospital Administrators provide material and organizational support, delegate authority and remove obstacles when building a culture that accepts the use of EHR Alerts. Administrative Leaders are in a position to act as vocal champions for well-designed alerts, and notably can act as champions for data informed approaches to adoption. Making a well-designed alert takes a lot of people working together and requires support at the leadership level to become successful.

Support from Administrative Leaders can come in the form of hiring specialists tasked with working with clinicians, Frontline Managers, Infection Preventionists, and Clinical Leaders to build a culture that accepts alerts as something that adds to the quality of care delivery. One role present in hospitals is the Clinical Informaticist or EHR Build Specialist. These individuals are specialists with technical knowledge about the EHR and domain knowledge about clinical care. Frequently, these individuals play a central role in advancing the use of alerts across the care system. Further, they can signal that it's OK for Clinical Leaders, Frontline Managers, and Infection Preventionists to invest their time and talent in figuring out what is going to work. Administrative Leaders also have to work to create partnerships with the organization's Information Technology department and leadership to execute effective alerts.

Remember, in a hospital setting, there is nothing that happens, big or small, good or bad, without the support of the administrators who oversee their implementation. Administrative Leaders oversee the implementation for all hospital policies, and can lead the charge for meaningful, thoughtful and respectful alerts across the organization. In some cases, all an Administrative Leader has to do to support the change is remove the barriers to change.

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Champions for Change: Administrative Leaders

✓ Provide material and organizational support, delegate authority and remove obstacles
✓ Can signal that it's OK to invest time and talent in figuring out what is going to work
✓ Create partnerships with the organization's Information Technology department and leadership to execute effective alerts

Administrative Leaders can become EHR Alert design champions

SAY:

The key takeaway from this presentation is this: Designing an effective EHR Alert is a team effort — well worth it because it improves patient outcomes.

Slide 27

The key takeaway is ...

✓ Designing an effective EHR Alert is a team effort – well worth it because it improves patient outcomes.