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Remote Response Team and Customized Alert Settings Help Improve Management of Sepsis

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Summary

Seeking a sustainable process to enhance their hospitals' response to sepsis, a multidisciplinary team at WellSpan Health oversaw the development and implementation of a system that uses customized electronic health record (EHR) alert settings and a team of remote nurses to help frontline staff identify and respond to patients showing signs of sepsis. When the remote nurses, or Central Alerts Team (CAT), receive an alert, they assess the patient's information and collaborate with the clinical care team to recommend a response. When indicated, the clinical team implements elements of the evidence-based sepsis bundle.

Piloted in six of the eight health system's hospitals, the initiative was associated with increased compliance with sepsis bundles and a decrease in hospital mortality in a little over two years. The team found that having a remote monitoring team is a more efficient use of staff and expertise. This benefit became particularly important during the staffing shortages during the COVID-19 pandemic. The process is now an embedded practice in all WellSpan acute care hospitals.

The innovation team believes that the remote nature of the CAT is a key factor to the success of the system. By routing alerts to remote nurses, the clinical team is less susceptible to alert fatigue, and remote clinicians can perform clinical observations and monitoring with fewer distractions and competing priorities. Also important is the adjustable alert algorithm. By using data and feedback, informatics staff can collaborate with clinical teams to adjust the algorithm and alerts, which prevents unnecessary disruptions and allows for greater sensitivity and specificity to signs of sepsis.

Contact the Innovator

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Date First Implemented

2017-01-01

Problem Addressed

The innovation team sought to reduce mortality in the emergency department and hospitalized patients diagnosed with sepsis. This patient group generally comprises around 6% of hospitalized adults.[1,2,3] The mortality rate for sepsis treated in hospitals is estimated to be around 12.5%.[4] Patients who survive sepsis face residual health problems and reduced life expectancy.[5]

Sepsis has multiple causes, including complications from surgery, aspiration, and invasive devices like central catheters. The condition often occurs with hospital or community-acquired pneumonia, bloodstream infections, and intra-abdominal infections.[5,6] To reduce the adverse effects of sepsis, research supports early identification and treatment with sepsis "bundles," which consist of multiple interventions and guidelines that require strict adherence to be effective.[7] Unfortunately, identifying patients who are declining and at risk for severe infection can be challenging. Higher adverse outcome rates for sepsis are related to the clinical complexity of impacted patients due to preexisting infection and other conditions. Additionally, hospitals have struggled to find ways to ensure compliance with sepsis bundles.[7,8,9]

Description of the Innovative Activity

While WellSpan's Sepsis Quality Initiative team generated and fine-tuned their ideas for addressing at-risk patients, a select multidisciplinary team worked to develop the most appropriate clinical protocols using hospital data and resources from the Surviving Sepsis Campaign. This process helped to inform which data to monitor in the EHR, and it guided the creation of the algorithm and alert system developed by the clinical and information technology (IT) teams. To test the idea of a remote monitoring team, WellSpan established a small, 24-hour team of remote nurses with experience working in emergency and critical care settings. At each facility, multidisciplinary teams collaborated to tailor communication processes to local needs. After establishing the infrastructure and site-specific workflows, the team conducted targeted education for all clinical and administrative staff.

When the system is deployed in the EHR, an algorithm processes specific vital sign indicators in combination with lab results to check for signs of sepsis. If a patient reaches preestablished parameters, the algorithm triggers an alert that enters the work queue of an available nurse on the CAT. The nurse evaluates the information and contacts the patient's physician or nurse through a secure chat or phone call to inform them of the observations and a recommended response. The remote nurse will continue to monitor the EHR to assure the clinical team's responsiveness and implementation of specific bundle elements, including testing and antibiotic administration, deemed clinically appropriate and in accordance with recommended timeframes.

For the first few months, the WellSpan team spent time analyzing the data as part of rapid-cycle troubleshooting to make the alerts more effective. For example, the team decided to disable the alerts for the immediate post-operative period since, during this time, it is common for a patient's vital signs to resemble the symptoms of sepsis. The team continues to evaluate the system for potential improvements.

After a period of implementation, the innovation team found that in the case of early identification and intervention in sepsis, the remote response team was efficient and required fewer than half the staff than onsite response teams. The innovation team believes that the system has promise for advancing equitable health outcomes because the review of patient data shows no statistically significant difference in response time and intervention, by race or ethnicity.

Context of the Innovation

To address concerning rates of sepsis mortality and expedite patient screening and alert response, the WellSpan team initially tried a "boots on the ground" approach that involved a response team consisting of onsite nurses. This approach was associated with increased compliance with the sepsis bundles and reduced mortality. However, as the team took on additional responsibilities and was no longer solely focused on sepsis, the results could not be sustained.

The WellSpan team theorized that because doctors and other care providers were busy and might have distractions and other alerts, remote nurses are better equipped to respond to alerts, assess the patient's condition, and oversee the implementation of bundle components. Additionally, a physician or nurse must be in the patient's medical record to see the alert. Therefore, routing alerts to remote nurses would increase the likelihood of timely identification of sepsis.

Results

In the last 12 months of a 28-month study following implementation, the median monthly mortality rate for 11,699 patients diagnosed with sepsis, severe sepsis, or septic shock in four implementing acute care facilities was 5.29%, which was lower than the expected rate of 7.75%.[10] Additionally, bundle compliance increased from around 50% to around 90% during the study period. The study team determined that compliance with the bundle accounted for 64% of the reduction in sepsis-related mortality. Response times, which were more than an hour before the initiative, decreased by 12 to 15 minutes. The number of patients diagnosed with sepsis did not change during the 28-month study. However, the Innovation team reported that improvements continued through the high patient volume and staffing challenges during the COVID-19 pandemic.

Innovation Patient Safety Focus

The innovation focused on reducing mortality by improving response to and management of sepsis.

Planning and Development Process

For the preimplementation planning phase, a healthcare organization should do the following:

- Create evidenced-based protocols for implementing sepsis bundle elements.
- Move all participating facilities to a uniform EHR system with the capacity to monitor data and provide highly customized alerts.
- Determine the workflow and sepsis alert needs of different facilities.
- Secure and partner with technical and informatics resources equipped to set up the algorithm and alerts system.
- Establish the CAT and train them in the pathophysiology of sepsis, evidence-based practices for treatment, and communication tactics.
- Educate and train other hospital staff about EHR-based alerts and the specifics of the initiative.
- Collect and report out on baseline clinical and bundle compliance data.
- Set up real-time, transparent reporting processes.

Resources Used and Skills Needed

Important components of the innovation include the following:

- Multidisciplinary teams stationed at each hospital location to oversee implementation
- Standardized EHR alert technology across all locations
- Established, evidenced-based, clinical criteria to inform local protocols on response to sepsis
- Information technology experts to customize and set up the alerts system
- Key performance indicators and timely transparent reporting of unit, team, and individual performance
- Adoption by staff at all levels
- Specialty-trained, experienced remote alerts team
- Communication channels for clinician-remote team collaboration
- Role-based training on the new system for all staff
- Opportunities for cross-functional representatives to build trust, share ideas, and seek help

Funding Sources

WellSpan Health received no outside funding to develop or implement this initiative.

Getting Started with This Innovation

To start the innovation, implementing teams must assess hospital capacity. Resources that need to be in place include dedicated IT staff, training for all staff, EHR technology with customizable alerts, and a shared commitment to use evidence-based protocols. When the alerts go live, it is important that all staff

remain flexible and work closely with the technical and informatics team to improve the process based on needs and available data. Another important starting component is performance reporting, which is most effective on a weekly basis and when it includes data at the individual, hospital, and systemwide levels. Data elements and measures should focus on bundle compliance including implementing the bundle and response times as well as sepsis outcomes.

Sustaining This Innovation

According to the innovation team, to sustain the innovation requires the following:

- Adoption by all staff including administrators, the remote team, frontline clinicians, pharmacy, and laboratory staff
- Real-time reporting on bundle compliance and sepsis outcomes
- Agility in adjustments of the algorithm or workflows to improve the process
- Sharing successes with the different implementing teams; take time to celebrate!
- Evidence of the supportive nature of the model (i.e., bedside clinicians benefit from the assistance of the remote team)
- Planning for scalability for times of increased cases of sepsis
- Collaboration across teams and with the patient's closest network of support
- Strong antimicrobial stewardship to encourage adherence to bundle guidance on antimicrobial treatment[11]
- Customized technology to reduce alert fatigue
- Face-to-face introduction of the CAT to clinical staff to build trust
- Process and quality improvement procedures that incorporate input from all staff who are involved or impacted by the initiative

Adoption Considerations Use by Others (Use By Other Organizations)

The team at WellSpan has received inquiries from approximately 30 organizations seeking information on the innovation.

References/Related Articles

Allen C. CATalyst for change: how members of WellSpan's Central Alert Team (CAT) are revolutionizing sepsis care. *Patient Saf*. 2021;3(3):74-79.

Delaveris SL, Cichetti JR, Edleblute E. 2019 John M. Eisenberg patient safety and quality awards: a model cell for transformational redesign of sepsis identification and treatment: aligning digital tools with innovative workflows. *Jt Comm J Qual Patient Saf.* 2020;46(7):392-399.

Dellinger RP, Rhodes A, Evans L, et al. Surviving sepsis campaign. *Crit Care Med.* 2023;51(4):431-444.

Footnotes

1. Rhee C, Wang R, Zhang Z, Fram D, Kadri SS, Klompas M. Epidemiology of hospital-onset versus community-onset sepsis in US hospitals and association with mortality: a retrospective analysis using electronic clinical data. *Crit Care Med.* 2019;47(9):1169.
2. Novosad SA, Sapiano MR, Grigg C, et al. Vital signs: epidemiology of sepsis: prevalence of health care factors and opportunities for prevention. *MMWR Morb Mortal Wkly Rep.* 2016;65:864-869.
3. Rhee C, Dantes R, Epstein L, et al. Incidence and trends of sepsis in US hospitals using clinical vs claims data, 2009-2014. *JAMA.* 2017;318(13):1241-1249.
4. Paoli CJ, Reynolds MA, Sinha M, Gitlin M, Crouser E. Epidemiology and costs of sepsis in the United States-an analysis based on timing of diagnosis and severity level. *Crit Care Med*. 2018;46(12):1889-1897.
5. Shankar-Hari M, Rubenfeld GD. Understanding long-term outcomes following sepsis: implications and challenges. *Curr Infect Dis Rep*. 2016;18**:**37.
6. Rhee C, Klompas M. Should hospital-onset adult sepsis event surveillance be routine… or even mandatory? *Antimicrob Steward Healthc Epidemiol.* 2022;2(1):e32.
7. Levy MM, Rhodes A, Phillips GS, et al. Surviving Sepsis Campaign: association between performance metrics and outcomes in a 7.5-year study. *Intensive Care Med*. 2014;40:1623-1633.
8. Choi S, Son J, Oh DK, Huh JW, Lim CM, Hong SB. Rapid response system improves sepsis bundle compliances and survival in hospital wards for 10 years. *J Clin Med.* 2021;10(18):4244.
9. Baghdadi JD, Wong MD, Uslan DZ, et al. Adherence to the SEP-1 sepsis bundle in hospital-onset v. community-onset sepsis: a multicenter retrospective cohort study. *J Gen Intern Med*. 2020;35(4):1153-1160.
10. Delaveris SL, Cichetti JR, Edleblute E. 2019 John M. Eisenberg patient safety and quality awards: a model cell for transformational redesign of sepsis identification and treatment: aligning digital tools with innovative workflows. *Jt Comm J Qual Patient Saf.* 2020;46(7):392-399.
11. Allen C. CATalyst for change: how members of WellSpan's Central Alert Team (CAT) are revolutionizing sepsis care. *Patient Saf*. 2021;3(3):74-79.