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Short Report

Journal of Infection Prevention

Journal of Infection Prevention
2022, Vol. 23(3): 120–124
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DOI: 10.1177/17571774211066760
jip.sagepub.com
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Enhancement of infection prevention case review process to optimize learning from defects

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Abstract

Hospitals continue to struggle with preventable healthcare-associated infections. Whereas the focus is generally on proactive prevention processes, performing retrospective case reviews of infections can identify opportunities for quality improvement and maximize learning from defects. This brief article provides practical information for structuring the case review process using readily available health system platforms. Using a structured approach for case reviews can help identify trends and opportunities for improvement.

Keywords

Case review, quality improvement, process improvement, infection prevention, hospital-acquired infections

Background

Many healthcare systems continue to struggle with preventing and reducing healthcare-associated infections (HAIs), such as catheter-associated urinary tract infection (CAUTI) and central line associated bloodstream infection (CLABSI) (Centers for Disease Control and Prevention, 2016). These preventable HAIs increase patients' risk of morbidity and mortality, as well as increases hospital length of stay, healthcare costs, and unnecessary antibiotic usage (Centers for Disease Control and Prevention, 2016). The use of quality improvement tactics, such as data analysis and stratification through retrospective reviews, can assist with identifying potential solutions for improvement (Rocque et al., 2019). Many healthcare systems have processes in place to proactively identify at-risk patients and optimize HAI prevention such as with the use of insertion and maintenance bundles (Institute for Healthcare Improvement, 2020). The electronic health record (EHR) holds a plethora of data; retrospective analysis of this data can be helpful to identify trends associated with HAI prevention. However, health systems may be challenged with reviewing this large amount of data in a structured manner and analyzing it for trends to inform clinical practice (Ehrenstein et al., 2019; Howe et al., 2018).

We propose that retrospective analysis of available clinical data for each HAI can help identify trends and previously missed HAI prevention opportunities. This article describes a successful, structured HAI case review process, through leveraging EHR data and engaging front line staff, to optimize learning from defects. This work was led by an Infection Prevention and Hospital Epidemiology (IPHE) department at a large academic medical center in the southeast United States. Practical information provided in this article can be used by other health systems seeking to improve active learning from HAI events.

Methods

Infection prevention specialists within the IPHE department identify infection cases through standard National Healthcare Safety Network (NHSN) criteria; infection rates are calculated as number of infections per 1000 device days

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Table 1. Catheter-associated urinary tract infection (CAUTI) and central line-associated bloodstream infection (CLABSI) Case Review Form Questions.

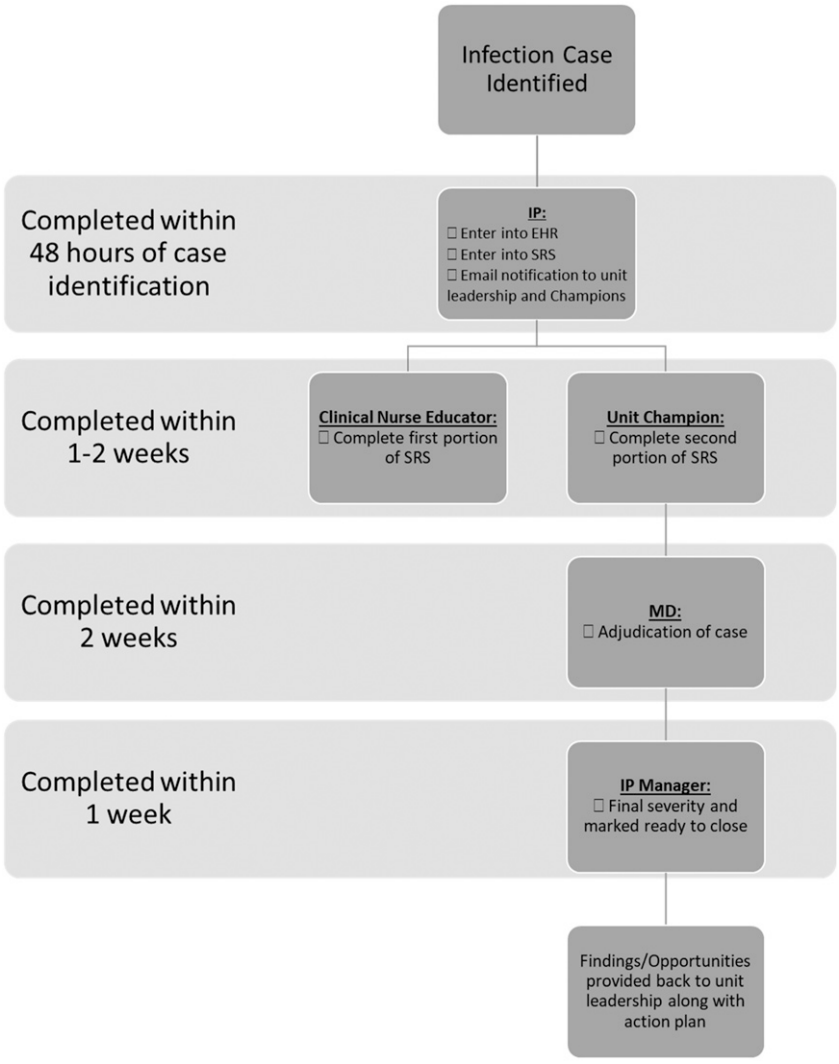
CAUTI case review	CLABSI case review
Infection prevention specialist	
• Location/unit • Patient's name • Organism name • CAUTI onset date • Urinary catheter insertion date • Days from insertion to onset of CAUTI	• Location/unit • Patient's name • Organism name • CLABSI onset data • Central line (CL) insertion data • CLABSI days from insertion to infection
CAUTI/CLABSI Champion	
• Who was the urinary catheter inserted by? • Urinary catheter inserter credentials • Urinary catheter insertion department • Urinary catheter documented indications • Documentation of daily bathing? • Urinary catheter care documented?	• Who was the CL inserted by? • CL inserter credentials • CL nature of insertion (emergent or non-emergent) • CL insertion department • CL documented indication • CL insertion site • CL number of lumens • CL dressing changes documented • CL caps and tubing changes documented per policy • Documentation of daily bathing • Was the patient a transplant recipient? • Did the patient have an open chest? • Did the patient have open wounds? • Was the patient assigned comfort care/hospice?
IPHE Clinical Nurse Educator	
• Urine culture collection date • Urine culture collection method • Urinalysis WBC result • Urine culture indication documented? • Urine culture documented indication(s) • Daily review of necessity for urinary catheter documented? • Alternatives to urinary catheter considered? • Patient with urinary catheter documented having diarrhea? • Was the patient assigned to comfort care/hospice?	• Indications for obtaining blood cultures • Blood culture draw site • Who was the blood culture obtained by? • Was the CL insertion bundle followed? • Was there a daily review of line necessity documented? • Did the patient receive dialysis prior to infection?
IPHE Medical Director Adjudication	
• Was the event consistent with a clinical CAUTI? • Opportunities for improvement identified	• Was the event consistent with clinical CLABSI? • Opportunities for improvement identified

CL=central line.

(Centers for Disease Control and Prevention, 2021). Beginning in 2016, the IPHE team began structured case reviews of each CAUTI and CLABSI using a paper review form completed by the infection prevention specialist. For each infection case, specific criteria were reviewed from the EHR, as noted in Table 1. In June 2018, the standardized case review form was embedded into the health system's electronic Safety Reporting System (SRS), which allowed for easier data entry, monitoring, and abstraction. The internal SRS incident reporting system allowed infection case reviews to be tagged, viewed, and updated by multiple individuals involved in the infection review process prompting a multidisciplinary approach.

Based on feedback from unit staff, CLABSI/CAUTI champions, and infection prevention specialists, the case review process was also updated (Figure 1). Specifically, in addition to the infection prevention specialist filing the report and completing details about the infection, the IPHE Clinical Nurse Educator and unit-based CAUTI and CLABSI champions completed sections around care and maintenance of the device. Unit-based champions serve as informal leaders, role models, and resources for staff regarding infection prevention practices. Furthermore, champions promote and monitor compliance with care bundles through monthly process audits. The IPHE Clinical Nurse

Figure 1. Healthcare-Associated Infection Case Review Process. IP=Infection Preventionist; EHR=electronic health record; SRS=safety reporting system; MD=Medical Director.



Educator and infection prevention specialists engage with the CAUTI/CLABSI champion nurses through a monthly robust meeting. Hospital IPHE Medical Directors finalized the review with an adjudication of the infection. Ideally, this review process is completed over the course of 4–6 weeks. Through the safety reporting system, infection prevention specialists are able to "tag" individuals and notify them that an event needs reviewed.

Data is then exported from SRS on a monthly basis to create two interactive, detailed CAUTI and CLABSI dashboards, using the Slicer functionality in Microsoft Excel™. These dashboards provide trends of all process measures pertinent to the infection from the case review, such as patient care and maintenance bundle elements. The clinical service units receive the dashboards monthly via email and share them during daily huddles and at monthly staff meetings. These data are used to improve clinical practices associated with noted deficiencies.

Results

Since June 2018, all hospital-acquired CAUTI and CLABSI cases were entered into SRS. Several trends were identified through this case review process, including inconsistencies in performing and documenting indwelling urinary catheter care, knowledge deficits on use of the nurse-driven indwelling urinary catheter removal protocol, lack of daily patient bathing documentation, and opportunities around needleless cap changes for central lines. Small taskforces have undertaken these initiatives and championed the development of solutions. The nurse-driven indwelling urinary catheter protocol was revised and an electronic learning module was disseminated among nursing teams for re-

education. Additionally, updates were made to the EHR to improve documentation compliance with infection prevention processes such as bathing worklist tasks and bathing compliance reports. Notably, due to opportunities identified with this case review process, along with compelling literature evidence, a large chlorhexidine gluconate (CHG) bathing initiative was implemented, resulting in a 40% reduction in CLABSIs over the course of 6 months (Huang et al., 2019).

The CAUTI and CLABSI interactive dashboards were shared with unit leadership on a monthly basis to drive unit-based infection prevention interventions. These data were used to identify and guide unit-based quality improvement initiatives, and were well received by unit leadership. Additionally, to provide further visibility of the data, audit data from The Joint Commission (TJC) Resources Portal—the platform used to capture indwelling urinary catheter and central line care bundle compliance—was also incorporated into the dashboards. Visibly presenting both data components (bundle compliance and infection case review trends) provided a comprehensive overview of infection prevention opportunities for leaders. Since beginning the case review process in 2016, there has been a decline in infection rates across the hospital, with a 34% reduction in CAUTIs rates and a 49% reduction in CLABSI rates. There were multiple concurrent quality improvement initiatives related to CAUTI and CLABSI during this time, and the rate reduction is likely multifactorial in nature.

The IPHE department continues to make improvements to the SRS infection case review process. Recently, the SRS file content was updated to allow for more precise and accurate data entry. Based on champion feedback, a thorough document with directions on how to complete the infection case review in SRS was developed. A timeline schedule for the case review period is being developed to ensure timely data entry and feedback to stakeholders. Lastly, to reduce the loss of perishable knowledge, the medical center has recently instituted harm "swarms" whereby the interdisciplinary team confers with frontline staff to analyze a harm event and identify potential root causes (Hagley et al., 2019). Swarms supplement the case review process, and future improvements will need to focus on how to interface these two.

Discussion

This brief article provides an overview of an HAI case review process used to identify opportunities to optimize learning from defects. The case review process utilized the health system's internal incident reporting system to capture patient- and unit-level data; many hospitals have this type of platform available, but may not use it to capture this type of data (Carlfjord et al., 2018). Additionally, this data is exported into Microsoft Excel™ with the Slicer function used. Whereas more robust platforms can be used for this type of data analysis, such as Tableau©, Microsoft Excel™ may be more readily available, less expensive, more user-friendly, and as such, a more practical tool to use. Lastly, involving the unit-based champions in this process was an innovative change and helped to build the champions' knowledge and engagement with infection prevention practices. This creates consistent focus at the local level to support sustained improvements. As noted in the literature, engaging front line staff through a champion role can help with buy-in from staff members (Flodgren et al., 2019).

Limitations

There are several limitations to this process. First, for some units, CAUTI and CLABSI events are rare; as such, the CAUTI/CLABSI champions may not be as familiar with the SRS data entry process. Although we have developed an educational tool to provide directions for CAUTI/CLABSI case reviews, there are approximately 37 hospital units each with a designated CAUTI/CLABSI champion, which could lead to variations in data entry. Additionally, while the input of CLABSI/CAUTI champions is valuable, there is sometimes significant delay to entry to due scheduling difficulties as the majority of champions work in direct bedside care roles. Lastly, dashboards are distributed in a standardized fashion, but each unit uses the dashboards in different ways. Future improvements could include a standardized approach to the use of this information, including pre-planned evidence-based interventions to respond to specific findings or deficiencies.

Conclusion

Streamlining HAI case review processes allow for better workflow and adjudication of CAUTI and CLABSI infection cases. Based on the data identified through this electronic case review process, the IPHE departments have been able to collaborate and partner with unit leadership to complete quality improvement initiatives. This process could be easily adapted for use with other quality outcome measures, such as hospital-onset *Clostridioides difficile,* falls, and pressure injuries.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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References

Carlfjord S, Öhrn A and Gunnarsson A (2018) Experiences from ten years of incident reporting in health care: a qualitative study among department managers and coordinators. *BMC Health Services Research* 18(1): 113. DOI: 10.1186/s12913-018-2876-5.

Centers for Disease Control and Prevention (2016) Healthcare-associated infections. Available at: https://www.cdc.gov/winnablebattles/report/index.html (accessed 23 June 2020).

Centers for Disease Control and Prevention (2021) National healthcare safety network. Available at: https://www.cdc.gov/nhsn/index.html (accessed 18 April 2021).

Ehrenstein V, Kharrazi H, Lehmann Het al. (2019) Obtaining data from electronic health records. In: RE Glikclih, MB Leavy and Dreyer NA (eds) *Tools and Technologies for Registry Interoperability, Registries for Evaluating Patient Outcomes: A User's Guide* (3rd ed.) Rockville, MD: Agency for Healthcare Research and Quality. Available at: https://www.ncbi.nlm.nih.gov/books/NBK551878/ (accessed 23 June 2020).

Flodgren G, O'Brien MA, Parmelli E, et al. (2019) Local opinion leaders: effects on professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews* 2019(6): 1–119. DOI: 10.1002/14651858.CD000125.pub5.

Hagley G, Mills PD, Watts BV, et al. (2019) Review of alternatives to root cause analysis: developing a robust system for incident report. *British Medical Journal Publishing Group* 8(3): e000646. DOI: 10.1136/bmjoq-2019-000646.

Howe JL, Adams KT, Hettinger AZ, et al. (2018) Electronic health record usability issues and potential contribution to patient harm. *JAMA* 319(12): 1276–1278. DOI: 10.1001/jama.2018.1171.

Huang SS, Septimus E, Kleinman K, et al. (2019) Chlorhexidine versus routine bathing to prevent multidrug-resistant organisms and all-cause bloodstream infections in general medical and surgical units (ABATE Infection trial): a cluster-randomised trial. *Lancet* 393(10177): 1205–1215. DOI: 10.1016/S0140-6736(18)32593-5.

Institute for Healthcare Improvement (2020) Evidence-based care bundles. Available at: http://www.ihi.org/Topics/Bundles/Pages/default.aspx (accessed 23 June 2020).

Rocque GB, Lennes IT, Rhoads KF, et al. (2019) Quality improvement at the health system level: measurement, risk stratification, disparity populations, and governance. *American Society of Clinical Oncology. Annual Meeting* 39: 388–398. DOI: 10.1200/EDBK_244941.