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Original article

Challenges and proposed improvements for reviewing symptoms and catheter use to identify National Healthcare Safety Network catheter-associated urinary tract infections

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Background: Retrospective medical record review is used to categorize urinary tract infections (UTIs) as symptomatic, catheter-associated, and/or healthcare-associated to generate National Healthcare Safety Network (NHSN) surveillance and claims data. We assessed how often patients with UTI diagnoses in claims data had a catheter in place, had documented symptoms, or met the NHSN criteria for catheter-associated UTI (CAUTI).

Methods: Two physicians retrospectively reviewed medical records for 294 randomly selected patients hospitalized with UTI as a secondary diagnosis, discharged between October 2008 and September 2009 from the University of Michigan. We applied a modification of recent NHSN criteria to estimate how often UTIs in claims data may be an NHSN CAUTI.

Results: The 294 patients included 193 women (66%). The mean patient age was 63 years, and the median length of hospital stay was 7.5 days. Catheter use was noted for 216 of 294 postadmission records (74%), including 126 (43%) with a Foley catheter. NHSN symptoms were noted in 113 records (38%); 62 (21%) had symptoms other than fever. Of 136 hospitalizations meeting urine culture criteria, 17 (5.8%) met the criteria for a potential NHSN CAUTI.

Conclusions: Retrospective medical record review to identify symptoms and catheter use is complicated and resource-intensive. Requiring standard documentation of symptoms and catheter status when ordering urine cultures could simplify and improve CAUTI surveillance and its fidelity as a hospital quality indicator.

Retrospective medical record review is the method currently used by most infection preventionists to categorize urinary tract infections (UTIs) as symptomatic, catheter-associated or healthcare-associated to generate National Healthcare Safety Network (NHSN) surveillance data for catheter-associated urinary tract infections (CAUTIs). Although some electronic tools have been developed to facilitate collection and reporting of catheter-days and urine culture data, review of text in medical records documentation is still required to assess whether the patient meets the specific combinations of symptoms and urinary catheter use required for identifying an NHSN CAUTI surveillance event.[1-3]

Retrospective medical record review is also used by hospital coders to characterize UTIs as catheter-associated and/or hospital-acquired in administrative discharge claims data to request payment.[4,5] Hospital-acquired CAUTI rates from claims data were publicly reported for 2011-2013. Although UTIs are a very common discharge diagnosis (listed in ~10% of all adult discharges), claims data very rarely describe UTIs as hospital-acquired CAUTIs.[6,7] Given the known issues with using hospital claims data to characterize hospital rates for public reporting and pay-for-performance penalties,[7,8] NHSN CAUTI events have replaced claims CAUTI events for both public reporting and upcoming value-based purchasing penalties for hospital-acquired complications.[9,10]

By applying standard definitions of symptoms, laboratory criteria, and catheter use for defining CAUTI events, NHSN surveillance for CAUTIs is a marked improvement over claims diagnoses, which rely on the language clinicians use to describe

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UTIs.[11] Nonetheless, important differences between NHSN surveillance and clinical criteria for CAUTI have been noted, particularly with regard to CAUTI symptoms.[9] NHSN surveillance also still relies on retrospective medical record review for symptoms as documented by bedside clinicians, to apply with other NHSN criteria for catheter use and laboratory data. Mandatory NHSN CAUTI surveillance is currently limited to intensive care units, in which patients often are too ill to describe symptoms beyond objective fever, and where the documentation of devices such as urinary catheters may be more standard, and thus "discoverable," in a retrospective chart audit. Expansion of NHSN CAUTI surveillance beyond the ICU is anticipated in 2015.[12]

To better understand how the challenges of retrospective medical records review may influence application of NHSN criteria (including outside the ICU setting), we performed a comprehensive review of medical records of patients discharged with a secondary diagnosis of UTI in claims data to describe catheter use, symptoms, and laboratory evidence. We also applied a modification of recent NHSN criteria to estimate how many claims diagnosis UTIs may meet the NHSN criteria for CAUTI.

METHODS

Design

Our team conducted a retrospective medical record review of a random sample of 295 adult hospitalizations with a listed secondary diagnosis of UTI in the hospital claims file and who were discharged from the University of Michigan Health System (UMHS) within the first 12 months after the October 1, 2008, implementation of the Hospital-Acquired Conditions (HAC) Initiative. The HAC Initiative specified the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes for identifying UTIs as nonpayable comorbidities when described as catheter-associated and hospital-acquired in claims data. Our sample was selected based on claims data diagnoses of UTIs, as opposed to positive urine cultures, because we wished to study how UTI symptoms, diagnoses, and catheter use were being documented after implementation of the HAC Initiative, a policy that specifically used claims data diagnoses of CAUTI for payment changes and public reporting. In addition, when this study was designed, the claims data diagnoses of CAUTI were the only publicly reported measures of CAUTI. NHSN CAUTI events were not publicly or mandatorily reported nationwide until 2012, and were not voluntarily reported from our institution. Our sample was generated by the UMHS Clinical Information and Decision Support team by first identifying all hospitalizations with UTI as a secondary diagnosis (ie, not the primary reason for admission) in the claims data within the selected time period. The random sample of hospitalizations for medical record review was then selected using a random number generator. This project was reviewed and approved by the University of Michigan's Institutional Review Board. The study included 2 types of data: medical records from each hospitalization and the accompanying claims data.

Data sources and collection

Comprehensive medical records for hospitalization

This retrospective medical record review was performed between May 2009 and May 2011, a period in which hospitalization records were accessible electronically. This comprehensive review included a detailed abstraction of provider notes (written by physicians, physician assistants, and nurse practitioners), nursing documentation, computerized order entry, and laboratory data. Details regarding the strategy used to conduct this comprehensive and standardized record review are available in a recently published methodology article.[11] Our abstractors were 2 internal medicine resident physicians who were facile in accessing and reading all types of medical documentation for hospitalizations and who received additional training (by investigator J.M.) in the clinical diagnosis and NHSN criteria for identifying positive urine cultures as symptomatic, catheter-associated, and/or hospital-acquired.

Because we anticipated that the details and combinations of the components of the NHSN CAUTI criteria would change over time, the abstraction tool was designed to abstract details regarding the presence or absence of individual signs, symptoms, laboratory criteria, and catheter use with respect to the timing of UTI onset and catheter use (eg, at admission, within 24 hours, 24-48 hours, >48 hours). Interrater reliability of our abstraction was assessed by an independent abstraction of 30 medical records by both physician abstractors. Our experience in training and using resident physician abstractors as research team members is also described in our recent methodology article.[11] All potential evidence for UTI or CAUTI (eg, symptoms, catheter use, laboratory data) was abstracted from admission documentation (including notes and laboratory studies associated with the emergency department course and inpatient admission provider assessments) and postadmission documentation (including all documentation after the day of admission). In each instance, the full hospital record was reviewed, including nursing notes. Catheter use was described and categorized for all urinary catheter types, including indwelling transurethral Foley catheters, indwelling suprapubic catheters, intermittent straight catheters, external condom catheters, and nephrostomy catheters.

Patient symptoms and vital signs evaluated included those specified in the 2009 NHSN CAUTI criteria,[1] including fever >38 °C with no other recognized cause beyond the suspected UTI, suprapubic or costovertebral angle (CVA) pain or tenderness, dysuria, frequency, and urgency. Laboratory criteria and the limitation of catheter-association to Foley catheters was applied as specified in both the 2009 and 2014 NHSN CAUTI criteria.[1,2] Additional symptoms abstracted included others commonly applied by clinicians as specified in the 2010 Infectious Diseases Society of America CAUTI guideline.[13] We also abstracted documentation of malodorous or discolored urine, which, although not recommended by guidelines, is a common reason why clinicians and patients request testing for UTI. Using all available documentation, abstractors were asked to categorize the timing of the UTI development with regard to admission and catheter placement or removal, in categories such as ≤48 hours or >48 hours, similar to the 2-day criteria in the 2014 NHSN CAUTI criteria[2] for describing a UTI as healthcare-associated or catheter-associated.

Administrative discharge abstract (claims data)

After all medical record abstractions were completed, the accompanying claims data for these hospitalizations were requested. Claims data included all diagnosis and procedure codes applied by the professional hospital coders to request payment for the hospitalization after the patient was discharged, in addition to routine patient demographic data. Claims data also included the new mandatory variable required by the HAC Initiative,[5] which required all diagnoses to be identified as hospital-acquired or present on admission. Comorbidity variables[14] were generated from the claims data ICD-9-CM codes using comorbidity software (version 3.4) from the Agency for Healthcare Research and Quality. Based on the inclusion criteria, all hospitalizations were for adults not admitted to obstetrics whose claims data included at least 1 UTI code as a secondary diagnosis from the 10 diagnosis codes chosen for nonpayment in the HAC Initiative[5] (ie, 112.2, 590.1, 590.11, 590.2, 590.3, 590.80, 590.81, 595.0, 597.0, and 599.0). The 996.64 catheter-association code was used to identify UTIs described as CAUTIs in claims data.