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Major Article

Nurse-driven protocols and the prevention of catheter-associated urinary tract infections: A systematic review

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Key Words:

Catheter-associated urinary tract infection
Nurse-driven protocol
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Background: Catheter-associated urinary tract infections (CAUTIs) are one of the most common hospital-acquired conditions and no longer reimbursable from Medicare as of 2008. Nurse-driven protocols (NDPs), which provide a medically approved rubric for professional nurses to make autonomous care decisions, can facilitate appropriate catheter use and timely removal, as advised in the Centers for Disease Control and Prevention's 2009 CAUTI prevention guidelines. However, little attempt has been made to systematically evaluate their effect on clinical outcomes.

Methods: A systematic review of studies published in the United States since 2006 was performed, following guidelines from the Institute of Medicine. Sources included CINAHL, Medline, professional agencies, hand-searching, and expert consultation. Clinical predictors and prevalence of CAUTI were examined and synthesized qualitatively; heterogeneity of outcomes made a statistical meta-analysis inappropriate.

Results: Twenty-nine studies were found eligible for inclusion. All used a case-control (pre-post) approach, and all reported reductions in clinical predictors of CAUTI, particularly indwelling-urinary catheter utilization and CAUTI rates. However, the number of CAUTIs remained unchanged in 1 study. A formal quality assessment revealed a high risk of bias; included studies met an average of 4.9 out of 11 quality indicators. Specifically, many did not use standardized measures.

Conclusions: NDPs appear to have a positive impact on the clinical predictors and prevalence of CAUTI. However, this review identified need for improving the study design of quality improvement projects conducted within the patient care setting.

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Catheter-associated urinary tract infections (CAUTIs) are one of the most common hospital-acquired infections in the United States, leading to excess costs, length of stay, and patient morbidity.¹ Beginning in October 2008, the Centers for Medicare & Medicaid Services ceased reimbursements for the costs of increased care resulting from hospital-acquired CAUTI.² To reduce costs incurred and improve patient outcomes, hospitals can use strategies to reduce CAUTI because it can be reasonably prevented through application of accepted evidence-based prevention principles.¹ According to the Centers for Disease Control and Prevention's (CDC) 2009 CAUTI prevention guidelines, the most effective way to reduce CAUTI is to insert catheters only for appropriate indications and remove them promptly when no longer medically necessary; the longer an

indwelling urinary catheter (IUC) is used, the greater this risk of infection for patients.³

One method for facilitating appropriate catheter use and timely removal is implementation of a nurse-driven protocol for appropriate catheter insertion and timely removal, based on an assessment of medical necessity. Nurse-driven protocols provide a rubric for professional nurses to make decisions on their own, describe the circumstances in which the protocols may be used, and detail the procedures involved, with less consultation with physicians. In the case of CAUTI prevention, this often takes the form of a decision-making flowchart or checklist for the professional nurse to assess whether a urinary catheter is indicated and when it should be removed.⁴

However, the academic and medical communities have not reached consensus on whether utilization of nurse-driven protocols are advisable. According to The Joint Commission, a nonprofit agency offering accreditation and certification to health care organizations and programs in the United States, "when granted greater decision-making power under these guidelines, [professional] nurses can have a tremendous impact on safety and care in a hospital because they can administer services and medication to patients

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in a more timely fashion.” In terms of CAUTI prevention, they suggest by allowing nurses more decision-making power to remove urinary catheters or to recommend a removal order, the number of IUC days and subsequent likelihood of infection can be reduced.⁴ In contrast to this, the American Medical Association has expressed opposition to expanding the scope of practice of medical professionals other than physicians. They argue care decisions that have the potential to adversely impact the patient, such as when to insert or remove an IUC, should be left to the physician who is sufficiently trained.⁵

Despite their controversy, implementation of nurse-driven protocols for the prevention of CAUTI is recommended by several prominent health care quality agencies.⁴ However, to my knowledge, little attempt has been made to systematically evaluate their effectiveness. This review aims to discover the effect of nurse-driven protocols on the clinical predictors and prevalence of CAUTI.

METHODS

Data sources and search strategy

Literature indexed in the scientific databases CINAHL, Medline, Health Source: Nursing/Academic, and Science Direct were searched. Studies not appearing in the scientific databases were identified using Google Scholar. In these databases, titles and abstracts were searched for the key words and phrases (“nurse-driven” OR “nurse-directed” OR “nurse-managed”) AND (protocol* OR intervention*) AND “catheter.” Searches were limited to studies published since 2006. Other sources included hand-searching reference lists of included articles; ProQuest—Dissertations and Theses; professional health care quality agency Web sites: the Institute of Healthcare Improvement, Agency for Healthcare Research and Quality, National Association for Healthcare Quality, American Nurses Association; and practitioner databases, including Medscape and Lippincott Nursing Center.

Inclusion and exclusion criteria

To ensure this review was relevant to current practice, and taking into consideration the interest in CAUTI prevention generated by Centers for Medicare & Medicaid Services’ rule change discontinuing reimbursements in 2008, and the updated CDC prevention guidelines in 2009, research articles published in the last 10 years were included. Inclusion and exclusion criteria were outlined following the Institute of Medicine’s population, intervention, comparison, outcome, and time framework for defining research questions.⁶

All study designs of articles published after 2006 (time) that examined the impact of a nurse-driven protocol (intervention) on clinical outcomes, such as IUC utilization rates, IUC days, and CAUTI rates (outcome), of acute care patients in the United States (population) related to CAUTI, compared with prior practice (comparison), were appraised; records not meeting these criteria, editorials, and opinion pieces rather than reports of an intervention were excluded.

Study selection process

All records populated through the aforementioned outlined search terms were collected across databases, uploaded into a citation manager, and duplicates removed. Initially, the titles of all identified studies from the scientific and academic databases were screened for eligibility based on the inclusion criteria previously outlined, followed by a review of abstracts for records passing the initial screening. Finally, a full-text review was conducted by the author

and an independent subject matter expert; final exclusions were made.

After this review, reference lists of included articles were reviewed and screened by title, and professional health care quality agency Web sites and practitioner databases were searched using the aforementioned search terms. Records from these additional sources passing a title screening were reviewed in full text by the author and an independent subject matter expert, and concluding exclusions were made. The list of records was updated to reflect these exclusions, and electronic copies of records to include were uploaded to the citation manager.

Synthesizing the evidence

A qualitative synthesis of data extracted was conducted, with information summarized in a large table outlining geography and setting; population, intervention, and time period; outcome measures; and results. A description of these categories has been provided in an Appendix that is available on request. No attempts were made to contact authors for additional information. The heterogeneity of outcomes and methods used made a statistical meta-analysis inappropriate.

Quality assessment

Level of evidence

One of the purposes of conducting research is to provide evidence of efficacy; however, not all evidence is considered equal.⁶ Consequently, the level of evidence was considered for each study before synthesizing the findings. A 7-level designation of evidence scale, as provided by Melnyk and Fineout-Overholt in their book, *Evidence-based practice in nursing and healthcare: A guide to best practice*, was used for this assessment. According to this scale, level 1 is systematic reviews of randomized controlled trials, level 2 is one or more randomized controlled trial, level 3 is controlled trials with no randomization, level 4 is case-control or cohort studies, level 5 is systematic reviews of descriptive and qualitative studies, level 6 are single descriptive or qualitative studies, and level 7 is expert opinion.⁷

Critical appraisal

To assess the risk of bias in the identified studies, an adapted version of the University of Adelaide, Joanna Briggs Institute’s Critical Appraisal Checklist for Case Control Studies was used. This checklist provides a series of 10 questions to assess the methodologic integrity of each study, and determine the extent to which the potential for bias was addressed in the design, conduct, and analysis. The questions were operationalized and applied to this review as outlined in Table 1.⁹ An additional question regarding whether the researchers mentioned use of an industry-recognized model for conducting quality improvement, which when applied helps to strengthen the reliability of process improvement projects, was added.¹⁰ When a study clearly passed a checklist parameter it received a point; no points were awarded if a study did not pass a parameter or if it was ambiguous. Points were then summed across all parameters resulting in an integrity score.

RESULTS

The search strategy identified 112 records, as outlined in Figure 1. After removal of duplicates, 36 records were screened for eligibility based on titles, resulting in 9 exclusions; 27 records were then screened for eligibility based on abstract. Of these, 3 were excluded and 24 records were obtained for full-text screening. Of the 24 full-text records screened, 2 were excluded. Additionally, 4 records

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