

COMMENTARY

Catheter Matters

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In this issue of *ICHE*, Fakhri et al¹ argue that a metric of catheter days as a proportion of all patient days should be introduced as an additional performance measure for monitoring indwelling urinary catheter harms. Catheter-acquired urinary tract infection (CAUTI) is one of the most common healthcare-acquired infections. Interest in infection prevention and control of CAUTI was relatively quiescent for many decades, but the past several years have seen renewed interest and substantial activity addressing the issue. An important catalyst for this attention occurred in October 2008 with the US Centers for Medicare and Medicaid Services implementation of a policy that hospitals would not be reimbursed for costs of CAUTIs acquired by hospitalized patients.² This policy was justified on the basis of an assessment that a substantial proportion of these infections were “reasonably preventable” adverse effects of hospitalization. Following closely on this change, the US Department of Health and Human Services National Action Plan to Prevent Health Care Associated Infections identified CAUTI reduction as 1 of the 8 initial metrics in the “Roadmap to Elimination.” The heightened attention to CAUTI both in the United States and globally is appropriate. In fact, little substantive progress in the prevention of CAUTI had occurred since the description of closed urinary drainage in 1960, and the 1983 CDC Guidelines for Prevention of Catheter-Associated Urinary Tract Infections were still being used by Infection Prevention and Control programs in 2008. The “new normal” is an environment in which CAUTI is a priority for infection prevention, and programs have been developed to achieve specific goals in limiting the frequency of adverse events from urinary catheters.

Evaluation of the effectiveness of these infection prevention programs requires accurate monitoring of the impacts of interventions, with continuing evaluation of outcomes that reflect program goals. This evaluation requires relevant, valid, and standardized measurements of events. The usual metric for monitoring CAUTI is the incidence of infection calculated with a denominator of 1,000 catheter days. This metric is recommended in the Healthcare Infection Control Practices Advisory Committee (HICPAC) guidelines³ and is the metric implemented for the National Action Plan. The National Action Plan’s initial 5-year target for 2013 was a 25% reduction

in CAUTI [Standard Infection Ratio 0.75] for ICU and ward-located patients. This target was not met. The renewed emphasis on the problem of CAUTI, the explicit reduction targets identified, and continued evaluation of variables potentially contributing to shortfalls in meeting goals has promoted critical consideration of clinical and laboratory limitations in criteria used for identification of symptomatic urinary infection in catheterized patients.

Bacteriuria is a universal consequence of prolonged indwelling catheter use, with duration of catheterization the major determinant of bacteriuria.⁴ Because a positive urine culture is the anticipated outcome of indwelling catheter use, this finding by itself only supports a diagnosis of CAUTI. Microbiology must be interpreted in the context of clinical events. But the clinical presentation of CAUTI is usually one of nonlocalizing signs and symptoms with fever, often by itself, the most prominent.⁴ Fever in catheterized patients is not specific for a urinary source.⁵ Localizing findings such as acute hematuria, costovertebral angle tenderness, or local suppurative complications of urethritis or epididymo-orchitis are more specific but infrequent events. The clinical definition, then, has limited reliability in both specificity and sensitivity. Such limitations are not unique to CAUTI because similar difficulties in ascertainment occur with, for instance, both ventilator-acquired pneumonia and central-line-associated bloodstream infections. Clinical definitions for symptomatic urinary infection for some other patient groups with a high prevalence of bacteriuria may also be problematic. These populations can usually be characterized by the presence of localizing genitourinary signs and symptoms, although the application of criteria sometimes lacks precision.

Nuances in the laboratory interpretation of a urine specimen and culture should also be considered. The appropriate quantitative count to identify bacteriuria in the catheterized patient and the determination of which isolated organisms should be considered uropathogens are not well appreciated by many clinicians. Pyuria occurs in many noninfectious conditions, including the presence of a catheter without bacteriuria, and for bacteriuric patients, pyuria does not correlate with presumed urinary symptoms. Forward-looking approaches to improving diagnostic accuracy, such as the evaluation of urinary cytokines as potential diagnostic

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biomarkers for symptomatic infection, have undergone only limited evaluation. Observations reported to date do not yet support any utility of this approach in differentiating symptomatic infection from asymptomatic bacteriuria. Despite these recognized limitations, standard definitions for CAUTI have been developed and are applied for surveillance purposes. They are also sometimes used for interfacility comparisons.

Comprehensive evidence-based guidelines developed to assist healthcare facilities in establishing programs and instituting practices for preventing CAUTI have been updated and provide an extensive list of specific recommendations.^{3,6} It is clear, however, that the single most effective means of preventing CAUTI is not to use an indwelling catheter. CAUTI does not occur in patients who have not been catheterized. Catheter avoidance includes both primary prevention by restricting catheter insertions to clinical indications where catheter use is essential for care and secondary prevention of minimizing the duration of catheter use by removing necessary catheters as soon as clinically feasible. The implementation of strategies to prompt the removal of unnecessary urinary catheters may decrease the overall duration of catheter use by 37% and is reported to lower rates of CAUTI by 50%.⁷

Fakih et al summarize the present landscape of multiple and variable definitions used for identifying CAUTI, all of which have limitations. The surveillance criteria of the National Health Care Safety Network (NHSN) have been the most systematically developed and are the most widely used globally.⁸ Following their initial implementation with the development of the CDC hospital-acquired infection surveillance program, these criteria have evolved over several decades. Changes have been made to address some of the recognized clinical and microbiologic limitations in diagnosis, some difficulties in application of criteria, and inconsistencies that may compromise interfacility comparisons. The definitions were most recently updated early in 2015.⁸ Several limitations are still acknowledged: (1) the residual uncertainties inherent with clinical case findings, (2) potential underreporting when no urine culture is collected, and (3) possible failure to recognize successful catheter avoidance programs because catheter days is the outcome denominator.

The authors propose that the catheter utilization ratio—a numerator of catheter days over a denominator of patient days—should be considered as a second outcome measure for the National Action Plan. This would be a measure of intensity of catheter use rather than a measure of specific complications attributed to the presence of a urinary catheter. They discuss three substantive issues to support the argument for implementation of this metric as an outcome measure rather than simply a process measure. First, highly effective programs for the prevention of CAUTI may not be reliably identified using the current outcome measure with the denominator of catheter days.⁹ If a program is successful in avoiding increased catheter insertions, the residual patients for whom a catheter remains essential may be a population at higher risk of

developing CAUTI. The impact is to decrease the overall catheter days for patients but retain a catheterized population with a greater likelihood of infection, so the infection rate expressed as the denominator of catheter days may actually increase. Second, not all negative outcomes associated with the use of indwelling urinary catheters are captured by measuring CAUTIs.¹⁰ Additional adverse events include those attributable to inappropriate antimicrobial use for asymptomatic bacteriuria, secondary to catheter trauma, or reflecting elements of patient quality of life such as immobility and discomfort. A measure that captures the proportion of all patient days experienced with an indwelling catheter could be a surrogate marker for these additional potential negative outcomes not identified by the CAUTI rate. Third, the numerator of catheter days is likely to be amenable to more precision in measurement, as insertion and removal of an indwelling catheter are discrete events captured in the electronic medical record. This more objective and accessible record could also support a more reliable metric for use in interfacility comparisons. Of course, a catheter utilization ratio cannot replace the CAUTI rate, and the authors do not suggest that it should. A need remains for some direct assessment of clinical outcomes.

This suggested additional metric seems to be a step forward in identifying negative patient outcomes attributed to use of an indwelling urethral catheter, but there are some limitations. Catheter days is a surrogate measure for patient catheter morbidity. The correlation of an indwelling catheter with patient discomfort or loss of dignity may be relatively straightforward, but the extent to which this measure correlates with trauma or treatment of asymptomatic bacteriuria is likely to be highly variable across facilities, as it is dependent on other processes of care. Thus, this metric may introduce inaccuracy when considered as a surrogate to identify these events. In addition, neither this metric nor the CAUTI rate measures the potential negative impact when a patient for whom an indwelling catheter is indicated does not receive a catheter because of inappropriate catheter avoidance by a healthcare provider, which remains a potential failure of care.

Healthcare-acquired infection metrics should retain a focus on clinical outcomes to remain relevant and credible. However, the potential adverse impacts of an indwelling urinary catheter are more complex than is suggested by the single outcome of symptomatic urinary infection measured as the current CAUTI rate. The proposed addition of a catheter utilization ratio is a reasonable further step to support programs for prevention of patient harms, and implementation seems relatively straightforward in an era of electronic medical records. As the authors acknowledge, the evaluation of a risk-adjusted device utilization metric for interfacility comparisons is necessary. The benefit of indwelling urethral catheters for some patients at some times must be acknowledged, but improving patient safety through minimizing complications from invasive devices is clearly advanced by

limiting indwelling urinary catheters to essential use. The intensity of catheter use measured by a catheter utilization ratio would provide meaningful information for patients, caregivers, administrators, and funders.

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