

Electronic alerts significantly reduce catheter-associated urinary tract infections

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A Penn Medicine team has found that targeted automated alerts in electronic health records significantly reduce urinary tract infections in hospital patients with urinary catheters. In addition, when the design of the alert was simplified, the rate of improvement dramatically increased.

The alerts help physicians decide whether their patients need urinary catheters in the first place and then alert them to reassess the need for catheters that have not been removed within a recommended time period. The electronic alert, developed by medical researchers and technology experts at the Perelman School of Medicine at the University of Pennsylvania, is the subject of a study published in the September issue of *Infection Control and Hospital Epidemiology*.

Approximately 75 percent of [urinary tract infections](#) acquired in the hospital are associated with a urinary catheter, which is a tube inserted into the bladder through the urethra to drain urine. According to the Centers for Disease Control and Prevention, 15 to 25 percent of hospitalized patients receive urinary catheters during their hospital stay. As many as 70 percent of urinary tract infections in these patients may be preventable using infection control measures such as removing no longer needed catheters resulting in up to 380,000 fewer infections and 9,000 fewer deaths each year.

"Our study has two crucial, applicable findings," said the Penn study's lead author Charles A. Baillie, MD, an internal medicine specialist and fellow in the Center for Clinical Epidemiology and Biostatistics at Penn Medicine. "First, electronic alerts do result in fewer catheter-associated urinary tract infections. Second, the design of the alerts is very important. By making the alert quicker and easier to use, we saw a dramatic increase in the number of catheters removed in patients who no longer needed them. Fewer catheters means fewer infections, fewer days in the hospital, and even,

fewer deaths. Not to mention the dollars saved by the health system in general."

In the first phase of the study, two percent of urinary catheters were removed after an initial "off-the-shelf" electronic alert was triggered (the stock alert was part of the standard software package for the [electronic health](#) record). Hoping to improve on this result in a second phase of the study, Penn experts developed and used a simplified alert based on national guidelines for removing urinary catheters they had previously published with the CDC. Following introduction of the simplified alert, the proportion of catheter removals increased more than seven-fold to 15 percent.

The study also found that catheter associated [urinary tract](#) infections decreased from an initial rate of .84 per 1,000 patient days to .70 per 1,000 patient-days following implementation of the first alert and .50 per 1,000 patient days following implementation of the simplified alert. Among other improvements, the simplified alert required two mouse clicks to submit a remove-urinary-catheter order compared to seven mouse clicks required by the original alert.

The study was conducted among 222,475 inpatient admissions in the three hospitals of the University of Pennsylvania Health System between March 2009 and May 2012. In patients' [electronic health records](#), physicians were prompted to specify the reason (among ten options) for inserting a urinary catheter. On the basis of the reason selected, they were subsequently alerted to reassess the need for the catheter if it had not been removed within the recommended time period based on the reason chosen.

Women's health units had the highest proportion of alerts that led to a remove-urinary-catheter order and critical care units saw the lowest proportion of alerts leading to a remove order.

"As more hospitals adopt electronic health records, studies such as ours can help point the way toward improved patient care," said senior author Craig Umscheid, MD, MSCE, assistant professor of Medicine and Epidemiology and director of Penn's Center for Evidence-based Practice. "Thoughtful development and deployment of technology solutions really can make a difference. In this study, we learned that no two alerts are alike, and that changes to an alert's usability can dramatically increase its impact."

Several studies have already shown that reminder systems to limit the use and duration of [urinary catheters](#) can lower catheter infection rates. However, the majority of these have used non-computerized reminders, such as written reminders or stickers. The current Penn study is one of the largest to examine the impact of electronically generated alerts. In addition to the size of the study, a second strength is its multi-year duration. Most prior studies relied on a brief study period, and several studies observed an increase in catheter use when the relatively brief intervention had ended.

Provided by University of Pennsylvania School of Medicine

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