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# Resident performance in complex simulated urinary catheter scenarios



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## ABSTRACT

**Background:** Urinary catheter insertion is a common procedure performed in hospitals. Improper catheterization can lead to unnecessary catheter-associated urinary tract infections and urethral trauma, increasing patient morbidity. To prevent such complications, guidelines were created on how to insert and troubleshoot urinary catheters. As nurses have an increasing responsibility for catheter placement, resident responsibility has shifted to more complex scenarios. This study examines the clinical decision-making skills of surgical residents during simulated urinary catheter scenarios. We hypothesize that during urinary catheterization, residents will make inconsistent decisions relating to catheter choices and clinical presentations.

**Methods:** Forty-five general surgery residents (postgraduate year 2-4) in Midwest training programs were presented with three of four urinary catheter scenarios of varying difficulty. Residents were allowed 15 min to complete the scenarios with five different urinary catheter choices. A chi-square test was performed to examine the relation between initial and subsequent catheter choices and to evaluate for consistency of decision-making for each scenario. **Results:** Eighty-two percent of residents performed scenario A; 49% performed scenario B; 64% performed scenario C, and 82% performed scenario D. For initial attempt for scenario A-C, the 16 French Foley catheter was the most common choice (38%, 54%, 50%,  $P$ 's < 0.001), whereas for scenario D, the 16 French Coude was the most common choice (37%,  $P$  < 0.01). Residents were most likely to be successful in achieving urine output in the initial catheterization attempt ( $P$  < 0.001). Chi-square analyses showed no relationship between residents' first and subsequent catheter choices for each scenario ( $P$ 's > 0.05).

**Conclusions:** Evaluation of clinical decision-making shows that initial catheter choice may have been deliberate based on patient background, as evidenced by the most popular choice in scenario D. Analyses of subsequent choices in each of the catheterization models reveal inconsistency. These findings suggest a possible lack of competence or training in clinical decision-making with regard to urinary catheter choices in residents.

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## Introduction

Every one in four hospitalized patients require a urinary catheter. The most common hospital-acquired infection comes from poor urinary catheterization insertion technique or catheter management.<sup>1</sup> Increased focus on the education of urinary catheterization aims to significantly decrease morbidity and health care costs associated with these hospital-acquired infections.<sup>2–4</sup> Hospitals have adopted stricter indications, reminder systems to remove catheters, standardized algorithms for catheter insertion, and alternative, less-invasive urinary catheter types.<sup>5,6</sup> These evidence-based guidelines result in decreased urinary tract infections. Nursing, residents, and staff physicians are instructed to follow these guidelines while inserting and managing urinary catheters.<sup>5,6</sup>

Resident adoption of the guidelines is yet unclear. With increased emphasis on patient safety and the thoughtful public concern of medical errors, surgical education is placed under the scrutiny of excellence and expectations for competency.<sup>7</sup> In response, surgical education incorporates simulation to provide trainees a safe, patient-free environment to develop procedure-related skills and minimize errors. In addition, in an effort to standardize education and ensure competency, the American College of Surgeons and Association of Program Directors in Surgery (ACS/APDS) created the Resident Skills Curriculum.<sup>8</sup> This curriculum includes a wide variety of basic and advanced skills that are considered essential for the surgical trainee to learn. In this curriculum, urinary catheterization is identified for surgical residents as a phase 1, basic/core skill, and task.

While the curriculum sets the expectation that surgical residents achieve competency in urinary catheterization, it appears that surgical residents often defer this task to a urological service when asked to troubleshoot.<sup>9</sup> Catheter insertion is often designated as a nursing task, and residents are often not called until a nurse fails a difficult catheterization scenario. Often when called to attempt urinary catheterization, physicians will prematurely consult a urology service with no attempt to place a catheter themselves.<sup>9</sup> Often times, urology services, although willing to catheterize, view some of these consults as unnecessary.<sup>9</sup> The suggested algorithm developed for the ACS/APDS Resident Skills Curriculum states that for an uncomplicated male or female, a 16 French (Fr) Foley catheter is an appropriate first choice.<sup>10</sup> This curriculum then moves forward to provide some suggestions to prevent common errors and maximize success. With premature consultation to urological services for urinary catheter insertion, it is uncertain if surgical residents have achieved competence.

The aim of this study is to assess the surgical trainee's ability to insert and troubleshoot difficult urinary catheterization scenarios in the setting of common and complex urinary pathology. We hypothesize that during urinary catheterization, residents will make inconsistent decisions relating to catheter choices and clinical presentations.

## Materials and methods

### Setting and participants

This study took place across seven Midwest general surgery training programs located at tertiary care hospitals. Recruitment focused on surgical residents who were entering their first year of dedicated laboratory research. Clinical residents and research residents in their second year who wished to participate were also allowed to participate. Resident participation was completely voluntary. Data collection occurred in either simulation centers or rented halls of the respective hospital's surgical department. Data were collected from residents over a period of 4 mo. The University of Wisconsin Hospitals and Clinics (UWHC) Institutional Review Board approved this study.

### Research protocol

Residents filled out an initial survey with basic demographic information. After completion, they were directed to the urinary catheter station where a researcher read a standardized introduction to the urinary catheter task. Participants were encouraged to perform the urinary catheterization as they would with a real patient and were told to verbalize any actions or choices that they would normally perform but could not due to the limitations of the simulation. Residents were presented with a clinical scenario and asked to catheterize three of four simulated urinary catheter models in less than 15 min.

Each clinical scenario was common and of varying difficulty: (A) female trauma patient with a bladder injury who had bloody urine output with successful urinary catheter insertion, (B) a preoperative female who had labial constriction, (C) an elderly male who had complete urinary tract obstruction of unknown etiology, and (D) a male patient with partial blockage of the urinary tract secondary to benign prostatic hypertrophy (BPH).

Residents were provided with a full urinary catheterization kit and were told to assume the patient was appropriately prepped and draped. They were allowed five different urinary catheters to catheterize the models, including a 16 French (Fr) Foley, 16 Fr Coude, 16 Fr three-way, 14 Fr Foley, or 12 Fr Foley catheter. There was no limit to the number of catheter attempts or catheter choices participants were allowed.

Study data were collected and managed using REDCap<sup>11</sup> electronic data capture tools hosted at the University of Wisconsin-Madison, School of Medicine and Public Health. REDCap is a secure, web-based application designed to support data capture for research studies. Data collection focused on the catheter choices, number of catheters used, total attempts at catheterization, attempt number that led to successful urine return.

### Data analysis

Data analyses were performed in SPSS.<sup>12</sup> Descriptive statistics and chi-square analyses were performed to explore the

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