Pediatric Urethral Catheter Consultations: Understanding Driving Factors

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Purpose: Pediatric urethral catheterization is often straightforward. However, it can be challenging and may require urological consultation. Possible critical factors are patient anatomy and comorbidities, and insertion technique. To better understand pediatric catheter consultations, we reviewed our experience.

Materials and Methods: All pediatric catheter consultations between July 2009 and June 2012 were identified. A retrospective review was then performed, focusing on demographics, reasons for consultation and difficulty of catheter placement. The 4 categories of difficulty noted were easy, challenging, extremely difficult and could not be placed. Patients were excluded from analysis if catheter placement was not needed, the consultation was for a catheterizable stoma or they were status post urological surgery. Statistical analyses were performed to evaluate associations between patient factors and difficulty of placement.

Results: A total of 93 consultations were identified, of which 57% were inpatient, 28% intraoperative and 15% other source. Of the inpatient consultations 75% were from an intensive care unit, the majority (80%) of which were for catheter placement, with the remainder for removal, nondraining catheter, trauma or other. After exclusions 65 patients remained, of whom 80% were male and 32% had a urological comorbidity. By difficulty level 69.2% of cases were easy, 15.4% were challenging, 9.2% were extremely difficult and 6.2% could not be placed. Location of consult, gender, urological comorbidity and history of prematurity were not significantly associated with difficult catheter placement.

Conclusions: Pediatric catheter consultations are largely straightforward. Comorbidities do not significantly impact catheter placement. Correct catheter technique may be more important than patient comorbidities, giving us a basis to shape catheter insertion training within pediatric hospitals.

Key Words: pediatrics, urethra, urinary catheterization

At pediatric hospitals urethral catheters are placed for a variety of reasons. Recent reports have shown that the majority are placed within the first 24 hours of hospitalization, most commonly while the patient is in the operating room or intensive care unit.[1] While catheter placements are usually straightforward, they can be challenging for anatomical or technical reasons. Urethral trauma during placement can lengthen the hospital stay and add morbidity, thereby increasing health care costs.[2,3] Within the last several years urethral catheterization has come under greater scrutiny due to nosocomial urinary tract infections and

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efforts to standardize catheter placement and removal.

Our prior review of adult catheter consultations suggested that education and training are major factors that contribute to difficulties with urinary catheter placement and any resultant urethral trauma.[4] Given the anatomical differences between adults and children, we did not believe these conclusions could be blindly applied to the pediatric population. As such, we evaluated our pediatric catheter consultations in a similar manner, hypothesizing that given smaller patient size and possible congenital conditions, these insertions would be more challenging. The literature regarding pediatric catheterization is sparse, especially concerning catheter placement quality improvement. In our review we sought to determine if difficulties arise as a result of patient factors or if there is an educational component that could be improved with quality of care measures. A secondary aim of the study was to determine whether adult and pediatric catheter placement issues are fundamentally different.

METHODS

We reviewed our prospectively maintained consult database with more than 10,000 entries from adult and pediatric urology providers and identified all pediatric catheter consultations at our institution from July 1, 2009 to June 30, 2012. Our institution is a pediatric hospital that is part of the University of Michigan Health System. The database is housed on a secure network server, and entries are made prospectively as the consults are performed.

Data Collection and Cohort Assembly

The study population included all patients from birth to 18 years who required urological consultation for catheter placement, positioning and/or removal concerns within the study time frame. Patients were excluded if they were status post urological surgery or if they were having difficulty catheterizing a continent stoma. These individuals were deemed to represent a separate patient population from the typical catheter directed consultations (fig. 1). Data included patient demographics (age, gender, gestational age), comorbid medical and urological conditions, and details of the catheterization attempt (type of catheter attempted and placed, reasons for placement and consultation, associated catheter trauma and difficulty level of catheter placement per the urological provider).

Outcome Characteristics

For purposes of this project categories of difficulty were defined as 1) easy, 2) challenging, 3) extremely difficult and 4) could not be placed. If the catheter was placed in 2 passes or fewer and did not require any other maneuvers, it was deemed easy. These catheters were all placed by a junior level resident (postgraduate year 3 to 4) without attending involvement. If more than 2 attempts were performed and/or guidewires were used, the placement was considered challenging. Extremely difficult placements resulted from either a suprapubic tube being placed or the patient having to undergo cystoscopic guided insertion. The category "could not be placed" applied to cases where catheterization attempts were unsuccessful and further intervention was not considered warranted. In these cases the primary service did not want to escalate to surgery and/or the individuals subsequently voided and the service no longer desired catheterization.

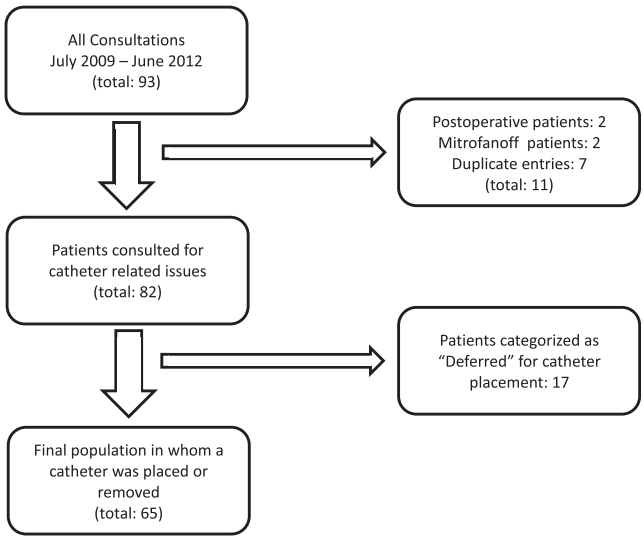

Figure 1. Cohort assembly

Data Analysis

Descriptive statistics were performed to describe the study population. Bivariate analyses and multivariate logistic regression were used to determine associations between patient factors and location within the hospital to our main outcome of difficulty of catheter placement. Continuous variables were compared using a Wilcoxon rank sum test and categorical variables were compared using the Fisher exact test. Data analysis was performed using SAS®, version 9.3 and $p < 0.05$ was considered statistically significant.

RESULTS

Patient Characteristics

During the 3-year study period 93 consultations were identified. The distribution of consulting locations is illustrated in figure 2. Of the consultations 57% were for inpatients, of which 47.2% were in the pediatric intensive care unit, 28.3% in the neonatal intensive care unit and 24.5% on the general care floor. During the study period a bimodal peak in consultations was noted in the late summer months (July/August) as well as in the winter months (December/January). The summer surge may reflect the new academic year. However, the bimodal trend