Knowledge, skills, and confidence among healthcare staff in urinary catheterization

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Abstract

Introduction: There is an increasing volume of urology referrals for urinary catheterization (UC). The aim of this study was to determine the confidence and knowledge among healthcare staff on UC. We also assessed their satisfaction with training and support received during catheter education and clinical practice.
Methods: This was a mixed-methods model using an anonymous online survey circulated among all hospital staff. Weekly reminders were sent, quantitative data was obtained from closed-ended questions, and thematic analysis was performed for qualitative open-ended questions.
Results: The response rate was 26% (n=90/350), from a heterogenous group of doctors and nurses from various specialties and grades in the hospital and community frequently dealing with UC. There was decreasing confidence levels in female UC (54%, n=47/87), three-way catheters (33%, n=29/89), and managing suprapubic catheters (25%, n=21/85). Female UC was reported as the most difficult of catheter insertions (35%, n=31/90). Although 83% (n=74/89) of respondents received catheter education, 53% (n=48/90) felt this was insufficient for clinical practice. Fifty-one percent (n=45/89) believed more support with UC in clinical practice was required and 64% (n=57/89) recommended changes in catheter education. The most common theme identified was the need for ongoing education and more practical supervision in clinical practice.
Conclusions: Catheter training should focus on different types of catheters and management of difficult catheter scenarios. Standardizing safe catheter education during undergraduate training and including this as a part of regular annual or biannual mandatory training for healthcare staff involved in dealing with catheters in clinical practice would be the way forward.

Introduction

Urinary catheters are one of the most commonly used medical devices in hospitals as approximately 25% of inpatients are catheterised (1). With an increasing volume of urology referrals and consultations, the specialty is fast becoming a catheter service and consultation requests for assumed difficult catheters or three-way catheter insertion are frequent. In >50% of catheter referrals, an attempt at urinary catheterization (UC) is not made prior to referral and the catheter is inserted without any adjuncts by a urologist. (2). Over 70% of 3-way UC for haematuria referred to urology are because of lack of previous experience in doing so, even though nearly 50% of patients may already have an indwelling 2-way catheter. Iatrogenic UC injuries constitute another UC related referral with an incidence of 0.3%-3% of male admissions (3). The most reported mechanism of this injury is by inadvertent balloon inflation in the urethra or false passage creation during insertion. Both iatrogenic morbidities are preventable by using safe and correct technique for UC. The implications of iatrogenic UC injuries include both short-term and long-term patient morbidity as well as increased healthcare costs (3).

There is clear evidence of lack of adequate training on UC at qualification among doctors. Studies in new medical graduates have reported increased confidence and reduced incidence of iatrogenic injuries after implementation of structured training programs in the short-term in various countries across the globe (4)(5). One in five doctors after one year of medical practice had never performed a male catheterization and nearly 50% had never performed a female catheterization in a UK-based study (6). UC training programs have been shown to improve the confidence in UC insertion in the short-term, however there are no studies to show long-term retention of this training in practice. Similar studies have been performed in nursing groups with positive results. (7). However, UC is commonly performed by all specialties and almost all grades of doctors and nurses. A single centre audit on iatrogenic UC injuries found that the junior healthcare professional group was not responsible for any injuries in the centre and hence a training program solely focussing on this group would not suffice (1). Hence, the current literature does not point towards an effective UC training program.

There is a need to understand the type of training programs that may be more effective for UC training and hence for patient outcomes in terms of iatrogenic injuries. The healthcare staff currently performing and managing UC regularly can provide the best insight in to the training they have received and how it can be improved to make UC safer in clinical practice. Hence, the aim of this study is to determine the confidence and knowledge of healthcare staff in UC and their satisfaction with the training and support received during their undergraduate medical and nursing education and subsequently during clinical practice.

Methods

Study design

This study is based on a quantitatively driven convergent parallel mixed methods model based on a pragmatism research philosophy (8) which combines the positivist and interpretivism epistemologies by integrating the qualitative and quantitative research methods.

Outcomes

Our primary outcome was to determine the knowledge, confidence, and frequency of UC among hospital staff. Our secondary aim was to assess the level of training and support received previously and currently by healthcare staff in the insertion and management of urinary catheters.

Population and sampling

A hospital-wide sample across two sites was included in order to engage different healthcare professionals and obtain a representative sample dealing with UC. The population sampling was based on probability sampling so that each member had a known and non-zero probability of inclusion in the study; to make data as unbiased as possible.

Survey

A web-based anonymous survey using the tool SurveyMonkey was used to collect data with a balance of closed questions to collect quantitative data and open-ended questions for the qualitative data in the form of free text. The themes explored in the survey included frequency of dealing with UC among respondents, their confidence in insertion and management of various catheters, their knowledge in UC, common difficult scenarios encountered and finally their experience with the training received in UC during their education and clinical practice. These unstructured fields were overtly linked to the preceding structured responses which facilitated linkage of the topics for participants while answering the questions and for analysis of the results. The survey was piloted to ensure it was easy to understand. Participation could be done on a smart phone quickly and conveniently. The survey reporting was done using the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) tool (9).

Circulation and advertising

The survey link was circulated among all hospital doctors and nurses in the available mailing lists from the centre of education in the hospital. It was accompanied by a small cover note describing the purpose of the survey and the approximate time it would take to complete the survey. Responses to the survey were taken as implied consent to participate in the project. The survey was first circulated among all staff, and then followed by two reminders at weekly intervals.

Data analysis

The closed ended questions were analysed using descriptive statistics to produce proportions, means and medians and their relevance to the answers. The open-ended answers were analysed using thematic qualitative analysis manually using the Braun and Clarke six-phase approach (10). Quasi-statistics method (Maxwell, 2010) was used to make simple counts of the frequency of the occurrence of themes in order to make data reporting more precise than using terms like "some", "usually" and "most". The application of this in analysis of qualitative data does not make this a mixed-method approach but is essentially to complement the overall process orientation of the qualitative research.

Ethics

The quality improvement committee and the medical education manager after consultation with the Research and Ethics Committee provided an ethical waiver to this project on the basis that this was a quality improvement project.

Results

Response rate

The survey was circulated among 350 hospital staff across two sites over a 6 week period. Reminders were sent out three times during this period. The response rate of the survey was 26% (n=90/350). A total of 90 healthcare staff responded in 6 weeks, of whom 85 completed the entire survey giving a completion rate of 95%. Incomplete responses were analysed and specific response rates for each answer as quoted in this section. Participants were restricted by the Survey Monkey application from taking the survey more than once, hence duplicate entries were prevented. The survey is attached as Appendix 1.

Survey respondents

Demographics

Of the total 90 respondents, 66% (n=59/90) were doctors and 34% were nurses (n=31/90). There was a mixture of community healthcare staff (n=12/90, 13%) and hospital based staff (n=78/90, 87%). The hospital staff were from various departments (Figure 1).
Respondents had a median of four years clinical experience in their field of work (interquartile range of 17 years). The experience level ranged from foundation year 1 doctors with a year or less of clinical experience 19% (n=17/90) to highly experienced hospital staff with over 40 years' experience. The grade of the doctors was diverse ranging from foundation doctors, core trainees, specialty trainees, staff grade doctors to consultants. Over half [57% (n=51/87)] of hospital staff had no previous urological experience while 41% (n=36/87) had some experience in urology. This ranged from a urology rotation as a foundation year doctor (n=13), to nurses with previous experience on a urology ward ranging from a few months to a couple of years (n=7) and some cross cover while on another specialty such as surgery or nephrology (n=7).

Frequency of catheterization
Over 50% of respondents dealt with urinary catheters weekly or more frequently (Figure 2). 93% (n=83/89) of respondents were involved in catheterizing patients as a part of their role and 6 respondents did not insert urinary catheters.

Confidence
Likert scales were used to assess confidence in UC. Over 70% (n=62/88) respondents felt they were either extremely confident or very confident in UC insertion while 8% (n=7/88) felt they were not so confident or not at all confident in UC insertion (Figure 3). Confidence with each catheter type varied with over two-thirds of respondents either extremely or very confident in the insertion of male urinary catheters (66%, n=58/88) while over half felt the same way about female urinary catheterization (54%, n=47/87). In contrast, only 33% of the respondents (n=29/89) felt this way about three-way catheters and 25% (n=21/85) felt the same way about managing suprapubic catheters onwards or other clinical areas.

Difficulty with various kinds of UC was ascertained, to understand what type of catheters staff required support for: 35% (n=31/90) felt female urinary catheters were most difficult followed by male catheterization (20%, n=18/90) and three-way catheters in 15% (n=13/90). Almost a quarter (23%, n=21/90) respondents felt none of the catheterization types were difficult for them while 8% (n=7/90) felt all catheter types were difficult.

Knowledge and skills
A set of six questions were asked about the knowledge and skills of respondents with regards to UC (Table 1). Most respondents overestimated the frequency of iatrogenic injury (as per previously published literature of 2 to 6) per 1000 catheters inserted (3). Sixteen percent (n=14/88) correctly estimated the rate of iatrogenic UC trauma and 28% (n=25/88) believed the incidence was over 16 per 1000 catheters inserted.
Respondents were asked to identify types of catheters from a range of options including coude tip catheter, small length catheter, Tiemann tip catheter and large bore catheter and the answer was deemed correct if they chose all true catheter types.

Catheter training
Ninety percent (n=80/89) of respondents felt formal UC training should be compulsory in their line of work, 83% (n=74/89) respondents had received formal training while the remaining 17% (n=15/89) had not received any training. The format of formal catheter training received by the respondents during their undergraduate training was model based teaching in 20% (n=17/84), bedside teaching in 35% (n=29/84) and patient supervised teaching in 45%(n=38/84).

Satisfaction with catheter training
Less than half (47%, n= 42/90) the respondents were satisfied with UC training during their under graduate education and over half felt (51%, n=45/89) the need for further support with UC in clinical practice. Over 64% respondents would recommend changes to the catheter

training they received during undergraduate education (n=57/89). They were asked to elaborate on this in free text as open-ended answers.

The most frequent theme 37% (n=38/104) was the need for ongoing education on UC in clinical practice. Another common theme was development of a troubleshooting pathway for difficult urinary catheter scenarios (17%, n=20/104) and practical supervision while initially performing urinary catheterization in patients 14% (n=15/104) (Figure 4).

Discussion

Several areas for improvement and learning points on UC training were obtained from this survey. Firstly, the common theme that emerged from the survey was the need to improve catheter training during medical education and in clinical practice. Secondly, medical and nursing graduates are not taught UC in a standardised fashion at undergraduate or post-graduate level. A large proportion of healthcare staff are not exposed to UC training during undergraduate training whether it may be female catheters, suprapubic or three-way urinary catheters and this leaves them underprepared for clinical practice. One final important learning point from this survey was the need for ongoing education overall, and specifically for different and difficult urinary catheters.

In comparison to the published literature, our sample was unique in its heterogeneity. For example, there are several studies focussing on newly graduate doctors (12), some focussing on nurses (7) and others focussing in specific areas in the hospital such as the critical care unit or the emergency department (13,14). However, UC is performed not only by a large proportion of hospital staff, it is also performed in the community. It is necessary to obtain perspectives from all the varied healthcare staff involved in this procedure to have a reflective and positive impact on urinary catheter outcomes.

Reports have shown practising healthcare staff may be deficient in UC practice, supporting the findings of our survey. One French study involving >1200 nurses demonstrated significant variation of knowledge and practice among nurses involved in regular UC. The authors also showed that 41% of nurses made at least one technical error while catheterising patients (15). A small scale study on 30 practising healthcare staff members found low experience with regards to UC among junior medical staff and nurses regularly practising UC (16). A structured training program was recommended as a remedial action. However, very few remedial or improvement models have been reported which can address this issue. This has implications for those involved in catheter education and training.

Guidelines from the General Medical Council (GMC) (17,18) include male and female catheterization as practical skills required by the graduates and foundation year doctors. The British Association of Urological Surgeons (BAUS) guidelines (19) on urology training in medical school clearly detail the need to teach female catheterization and replacement of suprapubic catheterization (19) in addition to male UC. However, a larger proportion of current UC training and research is solely focussed on male catheterization, particularly for junior doctors. Exposure to female catheter insertion and to suprapubic catheter management is currently inadequate resulting in low confidence levels among

healthcare professionals when performing female UC. Although confidence for catheterization was high among the respondents, this does not translate into practical skills (15,20,21).

Support is essential for self-directed learning as identified in meta-analyses and over half of our respondents felt they required additional urinary catheter support (22). It is feasible to deliver this using mandatory training in the NHS, which has been introduced as a way of safe and efficient delivery of service. Though it may differ across various institutes, there are many types of mandatory training that are common and delivered across each trust such as topics on infection control or basic life support. Spaced delivery of training (23,24) has shown better retention than massed training. All the respondents had received some form of massed catheter education during their undergraduate training whether it was model based, bedside or supervised on patients. However, they did not receive any ongoing training or feedback in UC during practice. Spaced repetitions of commonly performed skills are important not only for better retention of knowledge, but these methods may have the added advantage of correcting any wrong practices accumulated over time. Dedicated urinary catheterization workshops during the year for hospital staff at various levels are important to address the issues raised in this survey and to improve UC training and support.

Active involvement from urologists is required to improve UC training and provide ongoing support. There is a push to improve undergraduate urology education and exposure during undergraduate training, for example, LEARN (uroLogical tEAching in bRitish medical schools Nationally) — a national multicentre audit of urology teaching across British medical schools — is led by the British Urology Researchers in Surgical Training Research Collaborative (BURST Research Collaborative) in order to address this issue (25). LEARN aims to assess undergraduate urology teaching across medical schools in the UK with a view to ensure high exposure to urology teaching at an undergraduate level in the future, in order to equip our future workforce with the skills required to deal with urological pathology. This might be a useful model for urologists to replicate in other countries to drive this important change. The National Catheter Education Programme in the UK is another example of urologists and the urology specialist nurses driving important catheter related education using a mutli-professional setting to deliver a modular UC training program supported by the NHS and the Health Education England (26).

Limitations

There are some limitations to our study. There is a risk of only capturing engaged staff during this process and omitting disinterested healthcare staff. The possible bias in this approach could be a non-response bias as not everyone who receives the survey will respond. Extensive advertising of the survey and weekly reminders were used as a way of reducing this bias. There is also the risk of response bias, where respondents may not give truthful answers. To prevent this, the survey was anonymised. Finally, the response rate for the survey was low at 26%. There is no fixed acceptable range of survey response rates; however

it is known that physician response rates are usually lower than the general public due to time demands (27).

Conclusions

Catheter training should develop to focus on different types of catheters and management strategies for difficult catheter scenarios. Standardising safe catheter education during undergraduate training and including this as a part of regular annual or bi-annual mandatory training for healthcare staff involved in dealing with catheters in clinical practice would be a pragmatic solution to UC training and support issues raised in the current study. Rather than non-uniform local initiatives, a nationwide policy on urinary catheterization training for hospital staff may be the way forward. Future studies investigating the effectiveness of such training programs and policies on knowledge, skills and confidence of healthcare staff managing UC would be useful.

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Figures and Tables

Fig. 1. Specialty distribution of respondents.

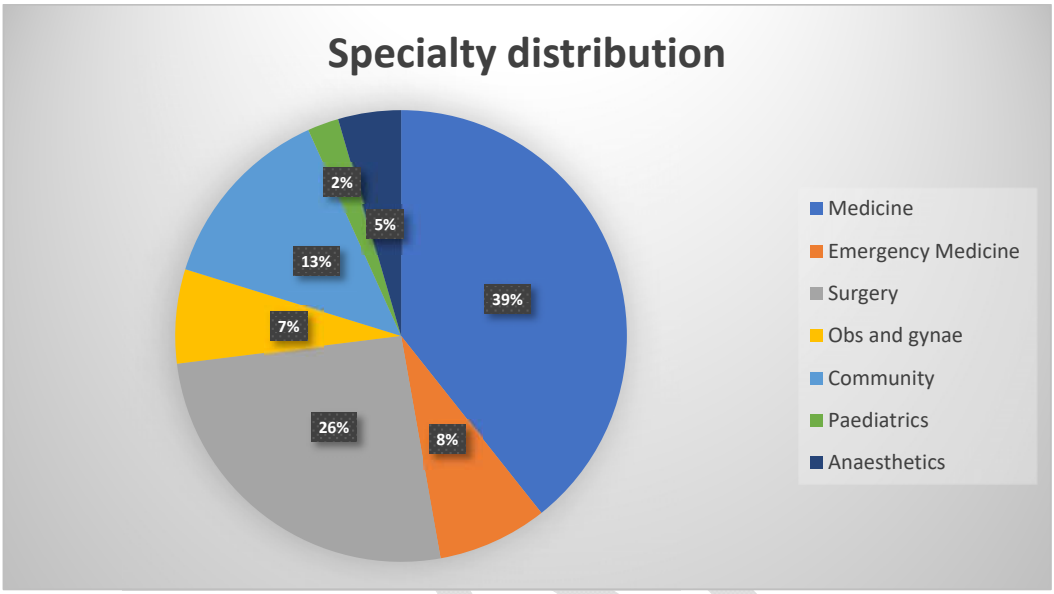

Fig. 1. Frequency of dealing with catheters among respondents.

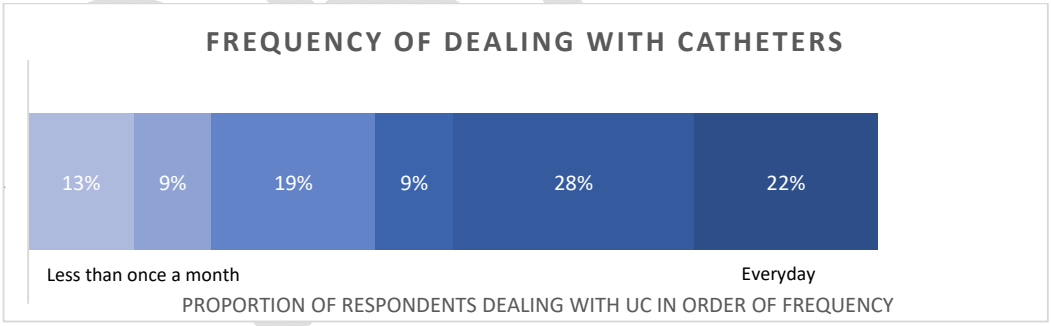

Fig. 3. Confidence in insertion of various catheters among hospital staff.

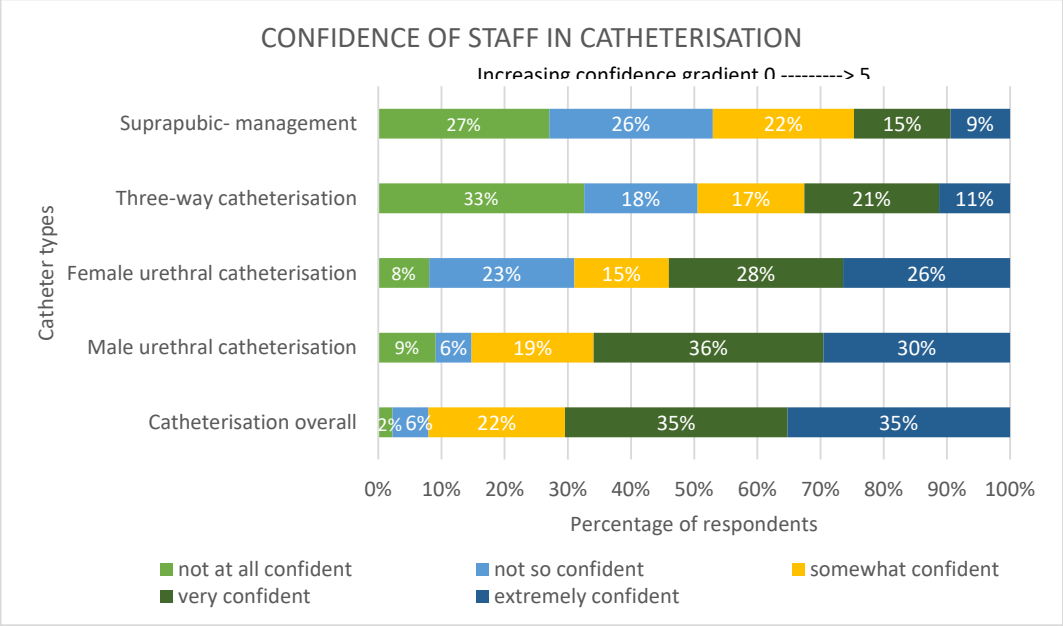

Fig. 4. Thematic analysis of all open-ended answers.

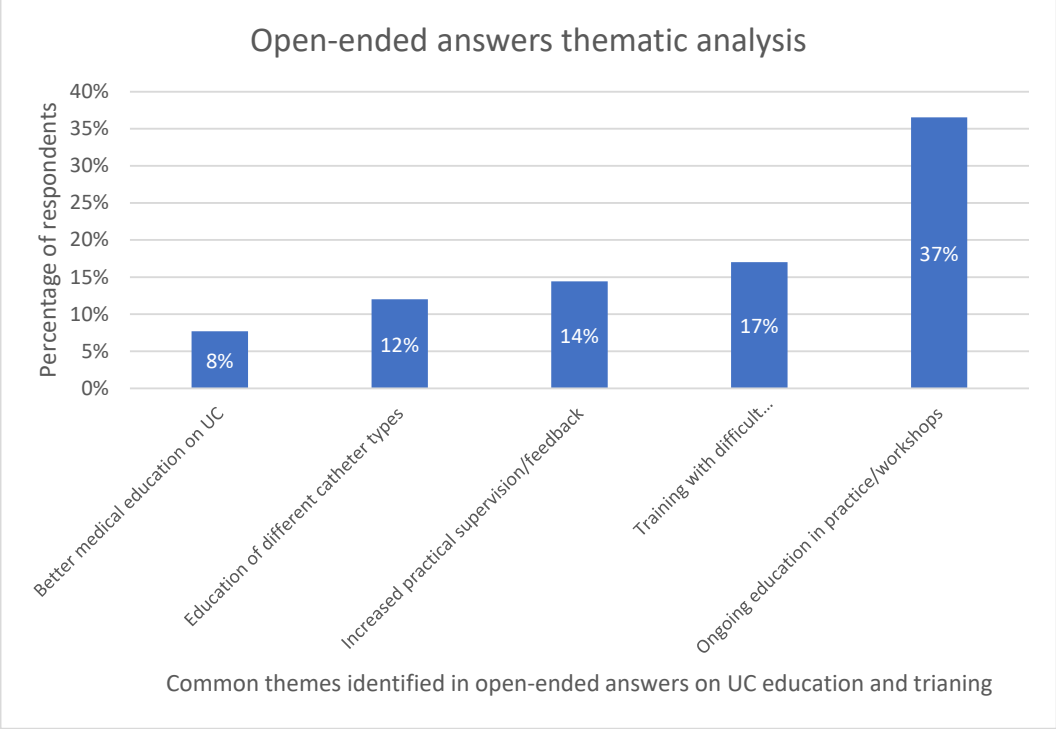

Table 1. Knowledge of healthcare staff on common urinary catheter (UC) scenarios	
Question	**Responses**
Frequency of iatrogenic injuries (2–6 per 1000) estimated	Grossly overestimated (56%, n= 49/88)
Difficulty with insertion of urinary catheter	1. 70% (n=61/87) try different type of catheter 2. 20% (n=17/87) call for help immediately 3. 10% (n=9/87) try using same catheter again
Identify types of catheters from options, e.g., coude tip, Tiemann tip, three-way	60% incorrectly identified catheters
Hematuria with clots management in an existing UC	1. 54% (n=47/87) would insert 3-way and start irrigation 2. 33% (n=29/87) call urologist to insert catheter 3. 13% (n=11/87) leave catheter as is and flush
Documentation of residual urine after UC	1. 72% (n=63/87) 10–15 min after insertion 2. 24% (n=21/87) immediately after 3. 3% (n=3/87) would not document
Suspected enlarged prostate	1. 36% (n=32/90) use 10–12F UC 2. 33% (n=30/90) use larger UC 3. 31% (n=28/90) call urologist, without trying themselves
No urine output after insertion	1. 91% (n=80/88) insert catheter further prior to inflation 2. 9% (n=8/88) inflate balloon regardless