Indwelling Catheter Challenge

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Introduction

Nurses in the acute care setting are expected to be knowledgeable of a variety of nursing competencies including indwelling urinary catheter care. An indwelling urinary catheter is not without risks even when used therapeutically on patients with various health problems. Risks include catheter-associated urinary tract infection (CAUTI), tissue damage and urinary blockage among others (Siddiq & Darouiche, 2012).

Study Design

This pre- and post-test study is part of a mixed methods research that investigated the impact of a CAUTI education package on nurses’ knowledge and indwelling catheter management practices. The intervention involved educating nurses on evidence-based strategies to manage indwelling urinary catheters and to prevent CAUTI.

Setting, Participants and sampling

The study was done at two surgical wards of a public hospital in Auckland, New Zealand from April to May, 2014. Data was gathered from a convenience sample of nurses (n=14) working at the surgical wards due to the catheter care activities they perform and their availability at the time of the research.

Data gathering tool

The study evaluated the nurses’ baseline knowledge of evidence-based indwelling catheter management using a 25-item multiple choice pre- and post-test. The test questions were adapted from CAUTI prevention tests published by Schneider in 2012 and, Dumont and Wakeman in 2010 to improve test reliability. Additional questions relevant to the research setting were incorporated and answers were referenced to complete the tool. The final tool was pilot tested by nurses at the medical and aged care services and changes were made to further improve reliability and validity.

Test questions were grouped together into four main topics to facilitate hypothesis testing. These are background knowledge, indwelling catheter insertion, indwelling catheter maintenance and indwelling catheter removal. The four main topics correspond to the four components of an evidence-based bundle of care which include: reduce inappropriate use of urinary catheters, perform proper techniques for indwelling catheter insertion, implement proper catheter maintenance procedures, and remove catheters in a timely manner (Institute for Healthcare Improvement [IHI], 2011).

Data collection procedure

Data collection had three phases, namely: pre-intervention, intervention and evaluation phase. Baseline data to determine nurses’ knowledge using the pre-test was gathered during the pre-intervention phase. Education sessions were implemented during the intervention phase and the post-test was administered during the evaluation phase.

Data analysis
The study utilised a paired t-test and the significance level was set at $p < 0.05$ for hypothesis testing. Wilcoxon Signed-Rank test was used to determine if there was a significant difference between each pre and post-test scores.

Ethical considerations

Ethical approval was sought from the research committee of the health board and the university human participants' ethics committee. The study adhered to the principles of beneficence by ensuring that the participants learned from the research, the principle of respect for human dignity by ensuring that the participants are making informed decisions, the principle of veracity by providing the participants full information about the study and the principle of justice through fair treatment and adhering to confidentiality of information.

Findings and discussion

The test questions were grouped together into four main topics, which in turn, correspond with the four components of catheter care. The four main topics with the relevant questions are:

- Background knowledge – questions 1, 2, 3, 4, 5, 7, 8, 12, 14
- Indwelling catheter insertion – questions 6, 9, 10, 11, 17, 20
- Indwelling catheter maintenance – questions 13, 15, 16, 19, 21, 22, 24, 25
- Indwelling catheter removal – questions 18, 23

Overall, the pre-test results showed that nurses had similar concepts regarding the following topics as evidenced by at least twelve (86%) of them providing correct answers to the questions on: signs and symptoms of CAUTI (question 5 and 7), indications of urethral catheterisation (question 9), CAUTI risk factors (question 12 and 21), hand hygiene (question 16 and 19), and proper indications for changing the urinary catheter (question 22).

Nurses’ concept of the following topics vary greatly as evidenced by their answers: effects of CAUTI on the patient's length of hospital stay (question 1), biofilm (question 4), evidence-based interventions that reduce the incidence rate of CAUTI (question 6, 10, 11, 13, 15), components of a CAUTI prevention programme (question 8), complications associated with CAUTI (question 14), appropriate and inappropriate use of indwelling catheters (question 17), proper time for removing indwelling urinary catheters (question 18), use of antiseptic lubricants (question 20), proper indications for changing the urinary catheter and the collecting system (question 23), peri-urethral area cleaning (question 24), urine sample collection (question 25). All of the nurses did well, however, in identifying an inappropriate indication for indwelling catheter use (question 9). These findings helped the investigator focus on these topics when providing education. Figure 1 presents 11 of the 25 questions where 50-80% of the nurses gave incorrect answers in the pre-test.

Figure 1. Sample test questions where 40-60% of the nurses had incorrect answers

4. Which among the following is true about biofilm?

A. It develops only on the external side of urinary catheters.

B. It provides shelter for bacterial growth.

C. It is a diagnostic criterion for CAUTI.
6. Which of the following reduces the incidence of CAUTI?

A. Routine catheter irrigation with 0.9% sodium chloride solution
B. Catheterisation only when indicated and prompt catheter removal
C. Antibacterial ointment application to urethral meatus
D. All of the above

10. Sterile insertion technique is the only effective measure in preventing catheter-associated urinary tract infection (CAUTI).

A. True
B. False
C. Not sure
D. Don’t know

13. All of the following are evidence-based ways of preventing CAUTI in the acute-care setting, EXCEPT:

A. Appropriate urinary catheter use
B. Proper urine sample collection
C. Proper catheter insertion and maintenance
D. Proper catheter removal

14. ALL of the following are common outcomes associated with CAUTI, EXCEPT:

A. Bloodstream infection
B. Urethral strictures
C. Mechanical trauma of the urinary tract
D. Genital infections

15. Systemic antimicrobial agents are best used routinely as prophylaxis against CAUTI.
17. The following are examples of inappropriate use of indwelling catheters, EXCEPT

A. As a substitute for nursing care of a patient with incontinence
B. As a means of obtaining urine for culture or other diagnostic tests when the patient can voluntarily void
C. To assist in healing of open sacral or perineal wounds in incontinent patients
D. Perioperative use for all types of surgery

20. Routine use of antiseptic lubricants is not necessary when inserting a urinary catheter aseptically.

A. True
B. False
C. Not sure
D. Don’t know

23. Changing indwelling catheters or drainage bags at routine, fixed intervals is an evidence-based recommendation.

A. True
B. False
C. Not sure
D. Don’t know

24. Cleaning of the peri-urethral area with antiseptics should be done regularly while the catheter is in place to prevent CAUTI.

A. True
25. Urine samples for culture could be collected from the port of the drainage bag using a sterile urine container.

A. True
B. False
C. Not sure
D. Don’t know

The post-test result showed a significant change in the nurses' overall knowledge level although some of the nurses’ earlier concept of catheter management and CAUTI prevention remained the same. The questions where a few nurses remained to have incorrect answers were: evidence-based interventions that reduce the incidence rate of CAUTI (question 6, 13, 15), appropriate and inappropriate use of indwelling catheters (question 17), use of antiseptic lubricants (question 20), proper indications for changing the urinary catheter (question 23), peri-urethral area cleaning (question 24), urine sample collection (question 25). These findings helped the researcher identify areas that require reinforcement when feedback was given to nurses.

The pre-test and post-test result when compared to each other, showed an overall improvement in the number of nurses who provided correct answers to each of the 25 questions. While not all of the questions were answered correctly in the post-test, 17 or 68% of the questions were answered correctly by 100% of nurses after the education session. Five nurses received a perfect score in the post-test.

Hypothesis testing and statistical analysis

Statistical analysis using Wilcoxon Signed-Rank test showed a significant difference (p < 0.05) between the pre- and post-test scores on each of the four main topics covered in the education intervention.

Further statistical analysis using paired t-test showed a significant difference in the overall score between the pre- and the post-test. Table 1 provides a summary of the statistical testing done on the overall pre and post-test scores.

Table 1. Descriptive summary of statistical testing of overall pre and post-test scores

<table>
<thead>
<tr>
<th>Test</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Difference (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-test</td>
<td>23.6</td>
<td>1.70</td>
<td>6.64 (4.96,8.33)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Pre-test</td>
<td>16.9</td>
<td>2.56</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results showed a significant difference (p < 0.0001) in the overall pre- and post-test scores of the nurses, with a mean difference of 6.64 and 95% CI of (4.96, 8.33).
Conclusion

The CAUTI education package had a significant impact on the nurses’ knowledge of the four components of indwelling catheter care and CAUTI prevention. These components are inter-related and represent the entirety of proper indwelling catheter care to prevent CAUTI.

Title:
Indwelling Catheter Challenge

Keywords:
catheter-associated urinary tract infection (CAUTI), evidenced-based practice and indwelling catheter care

References:


Abstract Summary:
A study done in a New Zealand hospital identified nurses’ (n=14) baseline knowledge of evidence-based indwelling catheter management using a 25-item pre- and post-test. Sixty-four percent received scores below 70%. An education intervention significantly improved (p < .05) nurses’ post-test scores. This interactive session challenges nurses to take the test.

Content Outline:
I. Nurses need to be aware of the various information that relate to indwelling urinary catheters and its care.

A. While this session will present a study done in New Zealand, the presentation will focus more on the content of the test as a means to inform the audience.

B. The interactive session will utilise an audience response system, i.e., Poll Everywhere to challenge the audience to answer the questions themselves.

C. The session will help the audience evaluate their own knowledge and compare it against the nurses in the study.
II. The pre- and post-test study is part of a mixed methods research done from April – May, 2014, in Auckland, New Zealand.

A. The study investigated the impact of a catheter-associated urinary tract infection (CAUTI) education intervention on nurses’ knowledge and indwelling catheter management practices.

B. The intervention involved educating nurses on evidence-based strategies to manage indwelling urinary catheters and to prevent CAUTI.

C. The study identified nurses’ (n=14) baseline knowledge of evidence-based indwelling catheter management using a 25-item pre- and post-test.

1. The test questions were adapted from CAUTI prevention tests published by Schneider in 2012 and, Dumont and Wakeman in 2010 to improve test reliability.

2. Additional questions relevant to the research setting were incorporated and the final tool was pilot tested through staff nurses at the medical and aged care services to improve reliability and validity.

3. Test questions were grouped together into four main topics to facilitate hypothesis testing.

4. The four main topics were background knowledge, indwelling catheter insertion, indwelling catheter maintenance and indwelling catheter removal.

5. The four main topics correspond to the four components of an evidence-based bundle of care, which include: reduce inappropriate use of urinary catheters, perform proper techniques for indwelling catheter insertion, implement proper catheter maintenance procedures, and remove catheters in a timely manner (Institute for Healthcare Improvement [IHI], 2011).

6. Data for each main topic was not normally distributed.

D. A non-parametric test, i.e., Wilcoxon Signed-Rank test was used to compare the pre and the post-test scores.

1. Statistical analysis showed that there is a significant difference (p < 0.05) between the pre- and post-test scores on the four main topics covered in the education intervention.

2. Each nurse in the study manifested overall improvement in their individual test scores after the education session.

3. Furthermore, nurses as a group, manifested improvements in their test scores in all topics covered.

E. Further statistical analysis using paired t-test showed a significant difference (p < 0.0001) in the overall pre- and post-test scores of the nurses, with a mean difference of 6.64 and 95% CI of (4.96, 8.33).

III. Are the nurses in the audience knowledgeable about evidence-based care of indwelling urinary catheters?

A. The audience will be asked questions from the study tool itself and they can send in their answers by interacting with the presenter online.

B. Each answer will be treated with privacy and only the participant would know how they fared in the test.
C. Each answer will however, be compared to the answers of other participants in the audience, and everyone in the audience will how they compared with the others.

D. This presentation method will not only inform the audience but will make them interact with the tool and other nurses.

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**Author Summary:** Monina Hernandez is a nurse-midwife who currently works as a lecturer at the School of Nursing, Massey University. Her experience as a nurse specialist for infection prevention and control in New Zealand and in community health and teaching in the Philippines motivated her to pursue research relevant to disease prevention. Her current research interests include infectious diseases, enhanced patient safety and workforce planning.