

## Maternity Nurses' Knowledge and Practices regarding Urinary Tract Infection among Women Undergoing Urinary Catheterization

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### Abstract

**Background:** Urinary tract infection is the second most common bacterial infection and the most common bacterial disease that affects the urinary system. **Aim:** To assess maternity nurses' knowledge and practices regarding urinary tract infection among women undergoing urinary catheterization. **Design:** A descriptive design was utilized. **Setting:** The study was conducted in Obstetrics and Gynecological departments at Benha University hospital. **Sample:** A convenient sample included 70 maternity nurses. **Tools of data collection:** Two main tools were used, (I) Self-administered questionnaire sheet to assess knowledge of maternity nurses regarding urinary tract infection and urinary catheterization and (II) An observational checklist to assess practices of maternity nurses regarding urinary catheterization. **Results:** More than one third of the studied nurses had good knowledge regarding urinary tract infection and urinary catheterization, and less than two thirds of the studied nurses had satisfactory practices. **Conclusion:** There was a highly positive statistically significant correlation between total knowledge and total practice scores of the studied nurses. **Recommendations:** Continuing in service education programs related to urinary tract infection should be designed to update nurses' knowledge and practices to suit newly developed concepts in care.

**Keywords:** Knowledge, Maternity nurses, Practices, Urinary tract infection, Urinary catheterization.

### Introduction

Urinary Tract Infections (UTIs) are an infection in the urinary tract caused by the presence of pathogenic bacterial organisms within the genitourinary tract which may be diagnosed from the laboratory investigation of the urine and symptoms which include lower abdominal pain, foul smelling urine and unknown origin fever. Other symptoms include incomplete voiding, frequent micturition and dribbling of urine. Escherichia coli is the commonest cause of UTI in the pregnant women which constitutes about 80-90% then klebsiella and Enterobacter (Obaid et al., 2021).

Moreover, risk factors of urinary tract infection increased with parity, low socioeconomic status, sexual activity, diabetes mellitus, chronic urinary retention, sickle-cell trait or disease, history of previous UTIs, bladder neuromuscular dysfunction, structural disorders of urinary tract, renal stones, and catheterization (Crentsil, 2020).

Another category of urinary tract infection is Catheter Associated Urinary Tract Infection (CAUTI) which referred to urinary tract infection in a woman with an indwelling catheter for more than two days and at least one definite sign of UTI such as fever > 38C, suprapubic tenderness, costovertebral angle pain, and a positive urine culture for no more

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than two microorganisms. Therefore, considered important for clinicians to ascertain the presence of an indwelling catheter, to assess for symptoms of CAUTI and to send a urine sample to the laboratory for proper identification of microorganisms (Ali et al., 2020).

Catheter-associated urinary tract infection is one of the most common hospital-acquired infections with nearly 200,000 reported incidents every year. Also, 15%–25% of women admitted to a hospital are catheterized. World Health Organization showed that women who were catheterized had 5% greater chances of acquiring a urinary tract infection for every day are catheterized. In one month, the chances of acquiring the infection increase to 100%. Indwelling urinary catheters are regularly used in different wards or units in various hospital settings worldwide, but researchers have shown that the use of indwelling urinary catheters is more widespread in intensive care units (Pietrzak et al., 2020).

Thus, nurses have an essential role in reducing CAUTIs and can significantly impact the overall process of indwelling urinary catheter placement. CAUTI can be minimized by avoiding unnecessary insertion of catheters and by shortening the duration of catheter use particularly in women with higher CAUTI risk such as immunocompromised women. Other evidence-based strategies to prevent CAUTI include strict compliance to hand hygiene, early catheter removal in uncomplicated surgeries, use of catheter alternatives, use of aseptic technique on catheter insertion, maintenance of a closed drainage system, maintenance of unobstructed urine flow, and proper training of nurses who are responsible for catheter insertion (Alqarni, 2021).

Nurses should be trained in the aseptic insertion of a catheter and to minimize disconnection of the indwelling urinary catheter from the drainage bag. The use of pre-connected catheter systems may prevent disconnection. Staff nurses should be taught to minimize urethral trauma during catheter insertion by using generous amounts of sterile lubricant. The considerations to be taken when inserting a catheter; women should be positioned correctly so a clear visualization of the urethral meatus is obtained. After insertion, the indwelling urinary catheter should be secured to the upper thigh in women to prevent excessive tension on the catheter, which can lead to urethral trauma and tears that may allow invasion of bacteria (Pamela, 2020).

### **Significance of the study**

Urinary tract infections are an infection in the urinary tract caused by the presence of pathogenic bacterial organisms within the genitourinary tract which may be diagnosed from the laboratory investigation of the urine and symptoms. Urinary tract infections are the most serious health problem affecting millions of people each year and one of the most common medical complications of pregnancy (Rashmi et al., 2021).

Also, urinary tract infections are the most commonly reported hospital-acquired condition, and the rates continue to rise. More than 560,000 women develop UTIs each year, leading to extended hospital stays, increased health care costs, and increased women morbidity and mortality. In Egypt, the prevalence of urinary tract infection is about 29% in Ismailia city, 30.29% in Suez governorate, and reached to 22% to 35% in Zagazig (Abd Elfatah et al., 2021).

The maternity nurse can play a major role in preventing and reducing CAUTI through prompt removal of unnecessary

urinary catheters, care should be taken to minimize unnecessary manipulation, prevent trauma and maintain a closed, patent and no kinked system, and generate high quality evidence regarding types and techniques of catheterization. The maternity nurse must be capable to assess the indication and necessity of urinary catheterization in addition, maintaining documentation, care and removal of urinary catheter (Coventry et al., 2021).

There was no study conducted at Faculty of Nursing, Benha University regarding assessment of maternity nurses' knowledge and practices regarding urinary tract infection among women undergoing urinary catheterization. So, the current study was implemented.

#### **Aim of the study:**

The study aimed to assess maternity nurses' knowledge and practices regarding urinary tract infection among women undergoing urinary catheterization.

#### **Research questions:**

- To what extent the level of nurses' knowledge regarding urinary tract infection among women undergoing urinary catheterization?
- What is the level of nurses' practices regarding urinary tract infection among women undergoing urinary catheterization?

#### **Subjects and method**

##### **Study Design:**

A descriptive study design was utilized to fulfill the aim of the current study.

##### **Study setting:**

The study was conducted at obstetrics and gynecological department and operating room in Benha University hospital.

##### **Sampling:**

**Sample type:** A convenient sample technique.

**Sample size:** All maternity nurses who were working at the Obstetrics and Gynecological

departments at the time of data collection. The total numbers were (70) maternity nurses.

#### **Tools for data collection:**

Two main tools were used for data collection:

**Tool (1):** Self – administered questionnaire sheet was designed by the researcher after reviewing the related literature. It was written in a simple Arabic language and consists of two parts:

**Part (1):** Concerned with socio demographic data of the studied nurses and contains 7 questions.

**Part (2):** Concerned with knowledge of nurses regarding urinary tract infection and urinary catheterization. It was consisted of (22) questions divided into two sections:

##### **Section 1: Maternity nurses' knowledge about urinary tract infection:**

Used to assess the maternity nurses' knowledge about urinary tract infection and it consisted of (6) questions **Section 2: Maternity nurses' Knowledge about urinary catheterization:** It consisted of (16) questions regarding urinary catheterization.

##### **Scoring system:**

Each item of knowledge questionnaire was take a score (2) for the complete correct answer, (1) for the incomplete correct answer and (0) for I don't know. These scores were converted into percent score.

Knowledge score was classified into:

- A scoring of < 50% of the total score indicated poor knowledge.
- A scoring of 50 -75% of the total score indicated fair knowledge.
- A scoring of > 75% of the total score indicated good knowledge.

**Tool (2):** Observational checklist: Was designed by the researcher after reviewing related literature (Palmer, 2018) to assess

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maternity nurses' practices, it included (29) statements which divided into three parts:

**Part (1):** Contained (10) statements about preparation before catheter insertion.

**Part (2):** Contained (10) statements regarding consideration during catheter insertion.

**Part (3):** Contained (9) statements regarding consideration after catheter insertion.

### **Scoring system:**

Each item of the observational checklist was assigned a score (1) if done and a score (0) if not done. The total score was calculated by the addition of the total score of all items of the checklist. The total score was classified into:

-Unsatisfactory: <60%

-Satisfactory: ≥60%

### **Tools validity:**

Tools of data collection were reviewed by panel expertise of three Obstetrics and Gynecological Nursing specialist to test content validity. Pre-testing of the tools revealed that the tool was clear, feasible and there was no ambiguity in the language.

### **Reliability:**

Internal consistency and a reliability coefficient done by (Cronbach's alpha test), and it was 0.832 for knowledge assessment sheet and Reliability of the practice was (0.876).

### **Ethical consideration:**

- Approval to conduct the study was obtained from the Scientific Research Ethical Committee at Faculty of Nursing, Benha University.
- An official permission from the selected study settings was obtained for the fulfillment of the study.
- The aim of the study was explained to each nurse before applying the tools to gain their confidence and trust.
- The researcher took oral consent from nurses to participate in the study.

- Maintain confidentially, self-esteem and dignity of nurses.
- Freedom to withdraw from participation in the study at any time.

### **Pilot study**

Ten percent of the total sample (7 nurses) was included in the pilot study to test the clarity and applicability of the study tools. It was done to estimate the period required to fill in the questionnaire, evaluate applicability & clarity of tools and assess feasibility of field work. Questionnaire weren't requiring modifications. Nurses involved in the pilot study were included in the study and the total sample were (70) nurses.

### **Field work:**

-Data were collected from the beginning of April, 2021 till the end of June, 2021 covering three months.

-The study was carried out by visiting the Obstetrics and Gynecological departments three days per week (Sunday, Tuesday, and Thursday) from 9AM to 2PM to collect data from maternity nurses until sample size was completed.

-The researcher introduced herself, greeted each nurse and explained the aim of the study for obtaining the formal consent. Nurses were assured that information collected would be treated confidentially and it would be used only for purpose of research then the researcher interviewed each nurse and collect the baseline data:

-First, the researcher distribute tool (I) Self-administered questionnaire to assess demographic data and knowledge regarding urinary tract infection and urinary catheterization of all available nurses per day and continue till all nurses were evaluated.

-Second, the researcher used tool (II) an observational checklist to assess practices of studied nurses regarding urinary

catheterization. Nurses were assessed while inserting the catheter to the women.

-The observational checklist was completed by the researcher for every nurse about steps of urinary catheter insertion including steps of (before, during, after) urinary catheter insertion.

-The average number of nurses that was observed was (2) nurses per day.

#### **Limitation of study**

•The researcher met some barriers to get responses from the nurses:

Some nurses didn't participate in the study at the time of data collection as they were busy and had a lot of work, thus the researcher wait them until finishing their work and this take a lot of time.

#### **Statistical analysis:**

The data were coded, computed and statistically analyzed by using version 20 SPSS program (statistical package of social sciences). Data were presented as frequency and percentages (qualitative variables) and mean  $\pm$  SD (quantitative continuous variables). Correlation coefficient was calculated between knowledge, and practice scores. A statistically significant difference was considered at p-value ( $P \leq 0.05$ ), and a highly statistically significant difference was considered at p-value ( $p \leq .001$ ).

#### **Results:**

**Table (1)** shows that less than half of the studied nurses 42.9% were in age group 29<39 years old with the mean age of  $34.27 \pm 9.16$  years. Regarding educational qualification, less than one third of the studied nurses 31.4% were diploma nurse. Regarding department, more than one third 44.3% of the studied nurses worked in internal department. Concerning current job, more than half of the studied nurses 58.6% were nurses. Moreover, less than One third of the studied nurses 30.0% had more than 15 years of experiences.

**Table (2)** illustrates that there was a highly positive statistically significant correlation between total knowledge and total practice scores

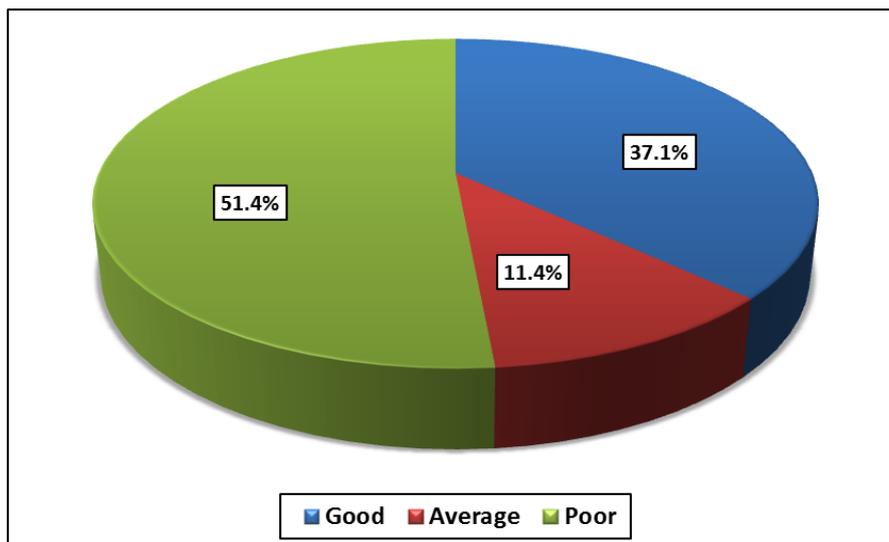
**Figure (1)** shows that more than one third of the studied nurses 37.1% had good knowledge regarding urinary tract infection and urinary catheterization.

**Figure (2)** reveals that nearly two thirds of the studied nurses 65.7% had satisfactory practices regarding urinary catheterization.

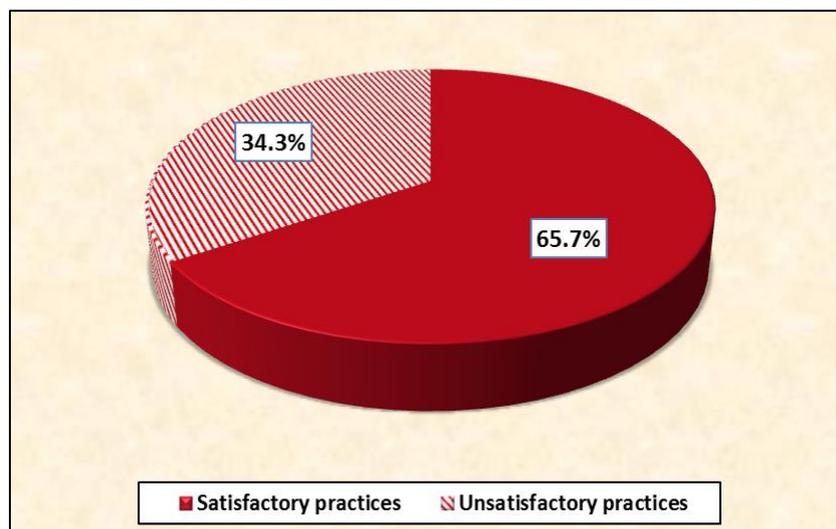
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**Table (1): Distribution of the studied nurses according to their demographic characteristics (n=70)**

| Socio-demographic characteristics         | No         | %    |
|-------------------------------------------|------------|------|
| <b>• Age (years)</b>                      |            |      |
| 20 < 29                                   | 24         | 34.3 |
| 29 < 39                                   | 30         | 42.9 |
| 39 < 49                                   | 13         | 18.6 |
| ≥49                                       | 3          | 4.2  |
| Mean ±SD                                  | 34.27±9.16 |      |
| <b>• Educational qualification</b>        |            |      |
| Diploma nurse.                            | 22         | 31.4 |
| Technical nurse.                          | 19         | 27.1 |
| Bachelor nurse.                           | 21         | 30.0 |
| Post graduate studies                     | 8          | 11.5 |
| <b>• Department</b>                       |            |      |
| Emergency.                                | 24         | 34.3 |
| Operating room                            | 15         | 21.4 |
| Internal department                       | 31         | 44.3 |
| <b>• Current job</b>                      |            |      |
| Nurse                                     | 41         | 58.6 |
| Supervisor                                | 22         | 31.4 |
| Head nurse                                | 7          | 10.0 |
| <b>• Years of experience</b>              |            |      |
| < 5                                       | 19         | 27.1 |
| 5 < 10                                    | 13         | 18.6 |
| 10 < 15                                   | 17         | 24.3 |
| ≥15                                       | 21         | 30.0 |
| <b>• Attending training courses</b>       |            |      |
| Yes                                       | 26         | 37.1 |
| No                                        | 44         | 62.9 |
| <b>• Types of training courses (n=26)</b> |            |      |
| Workshop                                  | 4          | 15.4 |
| Scientific conference                     | 6          | 23.1 |
| Training program                          | 16         | 61.5 |



**Figure (1): Percentage distribution of studied nurses regarding their total knowledge scores about urinary tract infection and urinary catheterization (n=70)**



**Figure (2) Percentage distribution of studied nurses regarding their total practices level (n=70).**

**Table (2): Correlation between total knowledge score and total practice score among studied nurses (n=70).**

| Total practice | Total knowledge |         |
|----------------|-----------------|---------|
|                | r               | P-value |
|                | 0.603           | 0.000** |

\*\* Highly statistically significance  $p \leq 0.001$

**Discussion**

The aim of the present study was to assess maternity nurses' knowledge and

practices regarding urinary tract infection among women undergoing urinary catheterization.

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Regarding socio-demographic characteristics of the studied maternity nurses, the current study revealed that about less than half of the studies nurses were in age group 29<39 years old with a mean age of 34.27±9.16 years. This finding is matched with **Balu et al., (2021)** who conducted study about "Assessment of Knowledge, Attitude and Practice on Prevention of Catheter associated Urinary Tract Infection (CAUTI) among Health Care Professionals Working in a Tertiary Care Teaching Hospital in India" and indicated that about less than half of the studied nurses were in the age group of > 30 years. Also, **Benny et al., (2020)** who studied "Nurses' Knowledge on Prevention of Catheter-Associated Urinary Tract Infection in a Selected Hospital of Mangaluru" and reported that the majority of the staff nurses were older than 30 years of age.

Additionally, this result is in disagreement with **Mong et al., (2021)** who studied "Knowledge, attitude and practice in relation to catheter-associated urinary tract infection (CAUTI) prevention in Malaysia" and noted that less than one third of the nurses were above 30 years old. This may be due to the large sample size and more than half of the studied nurse were in age group 25<30 years old.

Regarding the studied nurses' educational level, the finding of the present study showed that nearly one third of the studied nurses were diploma nurse. This result is congruent with **Mong et al., (2021)** who found that more than one third of the participants were diploma nurse.

On the other hand, this result is in disagreement with **Kbaysi et al., (2019)** who studied "The effect of educational intervention on the knowledge of nurses regarding catheter indications and catheter associated urinary tract infection preventive

measures in university of Michigan" and reported that more than half of the study participants were bachelor nurse.

Regarding department, the current study revealed that more than one third of the studied nurses worked in internal department. This finding is supported by **Algarni et al., (2019)** in study about "Nurses' knowledge and practices toward prevention of catheter-associated urinary tract infection at King Abdul-Aziz university hospital" and reported that half of nurses were working in internal department. Also, **Khan et al., (2021)** who studied "Knowledge and Practices Regarding Nosocomial Infection among Nurses in Hospital of Islamabad" and reported that less than half of the staff nurses were working in the internal department.

Regarding the studied nurses' current job, the finding of the present study clarified that about more than half of the studied nurses were nurses. This finding is agreement with **Khan et al., (2021)** who stated that more than half of the study participants were working as practical nurses. Also, **Balu et al., (2021)** who found that half of the study participants were practice nurses.

But this study disagree with **Kose et al., (2017)** in study about "Level of knowledge of the nurses work in a public hospital about the prevention of catheter associated urinary tract infections in Istanbul" and reported that less than one third were practice as nurses, more than half were staff nurses and were head nurses and stated that nurses knowledge is significantly affected by their qualification, if nurses have Bachelor degree or Master degree than they will manage and know the signs of CAUTI well and prevent further complications.

Regarding the studied nurses' years of experience, the current study illustrated that about less than one third of the studied nurses had more than 15 years of experience. This finding is supported by **Elbnedari et al., (2020)** in study about "Effect of an Educational Guideline about Gynecological Examination on Nurses' Knowledge and Practices in Port Said" and reported that more than one third of the study participant had more than 15 years of experience.

But, this study disagreement with **Shehab, (2017)** who performed a study about "Impact of Protocol of Care of Patients Undergoing Urinary Catheterization on Nurses' Knowledge in Port Said University" and indicated that nearly half of the studied nurses had more than 15 years of experience. This result may be due to nearly half of the studied nurses were in the age group of >35 years old and having more than 15 years of experience.

Concerning nurses'total knowledge about urinary tract infection and urinary catheterization, the study revealed that more than third of the studied nurses had good knowledge, while about half of the studied nurses had poor knowledge about urinary tract infection and urinary catheterization .This low score of knowledge may be due to that more than half of the studied nurses didn't attended training courses about urinary tract infection and urinary catheterization.

These findings are correspondent with **Dawa et al., (2019)** who conducted study about "Rehabilitation Nurses' Knowledge, Attitudes, and Behaviors for Preventing Urinary Tract Infections from Intermittent Catheterization in Surabaya" and reported that more than one third of the studied sample had

good knowledge about urinary tract infection and urinary catheterization.

Regarding maternity nurses'total practices about urinary catheterization, the present study revealed that nearly two thirds of the studied nurses had satisfactory practice level about urinary catheterization. These findings are correspondent with **Kulbay et al., (2021)** who reported that more than two thirds of the studied sample had satisfactory practice level about urinary catheterization.

Concerning the correlation between total knowledge score and total practice score among studied nurses, the current study illustrated that there was a highly positive statistically significant correlation between total knowledge and total practice scores. This result reflects the positive relationship between nurses' knowledge and practices.

These findings are congruent with **Peter et al., (2018)** in study about "Effectiveness of Clinical Practice Guidelines on Prevention of Catheter-associated Urinary Tract Infections in Selected Hospitals in India" on 150 nurses and found that there was a positive statistically significant correlation between total knowledge and total practice scores.

Also, these findings are correspondent with **Anwar et al., (2017)** in study about "Assessment of Perceptions and Practices of the Nurses to Prevent Indwelling Catheter Associated Infection in Pakistan" on 100 nurses and revealed that there was a highly positive statistically significant correlation between total knowledge and total practice scores.

#### **Conclusion:**

More than one third of the studied nurses had good knowledge about urinary tract infection and urinary catheterization, less than two thirds of the studied nurses had satisfactory practices regarding urinary catheterization. Additionally, there was a

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highly positive statistically significant correlation between total knowledge and total practice scores of the studied nurses. Hence, the aim was achieved, and the research questions were answered.

### **Recommendations:**

- ❖ A periodical training for nurses working at Obstetrics departments is
- ❖ mandatory, for improving and updating their knowledge and practices about catheter associated urinary tract infection.
- ❖ Booklet regarding urinary tract infection and urinary catheterization should be available in Obstetrics and Gynecological departments to be accessible to all nursing staff.

### **Further studies to be performed:**

- ❖ Assess the prevalence of urinary tract infection among women after urinary catheterization.

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## معلومات وممارسات ممرضات الأمومة تجاه عدوى المسالك البولية بين السيدات اللاتي يخضعن للقسطرة البولية

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تعد عدوى المسالك البولية ثاني أكثر أنواع العدوى البكتيرية شيوعاً التي تصيب الجهاز البولي. تعتبر عدوى المسالك البولية هي العدوى الأكثر شيوعاً والتي ترتبط بالرعاية الصحية وغالباً ما تحدث بسبب وجود قسطرة في المسالك البولية. لذلك هدفت هذه الدراسة الي تقييم معلومات وممارسات ممرضات الامومة تجاه عدوى المسالك البولية بين النساء اللاتي يخضعن للقسطرة البولية. وقد أجريت الدراسة في قسم النساء والتوليد و غرفة العمليات بمستشفى بنها الجامعي. تم تطبيق الدراسة علي 70 ممرضة. وكشفت النتائج أن قليل من الممرضات الخاضعات للدراسة كان لديهن معلومات جيدة ، أقل من ثلث الممرضات الخاضعات للدراسة كان لديهن معلومات متوسطة و أكثر من نصف الممرضات الخاضعات للدراسة كان لديهن معلومات غير جيدة عن عدوى المسالك البولية والقسطرة البولية ، وأقل من نصف الممرضات الخاضعات للدراسة كان لديهن ممارسات مرضية تجاه تركيب القسطرة البولية و أكثر من نصف الممرضات الخاضعات للدراسة كان لديهن ممارسات غير مرضية تجاه تركيب القسطرة البولية. ومن خلال النتائج تم التوصية بعمل برنامج تدريب دوري لممرضات الأمومة لتحسين وتحديث معلوماتهن حول عدوى المسالك البولية المرتبطة بالقسطرة البولية وتوفير كتيب عن عدوى المسالك البولية والقسطرة البولية في أقسام النساء والتوليد ليكون في متناول جميع طاقم التمريض.