Nurses’ Knowledge and Practice Regarding Prevention of Surgical Site Infection in Bangladesh

Humaun Kabir Sickder\textsuperscript{1}, Asst. Prof. Dr. Wipa Sae-Sia\textsuperscript{2}, Asst. Prof. Dr. Wongchan Petpichetchian\textsuperscript{3}

1. Master Student in Adult Surgical Nursing, Faculty of Nursing, Prince of Songkla University
2. Department of Surgical Nursing, Faculty of Nursing, Prince of Songkla University
3. Department of Surgical Nursing, Faculty of Nursing, Prince of Songkla University

Abstract

Surgical site infection (SSI) is a significant clinical problem for hospitalized surgical patients. The examination of nurses’ knowledge and practices regarding the prevention of SSI has not been conducted in Bangladesh. This descriptive correlational design was aimed at establishing the level of nurses’ knowledge and practice and to examine the relationship between nurses’ knowledge and practice regarding the prevention of SSI. The subjects were Bangladeshi nurses working in the surgical related wards of one acute care hospital. One hundred and twenty subjects returned the questionnaires, yielding a response rate of 96%. The Nurses’ Knowledge Questionnaire and Practice Questionnaire were administered. Data were analyzed by descriptive statistics and Pearson product-moment correlation. The findings revealed that nurses had low levels of knowledge (M = 69.67%, SD = 8.53%) and high levels of practice (M = 89.95%, SD = 4.06%). However, few nurses correctly answered or practiced in some areas of the prevention of SSI. There was a weak, negative correlation between knowledge and practice regarding prevention of SSI (r = -.18, p = .04). These findings suggest that nurses’ knowledge and practice in some certain areas of prevention of SSI need to be improved.

Keywords: Nurses’ knowledge and practice, prevention of surgical site infection, pre-operative care, post-operative care.

Background and Significance of the Problem

Surgical site infection (SSI) refers to an infection that occurs after an operation within 30 days if no implant or within one year if an implant is administered in the organ (Mangram, Horan, Pearson, Silver, & Jarvis, 1999). SSI is one type of nosocomial infection in which a surgical infection occurs after invasive procedures (Luksamijarulkul, Parikumsil, Varaporn, & Konkeaw, 2006). According to the National Nosocomial Infection Surveillance...
The 2nd International Conference on Humanities and Social Sciences
April 10th, 2010  Faculty of Liberal Arts, Prince of Songkla University

(NIS) System and the Centers for Disease Control and Prevention (CDC), SSI accounted for 14% to 16% of all nosocomial infections and was the most common health care associated infections among surgical patients in the United States (USA) (Mangram et al., 1999). Incidences of SSIs varied from hospital to hospital in different countries. In Bangladesh, the incidence of SSI ranged from 11% to 30% (Parvin, Mondol, & Begum, 2001; Saha & Ashrafuzzaman, 2008).

SSI is a significant clinical problem leading to morbidity and mortality. A study found that mortality rates were 7% in patients diagnosed with SSI (Whitehouse, Friedman, Kiraland, Richarden, & Sexton, 2002). The Institute of Medicine reported that SSI caused death in 44,000 to 98,000 patients per year in the USA (Seltzer, McGrow, Horsman, & Korniewicz, 2002). In addition, SSI caused pain, misery, emotional distress, and possible deformity (Fry & Fry, 2007).

Intrinsic and extrinsic risk factors were related to the development of SSI. Intrinsic factors referred to advance age, malnutrition, metabolic diseases, smoking, obesity, hypoxia, immunosuppression, and length of pre-operative stay (Nandi, Rajan, Mak, Chan, & So, 1999; Seltzer et al., 2002). Extrinsic factors referred to duration and application of skin antiseptics, preoperative shaving, antibiotic prophylaxis, pre-operative skin preparation, inadequate sterilization of instruments, surgical drains, surgical technique, surgical hand scrubs, and dressing techniques (Nandi et al., 1999; Seltzer et al.).

For the prevention of SSI, nurses should have proper knowledge about pre-operative, intra-operative, and post-operative care. For this study, the intra-operative prevention of SSI by nurses working at an operation theatre did not be assessed because in Bangladesh operational theaters are mostly was controlled by surgeons. In Bangladesh, nursing practices in relation to the prevention of SSI are based on working experiences and observation of senior nurses’ performance. In addition, no specific topic dealing with the prevention of SSI was included neither in the Diploma nursing program nor the 2-year Bachelor nursing program. Thus, there is a need to examine the knowledge and practice of nurses. The examination of nurses’ knowledge and practices regarding the prevention of SSI has not been conducted in Bangladesh. Therefore, this study was aimed at examining the nurses’ knowledge and practice regarding the prevention of SSI and also to examine the relationship between nurses’ knowledge and practice regarding the prevention of SSI.
Objectives

The objectives of this study were to identify the level of nurses’ knowledge and practice regarding the prevention of SSI and to examine the relationship between nurses’ knowledge and practice regarding the prevention of SSI.

Technical Terms

Knowledge regarding the prevention of SSI refers to the level of nurses’ cognition in terms of remembering, comprehending, and applying techniques for the prevention of SSI in pre-operative and post-operative care. Pre-operative care involves the maintenance of hygiene and preparation of skin, controlling underlying medical conditions, maintenance of nutritional status, and giving antibiotic prophylaxis. Post-operative care includes surgical wound care with aseptic precautions, wound assessment and monitoring of SSI, and nutritional support. It was measured through structured questionnaires (multiple choice questions) developed by the researcher based on a literature review.

Practice regarding prevention of SSI refers to the level of nurses’ perception of their actions in imitating, manipulating, and precision in prevention of SSI during pre-operative and post-operative care. Pre-operative care involves the maintenance of hygiene and preparation of skin, controlling underlying medical conditions, maintaining nutritional status, and giving antibiotic prophylaxis. Post-operative care includes surgical wound care with aseptic precautions, wound assessment and monitoring of SSI, and nutritional support. It was measured through structured questionnaires (using a 4-point rating scale) developed by the researcher based on a literature review.

Framework of the Study

The framework of this study was developed and based on Bloom’s Taxonomy (1956). Bloom proposed three learning overlapping domains namely the cognitive, psychomotor, and affective domains. There are interrelationships among these domains. The cognitive domain includes knowledge of pre-operative and post-operative care regarding basic levels of knowledge (remembering, comprehending, and applying). The psychomotor domain includes the practice of pre-operative and post-operative care regarding basic levels of practice (imitating, manipulating, and precision). However, the affective domain did not constitute part of this study because the prevention of SSI during pre- and post-operative care involved less of the nurses’ judgment and values in carrying out nursing care than other phenomena such as post-operative pain management.
Research Methodology

This study was conducted in an acute care hospital, the Shere-E-Bangla Medical College Hospital (SBMCH), Barisal, Bangladesh. The study was carried out from November, 2009 to January, 2010. A sample size was estimated using power analysis with alpha = .05, power = .80, and correlation of knowledge and practice variables with r = .24 from a previous study, yielded a sample size of 132 (Vij, Williamson, & Gupta, 2001). However, a total of 125 nurses worked in surgical related wards. Therefore, the researcher determined 125 subjects as the sample size of this study.

Approval and permission for the study was obtained from the Institutional Review Board, Prince of Songkla University, Thailand and the target hospital. The Nurse’s Knowledge Questionnaire and the Nurses’ Practice Questionnaires were then distributed to the sample of 125 nurses. These two questionnaires were translated into the Bangladeshi language using the back translation technique. They were tested for content validity by 3 experts and for internal reliability, yielding a Cronbach Alpha coefficient of .85 for the Knowledge Questionnaire and .87 for the Practice Questionnaire. Subjects were asked to answer through multiple choices in the knowledge questions and were asked to rate four levels of frequent practice for prevention of SSI. This rating was from “never practice” to “always practice”. One hundred and twenty nurses returned the questionnaires, yielding a response rate of 96%. The knowledge and practice scores were categorized into percentages of five levels: very low (<60%) to very high level (90%-100) (McDonald, 2002).

Data were analyzed using computer software. The subjects’ demographic characteristics, level of knowledge and of practices regarding the prevention of SSI were analyzed using frequencies and percentages. The Pearson product-moment correlation coefficient (r) was used to examine the relationship between nurses’ knowledge and practice regarding the prevention of SSI.

Results

Most of subjects were female (90.80%). The mean age of the subjects was 40.86 years (SD = 6.47) with a range from 28 to 55 years. The majority of the subjects were married (95.8%). Most of the subjects had completed a diploma in nursing (93.3%). The average working experiences in surgical wards was 3.77 years (SD = 1.29). More than a half of the subjects (54.2%) were trained in the infectious control program.
The results showed that the majority of nurses (70%) had knowledge regarding prevention of SSI at a low level (M = 69.67%, SD = 8.53%) with minimum scores of 48% and the maximum scores of 92% (Table 1). In addition, the sub-dimensions of the pre knowledge regarding the prevention of SSI (M =66.66%, SD = 10.40%) was at a low level and post operative knowledge regarding prevention of SSI (M = 74.16%, SD = 12.47%) was at a moderate level (Table 1).

The majority of nurses (98.3%) scored the practice of prevention of SSI at a high level (M = 89.95%, SD = 4.06%) with minimum scores of 80% and the maximum scores of 96% (Table 1). The sub-dimensions of the pre knowledge regarding prevention of SSI (M = 85.92%, SD = 4.87%) was at a high level and post operative knowledge regarding prevention of SSI (M = 96.00%, SD = 5.01%) was at a very high level (Table 1).

Pearson product-moment correlation coefficient was used to examine the relationship between knowledge and practice variables. It was found that there was a negative weak relationship between knowledge and practice regarding prevention of SSI (r = -.18, p = .04).

Table 1

<table>
<thead>
<tr>
<th>Variables</th>
<th>Min.-Max. (%)</th>
<th>M (%)</th>
<th>SD (%)</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Knowledge</td>
<td>48.00-92.00</td>
<td>69.67</td>
<td>8.53</td>
<td>low</td>
</tr>
<tr>
<td>Pre-operative knowledge</td>
<td>46.67-93.33</td>
<td>66.66</td>
<td>10.40</td>
<td>low</td>
</tr>
<tr>
<td>Post-operative knowledge</td>
<td>40.00-100.00</td>
<td>74.16</td>
<td>12.47</td>
<td>Moderate</td>
</tr>
<tr>
<td>Total Practice</td>
<td>80.00-96.00</td>
<td>89.95</td>
<td>4.06</td>
<td>High</td>
</tr>
<tr>
<td>Pre-operative practice</td>
<td>73.33-93.33</td>
<td>85.92</td>
<td>4.87</td>
<td>High</td>
</tr>
<tr>
<td>Post-operative practice</td>
<td>76.67-100.00</td>
<td>96.00</td>
<td>5.01</td>
<td>very high</td>
</tr>
</tbody>
</table>

Discussions

Knowledge Regarding Prevention of SSI

The findings revealed that total knowledge regarding the prevention of SSI was at a low level. The reasons might be due to the background of the subjects. The majority of the nurses had gained a diploma in nursing (93.3%). In addition, fifty five nurses (45.8%) had not been trained in the infection control training program because the authority provided a
limited number of places and selection was based on service experience. Moreover, the findings showed that the working experience in the surgical wards in these subjects was 3.77 years (SD = 1.29). Therefore, these factors may affect the low level of knowledge in this group of subjects. A previous study shows that nurses’ knowledge was influenced by professional education and training (Pancorbo-Hidalgo, Garcia-Fernandez, Lopez-Medina, & Lopez-Ortega, 2007). Another study also found that knowledge could be acquired through basic and continuing education, training, personal experience, or in-service training (Evens & Donnelly, 2006). In contrast, a previous study revealed that training program did not make any significant difference in the knowledge level between control and experimental groups (Benneth & Weale, 1997).

Moreover, the results indicated that all subjects did not know about the best method for pre-operative, clipping and shaving. Only twenty nine subjects (24.20%) correctly answered that pre-operative shaving should be done immediately before the operation. About thirty seven subjects (30.8%) understood that eating well-cooked food could prevent infection in surgical patients. Only one-third of the nurses (32.50%) identified alcohol-based antiseptic as the best agent for pre-operative skin preparation. These answers indicated that nurses lacked knowledge in these areas.

**Practice Regarding Prevention of SSI**

The findings showed that total practice regarding the prevention of SSI was at a high level. This indicated that nurses provided good nursing practice for the prevention of SSI. There are several factors that influence the high level of practice. The first factor is sufficient supplies of water, gloves, disposal boxes, surgical instruments and antiseptic solution. These supplies can help nurses to perform good practice for SSI prevention. The second factor is enough staff nurses to provide care. Based on the researcher experience, currently the hospital administrators increase the numbers of staff nurses and increase the monitoring system from supervisor to staff nurse levels. These factors can increase the hours that nurses in government hospitals spend in their working time in direct contact with their patients. This can be compared to a previous study that found that nurses spent only 5.3% of their working time in direct patient care (Hadley & Roques, 2007). The third factor may be due to the policy of punishment for neglecting patient care. This policy may lead the nurses to increase their awareness of practice about performing SSI prevention. The fourth factor is the knowledge and training of nurses. According to Bloom’s taxonomy (1956), practice is influenced by knowledge. However, a previous study revealed that practice was not only
influenced by knowledge (Najeeb & Taneepanichsakul, 2008). The individual and organizational factors of staff ratio, the policy of prevention of SSI, or the monitoring system for prevention of SSI influence practice. However, this current study did not explore these factors, and further studies are needed to examine the relationship between these factors. The fifth factor may be due to social desirability. A previous study found that Bangladeshi nurses may have high social desirability so that they responded to the self-report practice questionnaire to get higher scores although they might not perform those activities (Hadley & Roques, 2007). In this same study it was found that Bangladeshi nurses have been trained to perform task-oriented nursing care rather than problem-solving oriented nursing care. This may suggest that nurses perform nursing operations without knowing the reasons why they need to do.

When consideration was given to each item of practice, it was shown in this study that no nurses assess body mass index (BMI) in surgical patients for identifying nutritional status. This happens because assessment of BMI is a new concept for surgical nurses in Bangladesh. In addition, twenty nurses (20%) did not learn shaving methods from others. Only three nurses (2.5%) never advised surgical patients about performing pre-operating showering and 2.5% of nurses did not advise surgical patients about performing pre-operating showering with antimicrobial agents. These matters indicated that some nurses lacked practice in these areas.

**The Relationship between Knowledge and Practice Regarding Prevention of SSI**

A weak, negative correlation was found between knowledge and practice regarding the prevention of SSI ($r = -.18$, $p = 0.04$). This signified that knowledge did not influence practice regarding the prevention of SSI. This may be due to the self-reporting of practice and social desirability issues that may affect the high scores for practice. These may not be the actual true scores of nursing care, but knowledge could be a representative of true cognitive ability. Therefore, these phenomena could explain the negative relationship between knowledge and practice of SSI prevention. The relationship between knowledge and practice was found to be inconsistent in the literature review. One previous study found that there was a weak, negative relationship between knowledge and practice regarding infection control among doctors and nurses ($r = -.01$, $p = .001$) (Najeeb & Taneepanichsakul, 2008). However, another study found a positive relationship between knowledge and practice in the area of infection control ($r = 0.54$, $p < .001$) (Ndikom & Onibokun, 2007). This matches Bloom’s taxonomy. He mentioned that practice is positively related to knowledge. In addition, the
nurses’ practice regarding the prevention of SSI may also be influenced by other factors. These may include sufficient supplies of resources, changes in hospital policy, sufficient staff nurses, or in-service training of prevention of SSI. These were not explored in this current study. Future research is needed to explore the relationships of these factors and nursing practice in the prevention of SSI.

Conclusions

The study revealed that nurses reported a low level of knowledge and high level of practice regarding the prevention of SSI. There was a weak, significant negative correlation between knowledge and practice. This indicates that nurses working in the surgical related wards lack some knowledge of SSI prevention. Therefore, the hospital administrators need to conduct education and training programs to enhance knowledge of SSI prevention to improve the quality of nursing care in this area.

Limitations

This study used a self administered questionnaire to examine nurses’ practice regarding the prevention of SSI that may not reflect the actual nursing practice. Therefore, the implications of the findings may be used with caution. Since this study recruited only nurses working in surgical related wards the generalizability of the findings may be limited.

Recommendations

Based on the findings of this study, the researchers suggest the following recommendations:

1. Education and training program should be conducted to improve nurses’ knowledge and practice in some areas using evidence-based practice.

2. The nursing curriculum in Bangladesh should be adjusted to include the prevention of SSI in the contents.

3. Similar research should be conducted in other wards, including operating theaters, other medical wards, or other hospitals in Bangladesh.

4. A replication study using observation method is recommended to examine the level of nurses’ practice of SSI prevention.
References


**Acknowledgements**

We wish to express our gratitude to the Prince of Songkla University for providing academic resources. The primary researcher warmly acknowledges Bangladesh’s Ministry of Health for granting a scholarship. Gratitude is also expresses to the Directorate of Nursing Services, the Hospital Authority and Nurses for their co-operation and facilitation during the process of data collection.