

Nurses' Surgical Site Infection Prevention Practices in Bangladesh

Humaun Kabir Sickder, Wanchai Lertwathanawilat, Hunsa Sethabouppha, Nongkran Viseskul*

Abstract: Nurses play a significant role in providing quality care and in preventing surgical site infection. However, a thorough literature review revealed a lack of empirical studies regarding surgical site infection prevention in Bangladesh. The objectives of this study were to identify nurses' practices and their barriers and facilitators for surgical site infection prevention, and to propose direction for improving nurses' practices for such prevention. A mixed method design was used, using the Social Ecological Model as a framework. The quantitative phase of the study was conducted using a questionnaire survey with 233 randomly selected registered nurses who were working in 3 tertiary-level hospitals. The descriptive qualitative phase was conducted with 22 registered nurses utilizing focus groups, and with 3 nurse administrators utilizing in-depth interviews. The data were analyzed using descriptive statistics for quantitative data and content analysis for qualitative data.

The findings showed that less than half of the nurses always practiced surgical site infection prevention. Four barriers were insufficient knowledge, insufficient resources and budget supply, insufficient performance monitoring system, and lack of a surveillance system. Two facilitators were team willingness and team support of nurses' practices. Nurses should adhere to surgical site infection preventive practices in aspects of preoperative shaving; prophylactic antibiotic administration; and hand hygiene. The PEAK Model is proposed for improving nurses' practices for surgical site infection prevention but requires further testing in Bangladeshi hospitals.

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Introduction

Surgical site infection (SSI) is a significant clinical problem that affects the quality of health care outcomes globally, particularly in developing countries.¹ This infection can have serious impacts including: prolonged hospital stay, reduced quality of life, increased mortality, additional cost for patients and their family, and rising health care cost.^{2,3,4} The World Health Organization (WHO) reported that the SSI incidence rate was higher for procedures in oncology (17.2%),

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orthopedics (15.1%) and general surgery (14.1%).⁴ It has been reported that SSI incidence develops around 1 in 20 surgical patients in hospitals.³ In 2011 and 2012, the reported incidence rate of SSI in Bangladesh, the site of this study, was 20.16%–29.6% among various surgical patients.^{5,6}

Nurses play a major comprehensive role and span of continuum care in preventing SSI. Therefore, they can modify SSI risk factors in their daily practice such as improper hand hygiene and skin preparation, in order to prevent SSI.^{7,8} Many sets of guidelines in this area have been proposed in the past decade by the organizations working in the area of SSI prevention, such as the Center for Disease Control and Prevention (CDC),⁹ WHO,¹ and the National Institute for Health and Clinical Excellence (NICE).¹⁰ However, adherence to the recommended best practices according to the guidelines for SSI prevention remains low among nurses.^{11,12} Multiple studies have reported that proper practices for the prevention of infection among nurses have been affected by some barriers, such as knowledge, resources and SSI preventive guidelines.^{12,13} However, evidence in regard to nurses' practices for SSI prevention and its barriers and facilitators among nurses are very limited information in Bangladesh. Therefore, the principal investigator (PI) was very interested to explore nurses' SSI prevention practices and its barriers and facilitators in Bangladesh.

Review of Literature

Surgery has become an important part of the health care systems across the world. It has been estimated that 312.9 million major surgical procedures are undertaken annually worldwide.¹⁴ Surgical site infection (SSI) is one of the most common serious complications of surgical patients after operation.¹ It is an infection that occurs in surgical patients at the incision site within 30 days after surgery if there is no implant or within 90 days if there is an implant.^{9,15} According to the Center for Disease Control and

Prevention (CDC), surgical site infection can be classified into three groups: (1) superficial incisional SSI (involving skin and subcutaneous tissue); (2) deep incisional SSI (involving deep soft tissue, such as fascia and muscle layer); and (3) organ/space SSI (involving any part of the body implanted during surgery).^{9,15} Surgical site infection is a major global healthcare problem, and it is the most common type of healthcare-associated infection (HAI).⁷ SSIs account for 31% of all HAI among hospitalized patients in the United States of America (USA).¹⁶ In addition, previous studies in Bangladesh have reported that the incidence rate of SSI has ranged from 20.16% to 29.6% in various surgical procedures.^{5,6}

Surgical site infection has had a significant impact on patients, in terms of increasing morbidity and mortality; and on hospitals, in terms of higher costs.¹⁷ It can lead to significantly impaired physical and mental capacity, and also decrease patients' quality of life.^{7,18} For example, functional disability, emotional stress and anxiety, and lower quality of life have been found among patients with SSI.¹⁹ It was estimated in the USA that SSIs were associated with 406,730 days extra hospital stay and hospital costs exceeding US\$900 million.⁴

Certain specific procedure-related, modifiable factors are known to be responsible for developing SSI. These include inappropriate preoperative shaving, inadequate preoperative showering, inadequate patient skin preparation, poor hand hygiene practices, inadequacy of prophylactic antibiotics used, and inappropriate dressing techniques.^{1,17,20,21} Nurses can play a significant role both in providing quality care and in preventing SSI, to enhance safety for the undergoing surgical patients. For example, the risk factor of procedure time, such as preoperative shaving, could be modifiable as a result of changes in nursing practices.^{7,18,22} Various interventions have been recommended in the SSI preventive guidelines issued by the CDC.^{1,9,10}

World Health Organization, CDC and NICE guidelines have set down a number of recommended

best practices for preventing SSI, giving importance to the following six areas: (1) hair removal with an electric clipper should be performed immediately before the operation, if shaving is necessary; (2) preoperative showering with soap should be performed in the morning of the day of the operation; (3) preoperative skin disinfection of patients should be performed by applying an antiseptic solution; (4) prophylactic antibiotics should be administered within one hour prior to incision; (5) proper hand hygiene practices should be performed before and after any procedure; and (6) the incision dressing should be done using an aseptic technique.^{1,9,10} Thus far, however, several researchers have reported that there is a difference between current prevailing practices and the practices recommended in the guidelines.^{11,21} In Bangladesh, Hadley and Roques reported that nurses often did not comply with proper hand hygiene practices, and that surgical ward nurses often used improper wound dressing techniques.²³ However, little is known about the preventive practices of SSI among nurses in Bangladesh.

Why do nurses not routinely implement the best practices shown by the guidelines? The infection prevention practices of nurses tend to be affected by various barriers at multiple levels.¹² Until recently, a few studies have investigated the barriers of SSI preventive practices among nurses globally, but there has not been conducted any study in Bangladesh. Importantly, identifying an appropriate framework is crucial to understanding the research phenomena. The Social Ecological Model (SEM) describes a system comprising multi-level interactions between the behavior of each individual and their surrounding environmental factors at various levels – including intrapersonal, interpersonal, organizational, and national levels.²⁴ Thus, the SEM provides an ideal theoretical framework toward fully understanding the research phenomena at different levels.

Multiple studies report that proper practices for infection prevention among nurses have been affected by

some barriers, which can be categorized as intrapersonal: knowledge, attitudes and beliefs;^{20,25} interpersonal: peer support and leader support;²⁶ organizational: organizational policy, supply of resources, and in-service training and education; and national: policy and resource allocation.^{12,13} Therefore, it is important to further explore these levels. Assessing for SSI preventive measures in any health care setting is vital both for helping authorities to develop preventive measures and for improving nurses' practices for SSI prevention in Bangladesh.

Study Aim

The aims of this study were to identify nurses' practices for SSI prevention and their barriers and facilitators, and to propose direction for improving nurses' practices for SSI prevention.

Methods

Design

Mixed methods were used in this study. The quantitative phase used a survey method to identify nurses' practices for SSI prevention. The descriptive qualitative phase used focus group interviews (FGI) and in-depth interviews (IDI) with nurses and nurse administrators, respectively, to identify barriers and facilitators, and to propose direction for improving nurses' practices for SSI prevention. This research approach was chosen because it would provide a broader understanding of the research phenomenon from different data sources.

Sample and Setting

The study was undertaken within three tertiary-level hospitals in Bangladesh. The study was carried out from June–October 2015. The population consisted of 450 nurses from the general and orthopedic departments of the hospitals. The sample size was determined using the Yamane Formula,²⁷ yielding a total sample size of 233, and adding 10% to account for missing data. The sample of registered nurses was recruited by using a simple random sampling technique. The researcher made three lists among the nurses based on inclusion

and exclusion criteria from three hospitals and used a lottery technique to draw the sample. Moreover, one tertiary-level hospital was chosen to identify the barriers and facilitators of nurses' practices for SSI Prevention, because it is one of the largest tertiary-level hospitals located in the South zone of Bangladesh and has high incidence SSI rate. This hospital provides medical care to a very large segment of the population. A total of 22 nurses were recruited using purposive sampling technique for the FGIs and one nurse administrator was recruited for the IDI from the hospital. Furthermore, two national-level nurse administrators were recruited in this study for IDIs.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board of the Faculty of Nursing of Chiang Mai University in Thailand and permission letters were obtained from each selected hospital in Bangladesh. Before collecting quantitative and qualitative data, written consent was obtained from participating nurses who were informed of the purpose and methods of the study. The participants were also informed of their right to participate or withdraw at any time from the study. Prior to recording each interview, verbal consent was obtained from the interviewees. All data was kept anonymous and confidentiality was guaranteed by the use of a coding number. The recorded files of participants were archived securely.

Data Collection

Quantitative data was collected using the SSI Preventive Practices Questionnaire. The SSI Preventive Practices Questionnaire was first developed by Sickder, Sae-Sia and Petpitchetian in 2010.²⁸ The original, 25-item English version was used to identify nurses' practices for SSI Prevention after modifying the questionnaire with the author's permission. An item example is "Perform preoperative shaving using clipper method immediately before surgery." The questionnaire was translated into English to Bangla and conducted using the back translation technique by a bilingual Bangladeshi translator. Each respondent was asked

to answer each question by referring to a Likert scale ranging from 0–3, with 0 referring to "Never Practice," 1 to "Seldom Practice," 2 to "Sometimes Practice," and 3 to "Always Practice." The total scores are obtained by adding up all the items, with possible scores ranging from 0 to 75. The overall practice outcome of nurses was evaluated by divided into two categories: "Not Always Practice" (Never, Seldom, and Sometimes) and "Always Practice." The validity was verified by 5 experts in the surgical and infection control fields, yielding a content validity index of .98.

To establish reliability, the questionnaire was tested with 15 participants who had the same characteristics as those in the main, but were included in the main study. A Cronbach Alpha coefficient of .91 was obtained. The nurses were selected using a simple random sampling technique. The researcher sent the questionnaires to participants who responded by putting their completed questionnaire in a box in the nurses' station.

Descriptive qualitative data were collected, using a FGI Guide or an IDI Guide to gain in-depth information about the existing barriers and facilitators of nurses' practices for SSI prevention. However, the probe questions for the IDIs of the nursing administrators were different from those in the FGIs. The participants were selected for interviews using a purposive sampling technique. Each interview session commenced with an icebreaking activity, in which every participant introduced themselves. Open-ended questions were first used to elucidate the participants' expression of their thoughts and opinions, e.g. "In your opinion, what are the barriers regarding your practices for SSI prevention?" The researcher then asked probing questions to gain rich and detailed information. There were a total of 3 FGIs conducted with 22 nurses who were involved in the quantitative survey in the selected hospital, and each group comprised 6–8 participants. Each FGI lasted 60–75 minutes. The third FGI did not provide any new information as compared to previous sessions, therefore, data was considered to

be saturated. The FGI took place in the nursing seminar room of the hospital, a quiet environment. There were also 3 IDIs conducted with 3 nurse administrators using a purposive sampling technique, each one lasting 45–60 minutes.

Trustworthiness: The following 3 criteria, described by Lincoln and Guba ²⁹, were utilized to establish the trustworthiness in this study: (1) credibility was established through the triangulation of different data collection methods, FGI and IDI; (2) transferability was established through thick description, and by providing adequate contextual information about the setting; sampling technique; and sample characteristics; and (3) confirmability was achieved using an audit trail and the research advisory team checked and rechecked the transcriptions, as well as the ongoing data analysis and the findings.

Data Analysis

Descriptive statistics were used to identify nurses' practices for SSI prevention. These included means, standard deviation, frequencies, and percentages. The overall practice outcome of nurses was determined by division into two categories: "Not Always Practice" and "Always Practice." For the qualitative data, the audiotaped interviews were transcribed *verbatim* in Bangla and then translated into English by the PI. The transcriptions were checked by a bilingual translator to ensure validity. The content analysis the steps described by Graneheim and Lundman were used to analyze the interviews transcribed data.³⁰ These were: reading line by line; extracting the underlying meaning

of the text; coding the meaning units; clustering together the similar words, phrases, and concepts in relation to the content of each text; and compiling categories out of those sub-categories sharing commonalities.

Results

A total of 182 nurses returned the completed questionnaires from the selected three hospitals, giving a response rate of 78%. The mean age of the participants was 40.74 years (SD = 6.99), ranging from 26–58 years. Most participants were female (76.9%), married (96.7%) and had completed their diploma in nursing (73.1%). Most (97.8%) had not been trained in SSI prevention. There were 22 nurses and 3 nurse administrators in the FGI and IDI respectively. The mean age was 43.36 years (SD = 7.32), ranging from 30–54 years.

The overall proportion of nurses who always practiced SSI prevention activities was only 44.5%. Table 1 illustrates 6 aspects of the nurses' practices for SSI prevention. Only 28% always practiced the preoperative shaving practices for SSI prevention, while 72% indicated that they did not always perform this. Moreover, 62.92% of the nurses did not always time of administration preoperative prophylactic antibiotic appropriately before surgery and only 37.08% did this. Analysis revealed that less than half of the nurses (46.42%) indicated that they always practiced preoperative skin disinfection prior to surgery, and that only 51.37% of the nurses always performed proper hand hygiene practice.

Table 1. Frequency & Percentage of Six Aspects of Nurses' Practices for SSI prevention (n = 182)

Name of Six Aspects	Not Always Practice	Always Practice
Preoperative Shaving	131 (72.00)	51 (28.00)
Prophylactic Antibiotic Administration	114 (62.92)	68 (37.08)
Preoperative Skin Disinfection	97 (53.58)	85 (46.42)
Postoperative Incision Care	93 (51.10)	89 (48.90)
Hand Hygiene Practice	88 (48.63)	94 (51.37)
Preoperative Showering	85 (46.71)	97 (53.29)
Overall Practice	101(55.5)	81 (44.5)

Barriers

The qualitative data analysis revealed that there were four barriers that emerged as categories: insufficient knowledge, inadequate resources and budgets, insufficient performance monitoring systems, and lack of surveillance systems related to SSI prevention.

1. Insufficient knowledge

Most participants perceived that they had insufficient knowledge regarding SSI prevention. Three sub-categories emerged under this category:

i. Insufficient knowledge of preoperative shaving process. Some nurses indicated that they perceived lack of updated information regarding preoperative shaving process, especially the electrical clipper method and the depilatory lotion method, for example:

Sometimes we perform night before operation ... Sometimes we perform before operation. I don't have enough information about preoperative shaving methods, electrical clipper and depilatory lotion method, which method is best for SSI prevention, and about the proper time for hair removal. (FGI-1)

ii. Lack of updated knowledge of hand hygiene methods. Whilst participants noted that proper hand hygiene practice among nurses is a crucial aspect of preventing SSI, they had forgotten the steps of this, which they had learnt "long days" ago. For example, one said:

Hand hygiene is important for preventing transmission of [harmful] microorganisms and preventing SSI. I have no proper knowledge about hand hygiene methods that we should practice. I learnt about this many years ago... Therefore, I cannot remember hand hygiene proper methods. (FGI-1)

iii. Insufficient knowledge of prophylactic antibiotic administration. The participants expressed that they had no exact information about the proper timing for

administration of prophylactic antibiotics before operations, for example:

Prophylactic antibiotic administration is essential before each operation. I have no exact information about the correct timing for administering a prophylactic antibiotic before each operation. So we do not follow the timing for giving prophylactic antibiotics before operations. (FGI-2)

2. Inadequate resources & budgets

There were 5 sub-categories related to this category:

i. Lack of shaving equipment. Participants did not always perform proper preoperative shaving, because they lacked electric clipper shavers or depilatory lotion in their ward, for example:

There is no supply of electric shavers or of depilatory lotion in my ward for hair removal. So I think that it is problem for us to do proper shaving practices, and this makes it difficult to prevent SSI. (FGI-1)

ii. Skin preparation resources. The participants stated that preoperative skin preparation is an important aspect of SSI prevention but expressed that sometimes they do not get sufficient resources for skin preparation, such as antiseptic solution, for example:

I do proper skin preparation of surgical patients with an antiseptic solution, such as Haxisol (chlorhexidine gluconate) before each operation. Sometimes, I cannot do proper skin preparation before operation, because I do not get enough antiseptic solution, such as povidone-iodine or chlorhexidine gluconate. (FGI-2)

iii. Hand hygiene products. There were not enough hand hygiene products for the routine performance of proper hygiene practices, as this participant described:

[In hospitals], there is a lack of hand-hygiene products for performing [proper] hand hygiene

practice. For example, sometimes, there is enough water supply. Sometimes, there is no supply of water and a scarcity of soap and hand rub solution; and there are often no brushes. (FGI-3)

iv. Lack of guidelines. Most participants perceived that they have difficulty in implementing proper practices due to a lack of SSI preventive guidelines in the hospital. For example, one said:

There are no SSI prevention guidelines. I think that guidelines help us to perform our practices properly. We face various different problems without guidelines. Therefore, we do not practice correctly because of the lack of guidelines and the lack of accountability, in order to the prevention of SSI. (FGI-1)

Moreover, the nursing administrators expressed that there is a lack of national guidelines regarding SSI prevention for nurses in Bangladesh. One stated:

There are no national guidelines regarding SSI prevention. National and organizational guidelines help to establish proper practices among nurses. ...Nurses can learn well from written guidelines how to prevent SSI, step by step. [If they are guided properly], nurses will follow the guidelines. So I think that this lack of guidelines is an important barrier to the improvement of practices. (Nurse Administrator 1)

v. Insufficient budget support. The nurse administrators expressed that an adequate budget is a prerequisite for developing any project, but they specifically stated that there were insufficient budgets for SSI prevention programs, such as conducting training and workshops. The comments below illustrate this:

A sufficient supply of resources is crucial to effective nursing practice to prevent SSI and to give quality care to patients ...Our constraints in preventing SSI include those of national financial resources. I think it's difficult to

organize SSI prevention programs for nurses, like training programs and workshops, due to the scarcity of national financial resources. (Nurse Administrator 2)

3. Insufficient performance monitoring systems

This category is about insufficient performance monitoring system in order to evaluate the progress of various practices among nurses and has two sub-categories:

i. Insufficient monitoring of hand hygiene practice.

The nurses stated that there was an inadequate monitoring system to evaluate their hand hygiene practices, in order to provide feedback in preventing SSI:

A monitoring system is needed to evaluate our practice. We need feedback as to whether we need to change or sustain our hand hygiene practices to prevent SSI.... However, there is a lack of monitoring system of our hand hygiene practices, in order to evaluate the performance of the practice. (FGI-2)

ii. Insufficient monitoring of wound dressing techniques.

The participants stated that wound dressings should be done within 24 or 72 hours after surgery using aseptic techniques, but hospital authorities did not pay enough attention to monitor their dressing performance, for example:

Here [in the ward] we lack a monitoring system to assess our performance ...we do not know that our dressing techniques are proper or improper because of an insufficient evaluation system ...I think that an appropriate monitoring system can help to feedback to us about our performances. (FGI-2)

4. Lack of SSI surveillance systems

Surveillance of SSI with feedback to healthcare provider is an important component to reduce SSI, and two sub-categories emerged about this:

i. Lack of SSI assessment systems. The participants expressed that their hospital had no system to determine SSI. One stated:

A surveillance system is important for assessing the SSI rate and giving feedback to nurses and other health-care personnel. As far as I know, this hospital has no surveillance system for identifying SSI. So I do not know the actual magnitude of the SSI problem. (FGI-3)

ii. Lack of SSI preventive measure feedback systems. The nurse administrators described that they need ongoing feedback of the SSI situation and compliance with processes of SSI preventive measures, however, this system was lacking in their hospitals. One stated:

I think a surveillance system helps to determine baseline data of SSI and evaluate prevention and control strategies of SSI ... such data helps to feedback to nurses regarding implementation of SSI preventive measures. It provides timely, valid and useful feedback to nurses and also other health care personnel ... However, (in hospitals) there is no surveillance system to provide feedback to nurses, in order to prevent SSI. (Nurse Administrator 1).

Facilitators

Two categories of facilitators of SSI prevention, willingness and team support emerged:

1. Willingness

Participants considered that the willingness of the nurses and other interdisciplinary team members to work together could profoundly influence clinical practice to properly implement and sustain SSIP. Firstly, the self-motivation of each individual nurse was considered a crucial determinant as far as the implementation of effective nurse practices for SSI prevention. Participants felt that their willingness to establish team building would help to instigate effective practices for SSI prevention. One commented:

I participate actively and positively in the teamwork for SSI prevention. I do find myself perfectly willing to adapt the performance of proper practices for SSI prevention. (FGI-2, P4)

Secondly, the willingness of personnel such as doctors and other health personnel was a major facilitator to establish effective teams for the prevention of SSI. Participants stated that they felt willing to perform SSI prevention practices with interdisciplinary team members, for example:

We feel that the qualities and input of the team members from other disciplines – such as the motivation and commitment from the doctors and other health care providers as far as the performance of work willingness for the prevention of SSI. Thus we try to perform our best practices to put into effect the willingness for SSI prevention together with other disciplinary members. (FGI-1)

2. Team support for SSI prevention

This was noted as important as far as building mutual support among team members for the prevention of SSI. There were two sub-categories under this category: peer support and leader support.

i. Peer support

This was considered crucial to nurses' practices for SSI prevention, in order to establish team building for effective practices and for improving the outcomes of patients. Participants perceived that they generally got enough support and information from their peers in regard to the prevention of SSI. One stated:

I get support from my colleagues in SSI prevention. I get enough support from my colleagues of our team about how to prepare patients before operation, such as preoperative shaving, showering, and administration of prophylactic antibiotics. I think that enough support is needed to peers within team for the preparedness of prevention of SSI. (FGI-1)

ii. Leader support.

Receiving sufficient leader support to prevent SSI was critical and good leadership was considered vital for the successful implementation of proper practices in SSI prevention. This is because good leadership support often motivates staff for effective teamwork through the sharing of relevant knowledge and skills as far as the implementation of proper practice to prevent SSI, as well as to achieve the hospital goals. One participant mentioned:

I am in charge of the ward and also a leader. I always try to provide support our team. I share my knowledge and strategies with my colleagues for better performance of our practices within the team so that SSI can be prevented. Hence, nurses motivate as well as increase readiness within team, in order to perform better practice.
(FGI-1)

Discussion

Hospital infection control programs are a crucial component of quality health care. Surgical site infection is one of the most common types of hospital-acquired infections, and feedback regarding SSI rates to staff has been associated with the improvement of quality in care.³¹ The current study explored nurses' practices for SSI prevention among 182 nurses working in general or orthopedic surgical wards, using a self-report questionnaire. The study's findings have revealed that nurses who always practiced SSI prevention activities were found to be only 44.5%. This result is lower than the findings in a study done in an Ethiopian hospital, where 48.7% of the nurses were found to always practice regarding SSI prevention.²¹ On the other hand, this result is higher than the findings in a study done in Italy, where only 38% of the nurses were found to have always SSI prevention practices.³² It is important that, in this study and others, the factor of social desirability may affect the nurses' responses

to the self-report practice questionnaire. They tend to respond positively in order to get higher scores, even though they might not have actually performed the practices as stated.³³ However, the findings of the study indicate that a large number of the nurses did not perform always practices regarding SSI prevention. This is alarming, given that nurses have key responsibilities in hospital settings for SSI prevention. There are various factors that might be affecting SSI prevention practices among nurses. The nurses interviewed expressed that several barriers impede the proper implementation of SSI prevention practices in hospital settings. These include 1) insufficient sufficient practices resources; 2) inadequate in-services training and refreshing of skills; and 3) lack of proper SSI preventive guidelines. It is, therefore, important that authorities help to solve the above problems by developing effective policies, in order to implement the best possible SSI preventive practices among nurses, so as to reduce the SSI rate.

The qualitative findings of this study identified several barriers that impede nurses' practices for SSI prevention in Bangladesh: insufficient knowledge, inadequate resources and budgets, insufficient performance monitoring systems, and lack of SSI surveillance systems. The first barrier revealed that insufficient knowledge among nurses regarding SSI prevention tended to routinely affect their degree of proper practice in their clinical settings. Insufficient knowledge is a major factor impeding the proper implementation of SSI prevention.³⁴ Each individual's knowledge level in various areas tends to affect his or her behavioral patterns. For example, nurses with greater knowledge of infection control practices tend to have better patterns of practice.²⁵

Similar results were found in a study conducted in Ethiopia, which indicated that many nurses had insufficient knowledge regarding the prevention of SSI.²¹ These findings were also in line with those of another study conducted in Nigeria – which revealed that the majority of nurses had inadequate knowledge of SSI prevention.²⁰ This lack of knowledge is likely

to be due to the following factors mentioned by the interviewed nurses: lack of budget; inadequate up-to-date in-service training and education; lack of appropriate education policies and planning; lack of up-to-date guidelines; and nurses and other hospital personnel having limited access to the Internet.

The second barrier was illustrated by the inadequacy of resources and budgets for the prevention of SSI in hospitals in Bangladesh that are real barriers to the nurses' proper performance of practices for SSI prevention. Consistent with the findings of the present study, a study has found in Zimbabwe that insufficient resources impede the proper implementation of infection prevention and control practices among nurses.³⁵ The failure of proper hand hygiene practice among nurses is usually influenced by the lack of hand hygiene products and facilities, including running water, sinks, soap, either antiseptic or non-antiseptic, alcohol handrub solution, and hand paper towels.⁴ Moreover, one study conducted in the USA, which also utilized a mixed methodology, found that the adequacy of financial resources can affect the attitudes of health care personnel toward the implementation of practices recommended for them.³⁵

The third barrier was identified as an insufficient performance monitoring system of nurses' proper performance of recommended practices for SSI prevention. Monitoring is crucial for evaluating staff performance – especially because it helps to provide feedback to each nurse about specific practices to make any change.¹ An effective performance monitoring system is a continual process of observing and communicating with nurses, in order to give them constructive feedback about their practice in the clinical setting.³⁷ It has been found that any performance monitoring system at the individual level needs to be maintained continuously. Realistically, the only way for staff to develop their performance is through monitoring and constructive feedback.³⁸

Finally, the fourth barrier was revealed as a lack of a SSI surveillance system for proper SSI preventive

practices in the hospital; this may have increased the SSI rate.¹ Surveillance is an essential component of SSI prevention and control, as the surveillance data can be used to identify preventable cases and aspects of SSI.^{1,4} An effective SSI surveillance system helps to evaluate processes involving preventive measures and also routinely provides ongoing feedback to staff regarding the SSI rate.³⁰ Properly performed SSI surveillance – including feedback of appropriate data – is, an important component of preventive strategies for healthcare personnel, and it has been shown to reduce the risk of SSI.⁴

This study has revealed two facilitators of SSI prevention among nurses, team willingness and team support. Willingness and support strongly influence each individual as far as the establishment of effective teamwork and team success. Peer support is considered to be an important motivational factor that influences individual behavior within peer groups.²⁶ Moreover, it is important to note that supportive leadership is especially important to increase awareness and willingness within the nursing team to help to implement proper practices for SSI prevention. This finding is in accordance with a study conducted in the USA that found that supportive and effective leadership resulted in improved staff compliance with proper hand hygiene practices.³⁹ One review evidenced that positive proactive and supportive leadership appears to be an effective form of action toward infection prevention and control.⁴⁰

This study utilized both qualitative and quantitative methods to capture the body of knowledge regarding the research phenomena. Thus – based on the results of this study – the researchers propose the PEAK Model (Figure 1), which is a form of shorthand for improving nurses' practices for SSI prevention by way of the following aspects: P – provision of performance monitoring systems; E – establishment of SSI surveillance systems; A – allocation of resources and budgets; and K – knowledge improvement of SSI prevention.

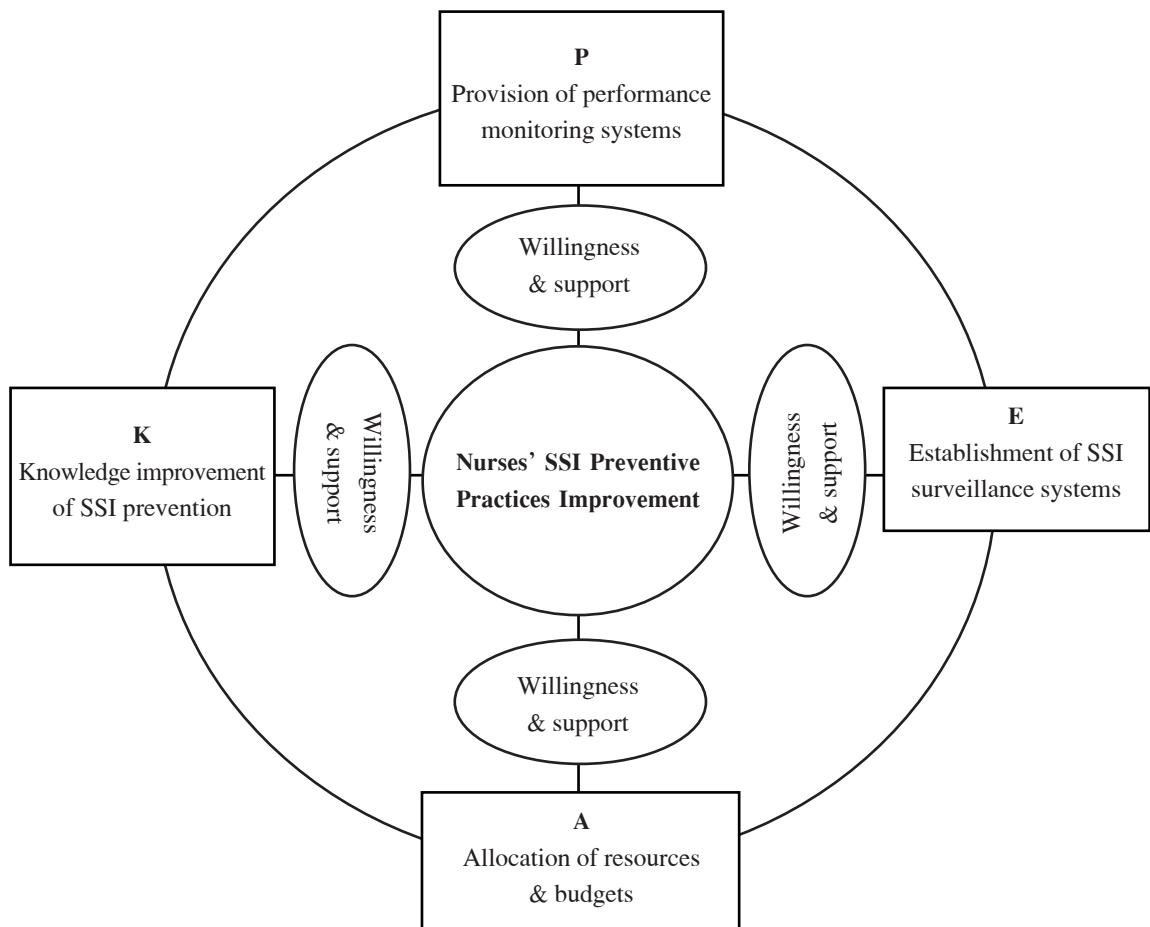


Figure 1 The PEAK Model for Improving Nurses' Practices for SSI Prevention

Therefore, there is great need to implement the proposed directions in the Model for the improvement of SSI preventive practices among nurses, in order to motivate them to engage in proper practices which will be beneficial for them and for their patients.

Conclusions and Implications for Nursing Practice

This study has given evidence of inadequate nursing practices regarding SSI prevention among nurses, and identified several important barriers and facilitators affecting those practices. Furthermore,

the PEAK Model has been proposed for improving nurses' practices for SSI prevention. This Model should be implemented and tested in each hospital for improving nursing practice for SSI prevention, so it will be an important contribution.

Limitations of the Study

There are two main limitations to the current study: Firstly, the samples of nurses came only from three tertiary-level hospitals in Bangladesh. Accordingly, the findings of this study may not represent the situation at all levels of hospitals in the country, including primary- and secondary-level hospitals. There are

many factors influencing SSI prevention, such as types of surgery, preoperative shaving, postoperative incision care, working environment, and culture. This study explored only nurse practice related factors, so this was second limitation.

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การปฏิบัติของพยาบาลเพื่อป้องกันการติดเชื้อแผลผ่าตัดในประเทศไทย

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บทคัดย่อ: พยาบาลมีบทบาทสำคัญในการให้การดูแลอย่างมีคุณภาพในการป้องกันการติดเชื้อที่แผลผ่าตัด อย่างไรก็ตามจากการบททวนวรรณกรรมพบว่าขึ้นไม่มีการศึกษาการป้องกันการติดเชื้อที่แผลผ่าตัดในประเทศไทย วัตถุประสงค์ของการศึกษาครั้งนี้เพื่อศึกษาการปฏิบัติของพยาบาล อุปสรรคและสิ่งสนับสนุนการป้องกันการติดเชื้อที่แผลผ่าตัดในประเทศไทยและเสนอแนวทางในการพัฒนาการปฏิบัติของพยาบาลในการป้องกันการติดเชื้อที่แผลผ่าตัดโดยใช้วิธีการศึกษาแบบผสมผสานตามรูปแบบของนิเวศวิทยาเชิงลังค์คอม การรวบรวมข้อมูลเชิงปริมาณรวมโดยวิธีการใช้แบบสอบถามโดยการสุ่มพยาบาล 233 คน ที่ปฏิบัติงานในโรงพยาบาลติดต่อกันสามแห่ง สำหรับการรวบรวมข้อมูลเชิงคุณภาพได้มีการรวบรวมข้อมูลจากพยาบาลจำนวน 22 คน โดยการใช้วิธีการสนทนากลุ่ม และสัมภาษณ์เชิงลึกผู้บริหารทางการพยาบาลจำนวน 3 คน วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนาและการวิเคราะห์เนื้อหา

ผลการศึกษาพบว่าพยาบาลน้อยกว่าร้อยละ 50 ที่มีการปฏิบัติการป้องกันการติดเชื้อยังสม่ำเสมอ อุปสรรคของการปฏิบัติประกอบด้วย ความรู้ไม่เพียง วัสดุครุภัณฑ์และบประมาณสนับสนุนไม่เพียง ระบบการติดตามการปฏิบัติไม่เพียง และไม่มีระบบการเฝ้าระวังการปฏิบัติ ปัจจัยสนับสนุนประกอบด้วย ความมุ่งมั่นของทีมการพยาบาลและการสนับสนุนจากทีมการพยาบาลในการสนับสนุนการปฏิบัติการป้องกันการติดเชื้อที่แผลผ่าตัด และได้มีการเสนอแนวทางในการปฏิบัติการป้องกันการติดเชื้อที่แผลผ่าตัดสำหรับพยาบาล

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คำสำคัญ: ประเทศไทย อุปสรรคและสิ่งสนับสนุน การปฏิบัติของพยาบาล การศึกษาแบบผสมผสาน แบบจำลองนิเวศวิทยาเชิงลังค์คอม การป้องกันการติดเชื้อแผลผ่าตัด

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