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Perspectives of Nurses and Infection Control Personnel toward Prevention of and Caring for Orthopedic Surgical Site Infection

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Abstract

Background: Orthopedic Surgical site infection is a problem being faced and suffered by both health care providers and patients despite adoption of updated institutional policies of infective prevention by hospitals. However, presence of social, cultural, and environmental factors might affect the behaviors of health care workers regarding adherence to institutional policies of infective prevention. As a result, perspectives of infection control personnel and nurses that aim to control and prevent orthopedic surgical site infection should be explored and described.

Methods: The study employed qualitative content analysis approach to collect data about infection control personnel and nurses providing care for orthopedic surgery patients through conducting one-to-one interviews.

Results: Four themes representing the perspectives of nurses and infection control personnel towards control and prevention of orthopedic surgical site infection emerged from data collected through 15 interviews; the themes were attention to health care outcomes, adherence to guidelines, maintaining positive attitudes to health care, and adopting interdisciplinary team.

Conclusion: The perspectives of nurses and infection control personnel perspectives towards control and prevention of orthopedic surgical site infection suggest the need to set strategies that facilitate adherence to guidelines of infection control and to provide appropriate modalities that enhance the attention to health care responsibilities and outcomes.

Keywords: Surgical site infection; Orthopedic surgery; Perspectives

Introduction

Orthopedic Surgical site infection (SSI) is a clinical a problem that occurs in orthopedic wards for patients undergoing orthopedic surgery [1]. SSIs complicate about 1% to 3% of orthopedic surgical interventions performed to patients [2], resulting in devastating complications after surgery interfering with the normal recovery process [3].

In spite of the improvement in sterilization techniques, surgical practices and infection control standards, SSIs are increasing worldwide even in hospitals equipped with modern facilities and applying standard protocols with patients undergoing surgeries [4]. It is believed that social, cultural, and environmental factors might affect the behaviors of health care workers regarding adherence to institutional policies of infective prevention [5]. To our knowledge, this is the first study to be conducted in Jordan to explore the behaviors and practices by infection control personnel and nurses toward prevention of orthopedic SSI.

The caring practices of nurses towards orthopedic surgery patient may be distinguished from caring practices towards other types of patients. For example, it was noted that nurses providing care for orthopedic patients were found to strive for providing individualized care. However, if nurses are not satisfied with nursing care they provide, they may have low perceptions of individualized health care activities and interventions [6]. Moreover, it was noted that staff nurses who were involved in orthopedic surgery operation showed adherence to use all infection precautions techniques [7].

Nurses' practices of health care provision can vary culturally; social and cultural factors can have an impact on adherence to universal precautions [8]. Furthermore, it has been noted that nursing practices in Bangladesh regarding prevention of SSI depend on working experience and observing senior nurses performance [9].

The purpose of this study was to explore the perspectives of nurses and infection control personnel regarding control of orthopedic SSI in addition to examining whether orthopedic SSI can be controlled or not according to nurses and infection control personnel perspectives.

Methods

This is a qualitative content analysis approach inspired by ethnography collection [10]. Qualitative content analysis is defined as techniques in which the data are analyzed exclusively qualitatively, without the use of counting or statistical techniques [10-12]. It is known that the goal of all qualitative inquiries is to understand a phenomenon, to provide a comprehensive description of this phenomenon (e.g. decision making, delivery of health care services), capturing the views, motivations, and experiences of participants, and explaining the meaning they make of those experiences [12,13]. In this study this inquiry is used to explore the perspectives of infection control personnel and nurses providing care for orthopedic surgery patients towards control and prevention of orthopedic SSI.

The target settings for the study were the hospitals in which there are specialized orthopedic units within. From those hospitals, purposive

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sample including infection control personnel and nurses who provide care for orthopedic surgery patients was selected to participate in the study. Participants were selected if they have a minimum two years of experience caring for orthopedic patients and only who are Jordanian who is willing to share their experience and perspectives regarding control of orthopedic SSI. The researcher included a variation of participants, such as age, gender, years of experience, and education level. The purpose was to gain maximum variation of subjects in accordance to the qualitative inquiry [14]. Due to presence of maximum variation in the sample being selected, the interviews conducted with participants was tailored to the educational level of participants (participants may have diploma, baccalaureate, master or PhD degree).

Data were collected through conducting face to face interviews with infection control personnel and nurses providing care for orthopedic surgery patients. The primary investigator asked one broad open question that was followed by narrower open ended questions which formulated an interview guide. The broad question was "*according to your experience, how the orthopedic surgery unit can improve infection control*?" The interview guide was developed to guide the interviews and to suggest any propping questions and to explore emergent ideas. An example of questions that were asked during interviews from the interview guide developed is: *"What are the factors that contribute to controlling and preventing orthopedic SSI?"*

Participants had the opportunity to lead the discussion during interviews in the direction they think it is relevant to the perspectives being investigated. Face to face interviews were conducted with participants until saturation is achieved, that is when discovered information is repeated and previously collected data are confirmed.

To ensure rigor and trustworthiness of the qualitative data collected, attention was made towards credibility, transferability, dependability, and conformability [15]. After collecting the qualitative data and extracting the codes, audit trail was left by two specialists in the field of qualitative data analysis to assure conformability of findings obtained, in which both specialists followed the dialogues of interviews and checked if the codes emerged from dialogue and developed by the author fit the data and representing the expectations and suggestions given by participants. Infection controls personnel with different qualifications and academic degrees and both associate degree nurses and staff nursing were interviewed and so transferability of study findings can be assured. The data obtained were returned back to participant to recognize the findings obtained and thus member check has been demonstrated in the current study. Moreover, some of the hospitals required the approval of infection control unit before publishing the study findings so this assured participant recognition of findings and subsequently assuring credibility. After obtaining IRB permissions from the selected hospitals, hospitals administrations were contacted to interview the selected nurses and infection control personnel. The access to information from interviews with both nurses and infection control personnel behaviors was based on only need-to-know basis. The nurses and infection control personnel were acknowledged about the risks of being participating in the study and the benefits expected to get from participating in the study. After that, consent form was signed with infection control personnel and nurses selected according to the inclusion and exclusion criteria. Process consent form was made as necessary and signed.

Confidentiality and privacy were assured by securing audio tapes of interviews, the notes of interviews with nurses and infection control in a locked cabinet and limiting access to them on only need-to-know basis. All information was kept on the researcher personal password-protected computer and only on the specified statistical program. Moreover, audio tapes and written notes were destroyed as soon as possible after the study is finished. The primary investigator conducted face to face interviews with nurses and infection control personnel. The interviews were audio-taped in order to facilitate transcribing of the dialogue occurring during the discussion. The interviews employed open-ended question, and the discussion started with grand tour question, followed by six questions, and additional questions can be added and asked to explore the perspectives of nurses and infection control personnel toward control of orthopedic SSI.

Nurses and infection control personnel in the previously selected hospitals was selected purposively using snowballing technique then each participant selected was asked to participate in the study and signed the consent form. From each hospital selected, the lists of infection control personnel and nurses in orthopedic and surgical units were obtained from the administrative departments with the contact details for each in order to ease contact with the selected participant. The first participant interviewed was asked at the end of his/her interview about who can provide proper answers for the questions in the interview and therefore the participant guides the primary investigator to the next interviewee.

Data analysis was started as the data collection process is launched, which employed the use of content analysis in order to express qualitative data in ideas or themes rather than numbers. The interviews were audio taped then were transcribed verbatim then translated from Arabic into English and back translated into Arabic to prepare for data analysis. A second check was done by the facilitator assigned before to ensure the accuracy of the transcription. A codebook was created to record the transcription conventions adopted by the researcher during data analysis. After transcription process is completed, the transcripts were read thoroughly. The data were analyzed by content analysis method in order to generate themes from codes emerged from interviews.

Results

Four hospitals in Jordan have specialized orthopedic units and are considered as main referral hospitals for orthopedic surgery. Consequently, these four hospitals were selected as settings for the current study, and they named as hospital-A, hospital-B, hospital-C, and hospital-D. In the four hospitals selected there were 13 infection control personnel and in their specialized orthopedic units there were 133 nurses; 89 staff nurses, 41 associate nurses, and three assistant nurses. From infection control personnel and nurses, a purposive sample of nurses and infection control personnel was selected according to inclusion criteria in order to join the face to face semi structured interviews.

The qualitative data included face to face interviews collected over a period of six weeks, started on November 14, 2016 to December 19, 2016. A total of 15 face to face interviews (8 with nurses and 7 with infection control personnel) were conducted, each interview lasted about 30 minutes. Members of infection control units had different qualifications and academic degrees, while nurses in orthopedic units had either diploma or baccalaureate degree in nursing, so it was necessary to interview more than one infection control member from each selected hospital in order to assure maximum variation and transferability of findings obtained (Table I).

After applying qualitative content analysis of interview scripts, four main themes emerged from data, which emerged from codes provided for pieces of data from interview dialogues. The four main themes were attention to health care outcomes, adherence to guidelines, maintaining positive attitudes to health care, and adopting interdisciplinary team. Table II summarizes the initial codes and subthemes emerging from qualitative data (Table II).

Attention to health care outcomes

In order to control and prevent orthopedic SSI, outcomes of orthopedic SSI should be acknowledged by health care providers

and risk factors that predispose patients to orthopedic SSI should be controlled besides realizing the possibility of occurrence of SSI in orthopedic surgeries patients. Participants stated that when risk factors for a potential health problem is known to be present and controlled by health care providers, this leads to minimized complications of a health problem the patient suffers from. Almost all participants agreed on the principle of controlling risk factors for orthopedic SSI in order to assure better outcomes on patients' health status.

"Control of orthopedic SSI leads to good consequences on patient recovery and satisfaction with his/her post-surgical status"

"When SSI is controlled and prevented, this has a good impact on patient health as postoperative complications will be reduced or minimized".

In order to control risk factors for orthopedic SSI, a number of requirements have been suggested and addressed by the participants. One of the requirements is education for both nurses and physicians about risk factors and how to control them as well as health education for orthopedic surgery patients about wound care and the need to control risk factors for orthopedic SSI. One participant said: *"When a patient is risky to develop orthopedic SSI, there are 2 points to consider: discharging him to home if health condition permits (in order to keep him away from hospital environment), with educating family about the need to control risk factors for SSI such as smoking and blood glucose level. In addition to training personnel and acknowledging them about risk factors for orthopedic SSI".*

Besides health education, there should be a focus on evidence based practice, a male infection control member from hospital B said: *"It is necessary to rely on evidence based practice to provide instructions specialized for surgical patients regarding wound care".*

Once a risk factors for orthopedic SSI are known, intervention to control such factors become necessary. Participants agreed on the need to control risk factors so that patient health status could be better.

"To assure good consequences on patient health status, it is necessary to address each patient related factor that is concerned with incidence of SSI". Infection control member, hospital C.

"As we control risk factors for orthopedic SSI, the incidence rate of SSI will be reduced, which increase the patient opportunity of complete recovery". Infection control member, hospital D.

In order to acknowledge outcomes of a health condition, such as orthopedic SSI, expectations about occurrence of orthopedic SSI and strategies to prevent such health condition should be put in mind. One participant said that prevention of orthopedic SSI cannot be 100% (complete prevention is almost impossible). On the contrary, two participants said that the follow up for patient status during preoperative, intraoperative, and post-operative periods leads to reduced orthopedic SSI rate to almost zero. However, in conditions were orthopedic surgical operations is conducted, expectations of health care providers may become worse. One participant said: *"Each surgical procedure is unique, and bone infection is difficult to manage compared to other types of infection regarding patient level of suffering and duration of treatment"*

He also said: *"If the surgery is emergent, this means that wound may become dirty and therefore an increased risk for orthopedic SSI".*

Table I: Characteristics of participants selected for qualitative data analysis.

Hospitals	Population	Numbers	Sample	Characteristics
Hospital A	Associate nurse	4		
	Assistant nurse	2		
	Staff nurse	21	2	1. Male, five years of experience with orthopedic patients 2. Male, two years of experience with orthopedic patients
	Infection control members	2	1	Female, ten years of experience in surgical units
Hospital B	Associate nurse	12	1	Male, three years of experience with orthopedic patients
	Assistant nurse	0		
	Staff nurse	18	1	Female, 14 years of experience with orthopedic patients
	Infection control members	3	2	1. Male, master degree of clinical nursing. Female, underwent special courses in wound management
Hospital C	Associate nurse	14	1	Male, three years of experience with orthopedic patients
	Assistant nurse	0		
	Staff nurse	22	1	Female, six years of experience with orthopedic patients.
	Infection control members	4	2	1. Male, master degree nursing service management 2. Female, five years of experience with orthopedic patients
Hospital D	Associate nurse	11	1	Female, eight years of experience with orthopedic patients
	Assistant nurse	1		
	Staff nurse	28	1	Female, liaison officer for SSI
	Infection control members	3	2	1. Male, baccalaureate degree in environmental and health sciences 2. Male, seven years of experience in surgical units

Table II: Codes and themes emerged from qualitative data.

Codes	Themes
Acknowledging outcomes of a health condition	
Controlling risk factors of a health problem	
Realizing possibility of occurrence of a health condition	Attention to health care outcomes.
Adherence to policies and rules	
Ignoring rules and policies	Adherence to guidelines
Acknowledging health care needs	
Performing health care responsibilities toward patients.	
Settings priorities of health care	Maintaining positive attitudes to health care
Role clarity	
Acknowledging role importance.	Adopting interdisciplinary team

In summary, in order to control and prevent orthopedic SSI through having attention to outcomes of orthopedic SSI, it is necessary to control risk factors for orthopedic SSI which can be achieved by health education for both health care providers and patients about how to recognize presence of a risk factor and to apply strategies to control such risk factor. In addition, expectation about possible strategies to prevent orthopedic SSI should be put in mind before orthopedic SSI can occur.

Adherence to guidelines

In order to control and prevent orthopedic SSI, health care providers should adhere to guidelines of prevention of SSI, which is present in policies and rules of infection control. However, level of adherence to guidelines provided by policies of infection control may vary among health care providers.

Actually there are policies adopted by infection control units to control and prevent SSI, but some of these policies are not applied in its correct and precise manner. Three participants agreed on the point of view that policies to control orthopedic SSI are available and comprehensive, but the problem is in putting them completely into action.

When nurses and health care providers do not recognize the importance of policies and rules in hospitals, they ignore the rules and subsequently this leads to non-adherence to guidelines. For example, believing donning gloves replaces the needs for hand washing. Some participants said: *"Some physicians and nurses skip hand washing by using only gloves because they think that gloves are enough and substitute the need for hand washing"*.

"One physician was not convinced about importance of surgical hand washing and each surgeon use different anti-septic solution for skin preparation".

Two participants reported that some health care providers are careless for hand hygiene, and in some cases workload and being in hurry can lead to neglect of hand washing as it is considered time-consuming procedure compared to hand rub by sterilium.

In fact, there were barriers to adhere to policies of infection control that aid in prevention of orthopedic SSI, among them are lack of knowledge about policies, being knowledgeable but not being convinced or underestimating the importance of applying such policies. The improper designation of resources and shortage of health care equipment and supplies played in important role in adherence to policies and rules of infection control. One participant said: *"Sink for hand washing are far enough from the site of providing nursing care that can prevent us from adherence to hand washing"*.

Another participant also said: *"We have no special room for providing wound care for surgical patients and so surgical dressing is conducted in patient room which contains 12 beds crowded with patients and visitors"*.

Four participants stated that there was shortage of necessary supplies and a long time was required to bring sterile equipment and single use surgical equipment to the hospital to become as available for surgeons, which force surgeons to use re-used equipment as alternatives that in turn may not help in prevention of SSI. Financial limitation was addressed by one participant as an important factor contributing to unavailability of resources, including human resources employment to meet the health needs of patients.

Despite of non-adherence to guidelines and policies, in some circumstances there is adherence to policies and guidelines of infection control which may be attributed to presence of facilities that enables health care providers to adhere to policies and guidelines. For example, participants in one of the hospitals said that there is a bath tub in each water circulation for each room, which enables patient to bathe preoperatively. They also reported that there are enough number of sterilizing equipment and machines, which help surgeons and nurses to use equipment needed for surgery and wound care in a safe and effective manner.

One of the situations of adherence to policies is when a risk factor for orthopedic SSI is encountered in order to eliminate presence of such factor. One participant said: *"If the patient has risk factors such as smoking, we refer to hospital policies of smoking prevention. We also have watch cameras on sinks, if physicians do not wash their hands, we remind them about that."*

Two participants suggested the use of watch cameras in important location of infection control such as hand washing sinks and doors of operation room in order to monitor the level of adherence to infection control policies. Furthermore, the presence of managerial written standards can help in adherence to policies and guidelines by health care providers. Two participants said: *"Presence of both mission and vision for hospital help infection control unit to focus on domains specific to preventing SSI (focus on hand washing for example). Also Accreditation standards provide infection control with instructions that help in focusing to reduce SSI rates"*.

In summary, adherence to guidelines that aim to prevent and control orthopedic SSI can be accomplished through effective using of facilities that increase level of adherence to guidelines of infection control such as using watch cameras on sinks and in operating rooms, reconsidering designation of resources in the field of health care, providing evidence based facts about non adherence to policies of infection control, and assuring availability of equipment needed for infection control.

Maintaining positive attitude to health care

In order to control and prevent orthopedic SSI, health care providers should maintain positive attitude towards health care provision. Actually health care needs for patients can vary from urgent needs to needs that can be delayed, and this creates priorities to provide health care needs, and by this, health care needs for patients with varying levels of priorities are acknowledged by health care providers. This in turn can maintain positive attitude by health care providers to meet patients' health care needs away from negligence or underestimation. By acknowledging and identifying health care needs, caring responsibilities can be determined by health care providers along with identifying priorities of health care. Below are some statements that were reported by participants from different hospitals which demonstrate the identification of health care needs: *"Orthopedic SSI can be prevented through hand washing (by nurses), maintaining clean environment around patient, providing preoperative bath, shaving surgical site by clipper, and health education (especially in wound care) to promote patient safety"*.

"Control of orthopedic SSI will be through: patient preparation preoperatively (through trimming and bathing), first dressing postoperatively by physician, keeping wound and patient environment clean, and adherence to standard precautions".

Patients undergoing orthopedic surgeries are at varying risk levels to develop SSI, ranging from low risk level to high risk level.Therefore, it is assumed that priorities of care differ according to risk level of SSI and therefore health care need can be identified according to risk level of SSI. One participant, for example, said that obese patient needs double dose of prophylactic antibiotic therapy (i.e. if patient has more risk factors, he needs more care than who has no risk factors). Most participants agreed on the point to prioritize care according to risk level, without neglecting low risk patients.

"Patient who has more risk factors for SSI needs more care and monitoring than who has no or minimal factors for SSI. The standard precautions of infection control are applied with all patients but with more attention to high risk patients".

On the other hand, some participants agreed on prioritizing care for patients with confirmed SSI only or for patient risky to develop orthopedic SSI.

"When a patient is confirmed to have SSI, more care and strict asepsis is applied with him. No more level of care applied when risk of SSI is increased".

"When we have high risk patients, label is placed above his bed, and bracelet to his hand. The preoperative bath should be provided by our hands. Also we provide gown and side rails for him. Postoperatively: diaper may be placed to prevent wound contamination by stool".

In summary, health care needs are determined according to priorities, which in turn can create health care responsibilities. Regarding orthopedic SSI, patients have varying degrees of risk to develop orthopedic SSI, which can create different health care needs in orthopedic surgery patient that in turn identify responsibilities toward those patients.

Adopting interdisciplinary team

In order to control and prevent orthopedic SSI, health care provided to orthopedic surgeries patients should be made based on collaboration among health care providers which in turn formulate an interdisciplinary team to which different health care specialties belong. In fact, each health care provider in health care institution assume specific roles, and these roles assumed are acknowledged as important as they collectively meet health care needs, so one cannot underestimate the role of a specific health care provider such as a nurse or overestimate the role of a another health care provider such as a physician. However, there is still some un-clarities of role assumed by health care providers, especially that are related to the control of infection and these roles to some extent lie in the gray area of responsibilities. A participant said: *"The field of responsibility for disinfection of patient environment still unclear (nurses vs. housekeepers), so this point remain neglected by both. In addition, it is extraordinary to find the isolation room the dirtiest room due to negligence and extra caution observed to deal with isolation room."*

More than one specialty other than nursing can hold responsibility for controlling orthopedic SSI and the importance of other specialties roles should be acknowledged. For example, one participant said that primary care provider has an important role in preventing SSI and the patient alone cannot prevent or control SSI. Also another participant from a different hospital suggested to assign university students to educate patients about wound care since health care personnel may have no time to do that. In addition, she suggested establishing preoperative team that evaluate surgical patient health and calculate patient risk index. Three participants from the same hospital addressed the importance of liaison officer role and clinical pharmacist role in monitoring patient health status.

"When an antibiotic is used as prophylactic, clinical pharmacist can convince the physician to avoid overuse of antibiotic, but for me as infection control nurse I cannot prevent physician from using prophylactic antibiotic when it is used improperly."

"In orthopedic surgery ward, there is a liaison officer that monitors the cases of infectious disease (including SSI cases) and also monitors the adherence level of medical hand washing by staff."

Two participants from different hospitals addressed the point of seeking consultation from specialist in the field of orthopedics and infectious diseases when SSI may be encountered by orthopedic surgery patient and the need to conduct surgical procedure by its specialist as this will be less time consuming and subsequently controlling the risk for developing SSI.

In summary, to adopt the presence of interdisciplinary team in hospitals, role of health care providers should be clearly identified for each specialty along with acknowledging the importance of each role assumed by each specialty in health care provision. By this, orthopedic SSI can be controlled due to complementary roles in preventing orthopedic SSI assumed by each health care provider.

Discussion

The nurses and infection control personnel interviewed in this study have demonstrated perspectives that aim to prevent and control orthopedic SSI which in turn, if applied or changed into practice, can reduce the incidence and severity of orthopedic SSI; the perspectives were represented in the themes: attention to health care outcomes, adherence to guidelines, maintaining positive attitude to health care, and adopting interdisciplinary team. The results of the current study can be compared with studies that explored the perspectives of nurses and infection control personnel regarding providing care for and preventing infections in different settings other than orthopedic surgery.

The perspectives of nurses and infection control personnel in the current study to control and prevent orthopedic SSI reflected the need for attention to health care outcomes that was presented in acknowledging the outcomes of a health condition (orthopedic SSI) as well as the need to control risk factors for a health condition (orthopedic SSI). Controlling risk factors for a health condition such as orthopedic SSI can lead to changes in health care practices that in turn make health care providers attended to health care outcomes. Some nurses, for example, infection control and prevention have been viewed as a factor of patients' safety, which suggests the use of feedback and observational audit of infection control and prevention practices [8]. On the other hand, behaviors of intraoperative personnel regarding infection control and prevention were found to be a major risk factor for SSI, a point that recommended conducting periodic active monitoring for infection control and prevention practices in order to sustain effects of interventions and to provide feedback for health care professionals [16].

For the purpose of monitoring for infection control and prevention practices that will sustain effective interventions for orthopedic SSI patients, developing local audit systems that focus on issues related to evaluating the risk for developing orthopedic SSI [17] can help in promoting orthopedic patients' health and wellbeing. Among the suggestions provided by participants during face to face interviews that may help in controlling risk factors for orthopedic SSI are health education for both health care providers and patients about how to recognize presence of a risk factor and to apply strategies to control such risk factor besides providing them with evidence based practices that can make them more aware about outcomes and management of orthopedic SSI.

Prevention and control of orthopedic SSI can be achieved through adherence to guidelines of infection control. However, varying levels of adherence to policies and rules that aim to control orthopedic SSI were present in this study which was ascribed to barriers and facilitators that affected the adherence to guidelines. Actually variability of adherence to guidelines in clinical health care settings and their implementation is affected by a list of factors; which are lack of awareness [18-20], lack of consensus on guidelines, influence from superiors or peers [18,19] and presence of co-morbidities among patients [18,21]. Some health care workers felt that infection control guidelines did not meet the reality of daily practice, and they could be breached in special circumstances [8]. Furthermore, evidence-based guidelines were found to focus on

patients with single diseases and often exclude complex patients, which limit their applicability in practice [21].

Adherence to guidelines in clinical health care settings can be improved by more than one strategy; among them are tailoring education about guidelines to meet learning needs of health care professionals, besides using reminders, audit and feedback [22]. The following recommendations were reported to improve the degree of adherence [19]; developing guidelines in collaboration with health care providers, ensuring active dissemination of guidelines, and conducting seminars and workshops that emphasize proper practice from time to time. In fact, health care professionals need to be motivated, trained and informed to incorporate evidence based practice into their work [23].

Control and prevention of orthopedic SSI can also be accomplished by maintaining positive attitudes to health care which emerges from the acknowledgment of health care needs by health care providers as well as performing responsibilities toward patients based in priorities that delineate health care needs, which is represented in this study in health care needs to control and prevent orthopedic SSI. Attitudes of healthcare professionals have a direct impact on health care, which can vary among practice sites and may be affected by clinical experience, beliefs and cultural aspects, and educational level [5]. Positive attitudes to provide health care is affected by age, years of clinical experience, and level of education; the higher educational level, the lower negative attitudes to provide health care [24]. In some circumstances, health care providers depends on experience to handle things that they are not trained to handle, and unqualified health care providers may carry out multiple tasks, which lead to inefficiency in health services [25]. So both education level and level of experience should be considered as important factors in maintain positive attitude to health care.

Pre-identified health care responsibilities can have an impact on attitudes for providing health care; For example, unclear assignments of health care responsibilities and poor documentation by nurses hindered appropriate care, despite the satisfactory perception of nurses of their own caring knowledge and ability to identify critical issues [8]. In the current study, nurses and infection control personnel acknowledged the health care needs of orthopedic patients which helped them in setting priorities in providing health care which resulted in acknowledging their health care responsibilities.

Health care needs of orthopedic surgeries patients require attention from health care providers. For example, it was found that staff nurses who are involved in orthopedic surgery operations show adherence to infection precautions techniques [7]. Whereas in another study it was reported that nurses may not recognize the importance of adhering to treatment regimens for infectious diseases such as presence of MRSA [8]. Several factors can affect level of nurses' practices regarding prevention of SSI, such as presence of sufficient supplies of antiseptic measures, enough staff nurses to provide care, presence of punishing policy concerned with neglecting patient care, and training and knowledge of nurses about prevention of SSI [9]. So when evaluating a situation in a health care setting in which orthopedic patients are receiving health care, attention should be made by administrators and infection control personnel toward level of orientation of health care personnel about preventing complications of a disease process such as orthopedic SSI as well as paying attention to factors that hinder provision of proper health care by health care providers. Furthermore, health care providers' age, level of education, and years of clinical experience should be taken into consideration when evaluating attitudes to health care for orthopedic SSI patients.

Nurses and infection control personnel claimed that adopting interdisciplinary team can contribute to control and prevention of orthopedic SSI which represented in the clarity of roles assumed by health care providers besides acknowledging the importance of roles assumed by each health care provider. Most participants in the study emphasized on having clear and identified roles to be assumed by health care providers in addition to addressing the importance of roles assumed by each health care provide so that health care providers formulate an interdisciplinary and collaborative team of health care provision.

Nurses working at hospitals apply both independent and dependent nursing interventions in accordance with physicians' advice. However, they take responsibility for threats to patients' lives [26]. For this reason and to decrease the burden of responsibility on nurses, it is recommended to establish interdisciplinary health care team work in clinical health care settings. In interdisciplinary team work, interdependence is displayed through sharing important information through written and oral communication, which helps in building a team member's respect for the input of other members of the team.

Study Implications

The results of the study addressed the factors that facilitate the proper application of health care practices which have a great impact on orthopedic surgery patients' health status in addition to addressing factors that hinder proper nursing practice and health care provision and also discussed the strategies to eliminate presence of such hinders or obstacles. Proper application of health care practices can be achieved by setting strategies that make health care providers adhere to evidence-based practices and by assuring that all facilities required for providing proper health care are available and sufficient and meet the health care needs of patients.

For the purpose of increasing adherence to guidelines of health care provision, it is recommended that guidelines to be developed in collaboration with health care providers in order to achieve consensus regarding applicability and feasibility of guidelines developed. In addition, seminars and workshops emphasizing the proper practice should be conducted from time to time to improve the degree of adherence. Moreover, establishing interdisciplinary team work can help in application of guidelines in health care settings. For already established guidelines that are used in health care settings in Jordan in which control and prevention of orthopedic SSI is addressed, they should be reviewed by managers and administrators to evaluate their applicability and feasibility and to be modified if necessary so that such guidelines can be applied efficiently to meet patients health care needs and to prevent complications of health problems.

Nurses should be informed about clinical guidelines that delineate the aspect of providing health care and meet the needs of orthopedic surgery patients in order to keep them aware about proper methods to provide health care. Furthermore, student at schools of nursing and beginner nurses should realize the importance of guidelines that are concerned with prevention of SSI besides educating them about such guidelines, which can be accomplished though continuous feedback during students' training in the field of health care provision where those guidelines are applied. During socializing nursing students into nursing it is important to have them learn how to engage in interdisciplinary health care team work in order to be involved in the future in collaborative interventions of health care provision.

In the field of health care provision where continuous education is required to raise health care personnel knowledge and competencies, there should be a focus from continuous education departments on searching for methods that incorporate evidence- based practice into health care and to tailor clinical guidelines of infection control to meet the circumstances and available facilities in health care settings. By incorporating evidence- based practice into health care as well as tailoring clinical guidelines of infection control to meet the circumstances and available facilities in health care settings, nurses' attention to health care outcomes will be increased.

Limitations

The current study employed the use of qualitative content analysis approach, which implies the study of the perspectives of nurses and infection control personnel to control orthopedic SSI. It cannot be guaranteed that all perspectives to control orthopedic SSI were captured and examined by the qualitative content analysis approach used in this research study, which implicates the future use of ethnographic approach to examine the perspectives of controlling orthopedic SSI over a wide range in nursing society by employing other data collection methods besides interviews, such as participant observation. Different workplaces or settings may affect generalization of study findings.

Conclusion

The findings of the current study indicate that nurses and infection control personnel perspectives towards patients underwent orthopedic surgery and patients with orthopedic SSI were characterized by 'attention to health care outcomes, adherence to guidelines, maintaining positive attitude to health care, and adopting interdisciplinary team'. Different research strategies other than used in this study should be used in order to resolve problems and negative domains of nurses and infection control practices towards orthopedic surgery patients.

Conflict of Interest

The authors have no conflict of interest to disclose.

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