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Infection control precautions in the operating rooms of a teaching hospital and comparison with international standards in Iran, 2017.

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Surgical site infections (SSIs) are not new problems and this problem was permanent. World Health Organization published many protocols which are used in all of countries, such as Iran. This study aimed to evaluate infection controls precautions in the Imam Khomeini hospital's operating rooms and compare with international standards. This study was a descriptive research. 170 surgeries in operating rooms of Imam Khomeini hospital were evaluated. Data collection instruments were demographic questionnaire for patients and surgeries teams, a researcher made checklist consisted of 13 items for patients, 34 items for personnel and 35 items for operating room's environment. Each item was measured with 1 score for Yes answer and 0 score for No answer. Respectively, the percentage (0-24.9), (25-50), (50.1-75) and (75.1-100) were reported according to so bad, bad, intermediate and good. Data gathering was done with observation and interview. Data analyzed by SPSS software. 170 surgeries in this study were evaluated. The average percentage of infection control precaution for three dimensions of patient, personnel and equipment operating room were 76.47± 2.6, 80.43±6.2 and 65.5±31.53 percent respectively. 24.1% of surgeries (41 surgery) were assessed in good level, 75.9% (129 surgery) in intermediate level and none were assessed bad level. The environment of operating rooms requires to a major revision. It is recommended that manager of hospitals pay more attention to it.

Keywords: Infection control, Operating room, Standards, Surgical team

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Introduction

Surgical site infections (SSI) are not new problems. And this problem was permanent [1]. hospitals are expected to be a safe, healthy and intact place but so many errors and mistakes have occurred in hospitals, which operating rooms errors are more than two-thirds of them [2]. SSIs are one of this errors that have a serious effect in patient's health [3,4]. According to recent researches, word-wide statistic of SSIs is reported about 18 percent [5]. Annually, in America 290000 persons get involved in SSIs which America's hospitals spending about 4 million dollars for that [6] and it occurs about 23 percent of people who has surgery in Iran [7]. All hospital personnel are responsible for infection control but due to direct and frequent contact with patients, it has much more importance for nurses [8]. World Health Organization had prepared a safe surgery/save life program which was included a check list of items should be executed before anesthesia, surgical incision and leaving the operating room [9]. Because of SSIs are important issues in creation and exacerbation of illness, increasing the hospitalization time and multiply the expense [13,14], so many protocols are published for increasing patient's safety and efficiency after surgery which nowadays are used to prevent of SSIs by nurses [10-12], in comparison with SSIs rate in Iran that was reported 23 percent [7], this rate of SSIs in Europe and America was reported 5 percent [15-16], whereas guidelines and rules published by WHO including appropriate preparation patient before surgery, proper use of

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prophylaxis antibiotics, use of safe and exact surgery techniques and proper management of caring and treating processes during and after surgery are same in all this countries [17-19]. In America, so many hospitals delivered information about SSIs by considering Centers of Disease Control and Prevention standards information and tried to decrease length of hospitalization and operating in fewer time by using WHO's recommended standards, but results shows that many of SSIs may occur after discharging due to factors that were not considered about infection prevention [20].

According to the results a study in Urmia, infection control precautions in surgical unit was 67.1 percent [21]. Also, a research in Rasht was reported that 97.9% of personnel, 100% of surgeons and 61.8% of anesthesiologists adhered to infection control guidelines. And 83.3% of infection control guidelines about medical equipment and operating room environment were done properly [22]. But according to results of a study in Shahre Kord's hospital, personnel adhered to principle of disinfection and sterilization (93.75%), cleanliness of clothes and scrub (79.2%) and patient (84%) were in poor level [23]. Also, another study results in Mazandaran showed 89% adhered to infection control [24,25].

Materials and Methods

This study was descriptive research aimed to evaluate infection control precaution in Imam Khomeini hospital's operating rooms, 2016. This study was approved in ethic committees and its code is IR.MAZUMS.REC.95.349. Sampling method was accessible sampling that was done at June until September 2016. Sample size based on the research's result which indicated 77% of infection control precaution [26], was estimated 170 subjects by using following formula.

$$n = \frac{z\left(1-\frac{\alpha}{2}\right).p(1-p)}{d^2} = \frac{(1/96)^2.0/77.0/23)}{(0/02)^2}$$

.

Data collection instruments were demographic questionnaire and researcher made checklist. Designed checklist had 82 questions in 3 dimensions of infection control precaution related to patients, personnel, and equipment of operation room by 13, 34 and 35 questions number in each dimension, respectively. Checklist items were a yes, no question that was measured with 1 score for yes answer and 0 score for no answer. The percentages (0-24.9), (25-50), (50.1-75) and (75.1-100) were considered according to so bad, bad, intermediate and good. Some examples of questions for patients' dimension are: Did he/she take a shower by antiseptics in night before surgery? Have incision place and its sides been washed before preparing skin by antiseptic? And some question's examples for personnel dimension are: Is personnel's hand washing method done based on international guideline? Is personnel's method for gun wearing correct? And some question's examples for equipment operating room dimensions are: Has operating room floor being washed by proper antiseptic before operation daily? Are the clean and dirty equipment being transferred from separated routes? Demographic questionnaire for the patients were consists of patient age, sexuality, type of operation and time of operation which was completed by asking patients. Reliability and validity of data collection instruments were confirmed to expert persons and Mazandaran University of medical science academic staffs. Inter rater reliability was estimated by 10 observation of 2 independent researcher which correlation coefficient was calculated 0.9 by ICC test. Also, for data analysis descriptive statics like (mean, frequency and median) and Inferential statistics such as chi square and Pearson's correlation coefficient were used.

Results

170 surgeries in Imam Khomeini hospital's operating rooms were evaluated which it has general surgery (2 rooms), obstetrics and gynecology surgery (2 rooms), orthopedic surgery (2 rooms), Neurosurgery (2 rooms), Urology (2 rooms) and vascular surgery (1 room) rooms. 55.3% of subjects were female and 44.7% were male whom were 7-81 year's old with 42.75 ±16.29 age average. The surgeries average time was 62.14±4.34 minutes. From these 170 surgeries, 41 surgeries (24.1%) in term of infection control precaution condition at good level, 129 surgeries (75.8%) at intermediate level. And in overall 73.28±+2.59% of infection control precaution was done properly

The average of infection control precaution in patients' dimension was 76.74±2.60 %. 11 surgeries (7.5%) were in intermediate level, 159 surgeries (93.3%) were in good level and no surgery was not in bad and so bad levels. For personnel dimension, the average of infection control precaution was 80.43±6.20% which 35 surgeries (20.7%) were in intermediate and 79 surgeries (97.3%) were in good level and no surgeries were not in bad or so bad levels. For equipment of

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operation room, the average of infection control precaution was 65.15±3.5% that all of 170 surgeries were in intermediate level and no surgery were not in good, bad and so bad levels (table 1).

Table 1 The percentage average of infection control precautions for all surgery and in term of dimensions, patients, personnel and equipment operating room

Percentage Average of Checklist Dimensions	Levels of Dimension	Frequency	Percentage
Precautions for Equipment	(50.1-75) intermediate	170	100
	Total	170	100
Precautions for Personnel	(50.1-75) intermediate	35	20.6
	(75.1-100) good	135	79.4
	Total	170	100
Precautions for Patients	(50.1-75) intermediate	11	6.5
	(75.1-100) good	159	93.5
	Total	170	100
Precautions for All Dimension	(50.1-75) intermediate	129	75.9
	(75.1-100) good	41	24.1
	Total	170	100

Discussion

Nowadays, the surgeries number in different cases is increasing so, pay attention to guidelines and standards for improving the surgeries quality and preventing of potentially risks such as SSIs is so important. This study's results indicated that infection control precautions in 24.1% of surgeries (41 surgeries) were in good level and 57.9% of surgeries (129 surgeries) were in intermediate level. Overall, 73.28±2.59% of infection control precautions were accomplished

Like this study's results, Foji and colleagues was done cross - sectional study which aimed to evaluating of safety standards in the operating room in Sabsevar University of Medical Sciences hospitals. they reported that this hospital's precaution in dealing with fire, standards patients' safety, personnel safety and infection control were 75%, 78%, 81% and 77% respectively [26]. Also, unlike the present study results, Nourian and colleague's reported level of the infection control methods using in 3 operation wards and 7 surgical units of Shahre Kord university hospitals. The finding showed that personal performance about disinfection and sterilizing methods (93.75%), individual health and scrub methods (79.2%) and the principles related to patients (84%) was poor. Also results indicated that operation room equipment in term of infection control rules differenced with standards [23]. Mousavi and colleague's study with aim of evaluation of safety standards in operation rooms of Tehran University of Medical Science hospital in 2010 was performed and reported that the overall safety of the operation rooms of hospitals was 84.9% and like the present study results in dimensions of infection control and personnel safety, were in low level [27] Another research was done by Dorando and colleagues aimed to adherence to international and national recommendation for the prevention of surgical site infections in Italy. And the results showed that hair-shaving before surgery, patient's shower with a common detergent and with an antiseptic solution, administering of antimicrobial prophylaxis and using appropriate antiseptics of the incision area was done 72.8, 87, 13, 75.7 and 94.4 percent respectively [28] which this percentage are similar to this study's findings. Ugurlu and colleague's study was done to assessing surgeon behavior and knowledge of hand scrub and skin antisepsis in the operating room. The findings showed that both adherence to local hand-hygiene protocols and surgical staffs' basic knowledge about surgical antisepsis were in low level [29]. So, it seems that lack of knowledge leads to inappropriate performance.

Conclusion

Based on this study results, infection control precaution in Imam Khomeini hospital in comparison with international standards has a significant difference. So that lack substantive supervision, employing unprofessional persons for accomplishing rules of infection control specially in equipment's dimension, lack of equipment, and inappropriate operating room environment have the most contradiction with standards. It sounds that lack of knowledge leads to inappropriate performance; so, staff training can improve efficiency

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Conflicts of interest

None declared.

References

1. Martone WJ, Nichols RL. Recognition, prevention, surveillance, and management of surgical site infections: introduction to the problem and symposium overview. Clinical Infectious Diseases. 2001;33(Supplement 2):S67-68.
2. de Vries EN, Ramrattan MA, Smorenburg SM, Gouma DJ, Boermeester MA. The incidence and

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nature of in-hospital adverse events: a systematic review. Quality and safety in health care. 2008;17(3):216-223.
3. de Lissovoy G, Fraeman K, Hutchins V, Murphy D, Song D, Vaughn BB. Surgical site infection: incidence and impact on hospital utilization and treatment costs. American journal of infection control. 2009;37(5):387-397
4. Umscheid CA, Mitchell MD, Doshi JA, Agarwal R, Williams K, Brennan PJ. Estimating the proportion of healthcare-associated infections that are reasonably preventable and the related mortality and costs. Infection Control & Hospital Epidemiology. 2011;32(2):101-114
5. Oliveira ACd, Ciosak SI. Surgical site infection in a university hospital: post-release surveillance and risk factors. Revista da Escola de Enfermagem da USP. 2007;41(2):258-263
6. Department of Health and Human Services. HHS Action plan to prevent healthcare-associated infections. Retrieved June. 2011.
7. Sohrabi MB, Khosravi A, Zolfaghari P, Sarrafha J. Evaluation of nosocomial infections in Imam Hossein (as) Hospital of Shahrood, 2005. Journal of Birjand University of Medical Sciences. 2009;16(3):33-39.
8.Smeltzer SC, Bare BG, Hinkle JL, Cheever KH. Textbook of medical-surgical nursing. Wolters Kluwer Health; 2008.
9. Verdaasdonk E, StassenL, Widhiasmara P, Dankelman J. Requirements for the design and implementation of checklists for surgical processes. Surgical endoscopy. 2009;23(4):715-726
10. Trimmel H, Fitzka R, Kreutziger J, von Goedecke A. [Anesthetist's briefing check. Tool to improve patient safety in the operating room]. Der Anaesthesist. 2013;62(1):53-60.
11. Einav Y, Gopher D, Kara I, Ben-Yosef O, Lawn M, Laufer N, et al. Preoperative briefing in the operating room: shared cognition, teamwork, and patient safety. CHEST Journal 2010;137(2):443-449.
12. Roberts NK, Williams RG, Kim MJ, Dunnington GL. The briefing, intraoperative teaching, debriefing model for teaching in the operating room. Journal of the American College of Surgeons. 2009;208(2):299-303
13. Perencevich EN, SandsKE, Cosgrove SE, Guadagnoli E, Meara E, Platt R. Health and economic impact of surgical site infections diagnosed after hospital discharge. Emerging infectious diseases. 2003;9(2):196-203.
14. Rehospitalizations After Treatment for SSI Add $10Million to $65 Million to Healthcare Costs. (2012). Available at: https://www.Infectioncontroltoday.com/ssi/rehospitalizations-after-treatment-ssi-add-10-million-65-million-healthcare-costs. Accessed August 01, 2012.
15. Schantz PM, Tsang VC. The US Centers for Disease Control and Prevention (CDC) and research and control of cysticercosis. Acta Tropica. 2003;87(1):161-163.
16. Manniën BvdZ J, Wille J, Hof S.v.d. Infection Control and Hospital Epidemiology. 2007;28(5):36-41.
17. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR, Committee HICPA. Guideline for prevention of surgical site infection, 1999. American journal of infection control. 1999;27(2):97-134.
18. McHugh S, Hill A, Humphreys H. Intraoperative technique as a factor in the prevention of surgical site infection. Journal of Hospital Infection. 2011;78(1):1-4
19. McHugh S, Collins C, Corrigan M, Hill A, Humphreys H. The role of topical antibiotics used as prophylaxis in surgical site infection prevention. Journal of antimicrobial chemotherapy. 2011;66(4):693-701
20. Available from: http://www.kevinmd.com/blog/2011/03/high-rate-surgical-site-infections-ssis-nations-hospitals.html.
21. Aghakhani N, Sharif NH, Ghana S, Emami ZA, Siyadat PA, et al. Surveying Prevention of Nosocomial Infections among Nurses in Educational Hospitals of Uremia in 2009. Journal Health Breeze. 2013;1(3):21-25
22. Majidi S A, Mehrabian F, Tabari R. Accomplish Principles of Infection Control by Operating Room's Staff in the Rasht Hospitals. 3. 2008;16(64):89-96.
23 noorian K aF, delaramM, kazemian A. The application level of the infection control methods in the operating wards of Shahrekord university hospitals compared to the standards in 2005. J Shahrekord Univ Med Sci. 2006;8(3):39-47.
24 Alaedini M Paghe AS, Fakhar M, Nasiri E. Implementing Infection Control Principles in Medical Teaching Hospitals of Mazandaran University of Medical Sciences, 2011. J Mazandaran Univ Med Sci. 2013;23(98):274-280.
25. Alaedini M, Paghe ASr, Fakhar M, Nasiri E. Implementing Infection Control Principles in Medical Teaching Hospitals of Mazandaran University of Medical Sciences, 2011. J Mazandaran Univ Med Sci. 2013;23(98):273-280.
26. foji S, Tabasi H, Akbar Zade R, Akrami R. Assessment of safety standards in the operating room in hospital, Sabzevar University of Medical Sciences in 2014. Beyhagh. 2014;19(1):58-64.

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27. Mousavi S, Dargahi H, Hasibi M, Mokhtari Z, Shaham G. Evaluation of safety standards in operating rooms of Tehran University of Medical Sciences (TUMS) Hospitals in 2010. Payavard. 2011;5(2):10-17
28. Durando P, Bassetti M, Orengo G, Crimi P, Battistini A, Bellina D, et al. Adherence to international and national recommendations for the prevention of surgical site infections in Italy: Results from an observational prospective study in elective surgery. American journal of infection control. 2012;40(10):969-72.
29. Ugurlu M, Mokhtare S, Yildiz F, Pekru Y, Kuzucanli M, Aktan A-O. Surgeon Behavior and Knowledge on Hand Scrub and Skin Antisepsis in the Operating Room. Journal of Surgical Education. 2014;71(2):241-5

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