Background

“The healthcare-associated infections (HAIs) were defined by the CDC/National Healthcare Safety Network (NHSN)Surveillance as a localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s). There must be no evidence that the infection was present or incubating at admission”(1.p:2). HAIs occurs during a hospital admission 48 hours or more after hospital admission or within 30 days after discharge. If a foreign object is inserted into the patient’s body by a surgery (implant), NIs can occur up to one year after such procedure(1-2).

According to statistics published by the World Health Organization (WHO), the highest incidence of NIs is related to the hospitals of the East Mediterranean and the South-East Asia and the lowest to the hospitals of the Western Pacific Ocean and the Europe(3). A study conducted by the WHO in 55 hospitals in 14 countries, including the countries of the Eastern Mediterranean, confirmed the prevalence of infections due to medical care in hospital wards with an average of 7.8 percent(4). WHO studies show that 5% to 25% of patients admitted to the hospitals suffer from nosocomial infections, which its incidence in intensive care units in developed countries is 25% and in developing countries is up to 50%(5).
In Iran, according to claim of hospitals there is no infection or about 1%, while actual prevalence is estimated to be about 15%. This means that out of every 7 patients one patient suffers from NIs that impose a very high cost to the country. The latest reports in 2010 in Iran, indicated that the status of control of NIs is in bad condition. Unfortunately, in this field in our country we do not have access to accurate data, However the prevalence of NIs afflicting most countries and not only for Iran.

ICU nosocomial infections are primarily related to the patient’s health status, invasive device utilization such as endotracheal tube, breathing with mechanical ventilators, central venous catheterization and urinary catheterization, use of immunosuppressors, prolonged hospitalization, colonization by resistant microorganisms, various antibiotics prescription and weaken the defensive mechanisms.

ICU nosocomial infection rate varies from 18 to 54%. It is responsible for 5 to 35% of all Nis and for approximately 90% of all outbreaks of diseases in an ICU. The ICU high mortality rates, commonly ranging from 9 to 38%, can reach 60% due to Nis occurrence.

The HCWs have an important role in the spread of infection and are one the key member of the management and control of NIs. Reviewing the studies by the researchers, showed that no similar qualitative study in Iran has been done to analyze the problems mentioned above, it also is noteworthy that the importance of NIs is because of the fact that it is considered as one of the main causes of death in all countries and leads to a longer length of stay in hospital.

Objectives

The purpose of this study was to explore the perspectives of health care workers about the process of prevention and control of NIs in intensive care units of hospitals.

Materials and methods

The qualitative content analysis used in the present study, was used for data collection and analysis of the perspectives and experiences of HCWs. Qualitative content analysis can be described as a bridge between the original text and the presented results. It consists of a slow and systematic transformation of the original text into condensed categories and emerged themes.

Setting and participants

In this study, 21 HCWs were selected through a purposeful sampling strategy from August 2013 to the end of July 2014. They were chosen by using maximum variation sampling. Data collection was continued until achieving data saturation and themes’ emergence. Saturation refers to the repetition of discovered information and confirmation of the previously collected data.

Data collection

This study used face-to-face and semi-structured interviews for data collection by the first author (who is a supervision of infection control). The main question to begin the interview with was: “What do you do for infection control in the ICU?” answers, probing questions were asked during the interviews to better understand and clarify their experiences. The interviews lasted for between 35 to 145 minutes. All interviews were tape-recorded, listened and transcribed verbatim.

Data analysis

The MAX-Q-DATA software was used to assist the storage, searching, initial and final coding of qualitative data. The qualitative content analysis conducted to analyze data for to identify the emerged themes and categories by Graneheim and Lundman’s, which was described in the following steps: 1. the recorded interviews were immediately transcribed word-by-word, and they were used as the main data of the research; 2. the recorded voices were listened several times, handwritten texts were frequently reviewed, and a decision was made to divide the text into meaningful units; 3. Condensed units were categorized into subcategories; 4. According to the similarities and differences, subcategories were divided into categories; 5. Finally, the themes were formulated as the expression of the latent content of the text.

Trustworthiness

In order to ensure trustworthiness, we used confirmability, credibility, dependability and transferability as advocated by Lincoln and Guba and Graneheim and Lundman. Credibility and confirmability were achieved by returning a summary of the interviews to participants and applying their revisions using member checking procedure and peer debriefing. Maximum variation of the sampling enhanced the data credibility and confirmability.
The full text of several interviews together with initial coding, concepts and categories was sent to an observer familiar with qualitative research in nursing education, and necessary corrections were made. The data were analyzed independently by the researchers in order to identify and categorize the initial codes. Then the codes and themes were compared.

**Ethical considerations**

The current study was a part of the doctoral thesis in PhD degree of nursing education, which was approved by Shahid Beheshti University of Medical Sciences, international, Tehran, Iran. The ethical considerations were regarding to the autonomy, confidentiality, and anonymity of the participants during the study period and publication of the study. Other ethical issues in this study included the researcher aims and methodology were described to the participants and all participants were informed about the objectives and methods of the study. They were also informed that participation in the study is voluntary, so they could refuse to participate or withdraw from the study at any time. Lastly, the participants were reassured that their responses and identities would be kept in full confidentiality.

**Results**

The majority of participants (57.1%) were male and most of them (42.8%) in the age range of 36-45 years (Table 1).

The results of qualitative content analysis of staff’s experiment in the ICU in the field of the reduction and prevention of nosocomial infection using conventional approach emerged 5 main themes: “The effectiveness of the infection control training process in the intensive care units “,” Systematic infection control processes “,” General management of hospitals “,” Management of resources “ and “ Organizational leadership”.

**The effectiveness of the infection control training process in the intensive care units**

Training in this area included the planning, content, methods and pattern of the teaching. In the training process, the information and knowledge of the medical staff should be updated with the proper management to control and reduce the nosocomial infections.

**Appropriate training management**

“One of the main problems is that faculty and students come together into the ward, She/He does not know a lot of new and updated instructions about infection control, teach to students the same thing learned from her/his student period, university should hold permanent retraining courses for these faculty members, they should be updated on infection control means patient safety…”(P 6)

**Effectiveness of educators**

“People who do not know updated content...
about infection control…, Must appoint someone to education, even to teach nursing students, really what we read in textbooks is completely different from what we see in practice…”(P 21).

**Written program for Infection control training**

“Infection control courses, especially for staff that works in ICU and the hospital staff is required, due to the higher prevalence of infection in ICU it is important to emphasize it, these education courses periodically can lead to convergence between the medical team…” (P 4).

**Utilizing the abilities of the trainees**

“Some people who have participated in retraining courses on infection control, working in wards that do not need them, or on the contrary, one who participates in retraining courses that infection control did not work…” (P 7).

**Systematic infection control processes**

Executive processes of infection control should be administered systematically and purposefully in the health care centers and guidelines should be offered for applying the standards provided that the control and monitoring systems permanently monitor and evaluate these processes.

**Strategies for implementation of the standards**

“Medical equipment after use is not properly washed, disinfected and sterilized …”(P 10).

**Effectiveness of infection control system**

“…There is not statistics about infections caused by the procedures in the ward, the patient transmission and its subsequent infections not followed up” (P 15).

**Full control and supervision over the process of infection control**

“One activity that was conducted many times in this intensive care unit by the Chief Doctor and none of the infection control managers and supervisors did not deal with it, is performing the therapeutic procedures in the ward instead of the operating room and all services even general surgery and neurosurgery do it easily …” (P 20)

**General management of hospitals**

Hospitals should be managed in a manner that along with coordinating with other units in the hospital and supply and improvement of the human resources, provide the physical conditions for the control and prevention of nosocomial infections.

**Cooperation of the relevant units in the hospitals**

“One of the problems of infection control in this ward and hospital is related to the laboratories; Laboratory Unit does not provide timely answers …”(P 14).

**Providing the desired physical conditions**

“There is no enough and necessary space in the physical structure of the ward, its space is limited and has non-standard and inadequate toilets, however, its map is non-standard, the old ward is transformed to the intensive care unit by destroying a room and a floor …” (P 2).

**Improvement of the human resources**

“There are few nurses and crew in the intensive care unit according to the patient need because there is no hiring nurse and crew” (P 1).

**Management of resources**

Management of the resources is the process of working with people and equipment so that these people and their organizations achieve their full potential. Management of the resources included the utilizing of the human resources and equipment for the organization’s goals.

**Funding**

With the empty hands you cannot overcome to the germs and infections, you must have certain financial row till you cost of certain resources with a planning and …” (P 12).

**Providing efficient human resources**

“…Sometimes we do not have the gloves in the ward and should we use sterile gloves instead of disposable gloves, we very tried in our ward to make the culture of using the gloves …” (P 4).

**Competence in organizing the staff**

“Another problem to the infection control in intensive care units is a shortage in trained human resources to work in the intensive care units and it includes all medical staff such as physicians, nurses, crew, etc. …”(P 11).
Organizational leadership

Leadership is one of the five principal tasks of managers. Leadership can be defined as a process in which management organization tries by creating motivation and effective communication encourage the staff to perform organizational tasks interestingly and desirably.

Provide the sufficient motivation to work in the ICU

“The nature of work in the intensive care units is in such a way that the staff enters to them with interest and desire and performs their tasks. It should be a distinction between these staffs and other staffs of other wards so that they can enter to the ICU with interest and ...” (P 3).

Update the knowledge, attitude and skills of the staff

“To these problems is needed to use qualified and trained personnel in the ICU and held for them the continuing training courses, rounds need to be done at the bedside of patients, initially introduce the patient and measures and procedures that need to be done in the next shift should be expressed ...” (P 9).

Participation of all health team members in the process of infection control

“Infection control is not like other treatment procedures that to be considered it has one aspect or a measure in the hospital that you can manage it by itself, all groups of services to the head of the hospital should have a role in controlling the infection and should identify obstacles in this process so that everyone can be involved in its prevention and ...” (P 16).

Setting the goals of infection control in coordination with the infection control team

“Must develop a written, clear and concise short and long-term plan with the participation of all members of the committee, act based on it and to be identified its strengths and weaknesses, ..., we can say that the infection control is a team work and ...” (P 8).

Discussion

The results of qualitative content analysis using conventional approach in the field of the reduction and prevention of nosocomial infection staff's experiment in ICU, revealed 4 main themes: “The effectiveness of the infection control training process in the intensive care units”, “Systematic infection control processes”, “General management of hospitals”, “Management of resources” and “Organizational leadership”.

According to a research conducted in our country, the nursing shortage or inadequate distribution of the human resources are the major problems of hospitals\(^\text{14}\). Therefore, standardization of the number and distribution of health staff in clinical settings is necessary to improve the efficiency and quality of services provided to patients, better utilization of existing resources and improves productivity in hospitals\(^\text{15}\).

Systematic infection control processes based on the participants’ experiments in this study emerged as one of the main themes. Prevention of nosocomial infections requires a continuous, controlled and systematic program which includes: limiting the transfer of organisms between patients during the direct care of them, methodical use of hand hygiene\(^\text{16}\), a team viewing and working at the process of infection control by coordinating and cooperating with all scientific and administrative organizations involved in controlling nosocomial infections such as the Centers for Disease Control and Prevention and deputies of health and treatments of universities, separation, isolation and cohorting policies in outbreaks, respecting the disinfection and sterilization principles, sanitary waste disposal, allocation of theoretical and practical module of prevention and control of nosocomial infections for medical staff before the entering to the clinical settings and training them before the entering the clinical wards\(^\text{17}\), environmental risks for infection, the establishment of nosocomial infection prevention and control associations in order to disseminate the latest international scientific data, protect patients with prophylactic use of appropriate disinfectants\(^\text{18}\), proper nutrition of patients, limiting the risk of endogenous infections by minimizing invasive procedures and promoting the proper use of anti-microbial agents, evaluate and identify the epidemic and its required interventions, detect and control outbreaks of infections, prevention of infection in health care workers, increasing the number of staff for patient care and holding continuing education programs specially cohorting for medical staff\(^\text{19}\).

The effectiveness of the infection control training process in intensive care units based on the
participants’ experiments in this study emerged as one of the main themes. Many quantitative studies have been conducted in Iran and other countries, which suggest that awareness of the medical staff about nosocomial infections is in low to moderate level\(^{(19)}\). Knowledge and awareness enable the medical staff to play an important role in the prevention, pursuit, limit and treatment of infectious diseases\(^{(20)}\).

The results of the studies showed that the academic training of the infection control team including doctors and nurses and providing postgraduate courses for them\(^{(21)}\) especially cohorting during the outbreaks\(^{(20)}\) can increase knowledge and awareness of the medical staff. It is better that the theoretical and practical module of prevention and control of nosocomial infections for medical staff before the entering to the clinical settings\(^{(22-23)}\).

In conclusion, our study showed that by applying the effective change in the educational process, continuous and systematic implementation of infection control processes along with resource management in hospitals, providing efficient and updated programs for the control and prevention of nosocomial infections and its monitoring and evaluation it can be done an effective measure in the control and prevention of such infections.

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