**Abstract**

Objective of this study was to evaluate knowledge, Practice and Attitude of nurses, auxiliary nurses and midwifery staff towards standard isolation precautions.

In a cross sectional survey 200 nurses, auxiliary nurses and midwifery staff, were evaluated by a questionnaire for knowledge of, attitude and practice towards standard isolation precautions at a teaching hospital in Yazd, Iran. The data was collected and analyzed by using SPSS14 software.

Two hundreds (87%) of 230 nurses, auxiliary nurses and midwives responded the distributed questionnaires. Knowledge and attitudes were moderate but their practice was relatively poor. Mean score of knowledge, attitude and practice towards standard isolation precautions were 11.9(Maximum=16.5), 27(Maximum=50), 4.6(Maximum=9) respectively. Practice scores of women were significantly higher than men (P value 0.028). Knowledge score of study subjects increased significantly with age (pvalue0.004).A positive linear correlation was observed between knowledge and practice (p value 0.01 correlation coefficient 0.173).

This study revealed that knowledge and Attitudes towards standard isolation precautions were moderate but their practice was relatively poor. Serious defects in knowledge of health care workers regarding hand hygiene, disinfecting endoscopes, avoiding recapping needles and respiratory isolation precautions were present. An educational program on standard isolation precautions for all health care workers can improve the infection control by increasing compliance of them with standard isolation precautions that is necessary for care of patients.

Key words: Knowledge, practice, standard isolation precautions

**Introduction**: there is growing concern about the transmission of blood borne pathogens during medical procedures from patients to health care workers (HCW) and among patients1. In Iran in addition to increasing risk of infections such as Hepatitis B virus, Hepatitis C virus and Human Immunodeficiency virus especially among intravenous drug users2, some outbreaks of the arbovirus Crimean Congo Hemorrhagic fever have occurred which have caused mortality in HCWs3. Universal precautionary measures developed by centers for Disease Control and Prevention as well as transmission based isolation precaution can prevent transmission of infections4. The application of Universal precautions (Ups) has been shown to reduce both occupational exposure to body fluids and patient-to-patient transmission of blood-borne viruses (BBVs) via the health care workers5.

The objective of this study was evaluation of level of knowledge, practice and attitude of nurses and midwifery staff towards standard isolation precautions in Shahid Sadoughi University affiliated hospital in Yazd, a central city in Iran.

 **Methods and subjects**

A cross sectional survey was done during August and September of 2009 at Shahid Sadoughi University affiliated 350 bed teaching hospitals Yazd, Iran. Yazd city is located in a province in the center of Iran. A questionnaire was prepared by an infectious disease specialist who was a member of hospital infection control committee, and a health education specialist. Items were adopted partly from previous studies; but many of them were designed according to CDC guidelines. In a pilot study the designed questionnaire was distributed to 30 nurses in another hospital to test its practicability and validity. For internal consistency Cronbach, s alpha coefficient was measured (0.67).

 230 questionnaires were distributed to all 230 nurses, auxiliary nurses and midwives working in internal medicine, general surgery,ENT,gynecolog&obstetrics,ICU,NICU,emergency,neurology,orthopedics,cardiology&CCU,pediatrics,ophthalmology and infectious diseases departments by an intern in every work shift. Questionnaires were gathered after 1 hour. Two hundreds of them responded. Ethical clearance was obtained from the ethical board committee of Shahid Sadoughi University. Questionnaires were anonymous and it was declared that it has no implication for evaluation of respondents regarding their career. It included demographic variables such as: age, Sex, years of professional employment, ward, 14 knowledge questions, 10 attitude questions and 12 items evaluating their practice. Knowledge section included 3questions with 3 choices (yes, no and I do not know), 2 questions with A, B and bothA&B, 4multiple choice questions and 5questions with more than one correct answer. To each correct answer for knowledge question 0.5 to 1 score depending on type of question and to incorrect answer 0 was assigned. Maximum score was 16.5 scores.

Attitude items with 5 choices were based on Likert scale format(I fully agree ,I agree, I have no idea ,I disagree and I fully disagree). Attitude questions took 5 to l scores. Maximum score was 50 scores .Twelve questions assessing practice again based on Likert scale (always, often, sometimes, seldom, never). In practice questions 1 score was given only to correct answer, all other answers received zero. We designed likert scale for practice questions to enable study subjects for answering questions, but we assumed standard isolation practices as necessary critical tasks, so we assigned score 1 only to correct answer, always or never for example and zero to all other answers. This concept has already been applied 2, 4.

Data were analyzed with SPSS14 and  of 0.05 was taken as significant. For evaluation of gender effect on knowledge, attitudes and practice Mann-Whitney, to determine effects of age, duration of employment and departments on scores, krusskal wallis was applied. Correlation between knowledge, attitudes and practice was computed by Spearman, coefficient. Total scores obtained were categorized into 3 Levels, Poor (< 50%) moderate (50% to 75%) and good (>75%) of maximum scores.

**Results**: Two hundreds of 230 nurses and auxiliary nurses and mid wives responded the distributed questionnaires (87%), from whom 172 (86%) were female and 28 (14%) were male. Range of their age was 20 to 50 years, 26.5% of them were employed for <5 years. 30.5% for 5 to 9 years and 33% for>10 years.

Knowledge Level of study subjects was poor in 10%, moderate in 55.5% and high in 34.5%.Mean score was 11.9. Attitude level of study subject was poor in 30.5% and moderate in 68%.Three (1.5%) of nurses did not respond to attitude items. Mean score was 27. Practice level was poor in 49%, moderate in 43% and high in 8% of them. Mean score was 4.6.

Practice scores of women were significantly higher than men (P value 0.028); their knowledge score were higher than men as well but not statistically significant (Table 1).

Knowledge score of study subjects increased significantly with age(pvalue0.004), their attitude scores increased with age as well but not statistically significant (Table 2 ).

Both knowledge and attitude scores increased significantly with years of employment (P value 0.002 and 0.032respectively) and those with < 5 years of employment had the lowest although statistically non-significant practice score (Table 3).

There was no statistically significant difference between knowledge, Attitude and practice of nurses in internal medicine, general surgery,ENT,gynecology obstetrics,labor,ICU,NICU,emergency,neurology,orthopedics,cardiology&CCU,pediatrics,ophthalmology and infectious diseases departments ( p value 0.12, 0.11 and 0.13 respectively)(Table4).

Regarding distribution of correct answers (compatible with CDC and prevention guidelines) to knowledge questions, the most frequent correct answer was to a question about putting on gloves while touching patient’s mucosal surfaces (99%). The most frequent wrong answer (76%) was to a question about technique of disinfection of endoscopes after use (Table 5).

A question assessing attitude of respondents about wearing face masks while suctioning patients secretions, received highest mean score ( 3.8).The lowest mean score ( 1.3 ) was received by a question about wearing gloves for vein puncture(Table6).

Regarding distribution of correct answers about practice questions, the highest correct answer (87.5% of respondents) was to a question about washing hands after accidental contact with blood, liquids and secretions of patients while the lowest correct answer (20.5%) was to a question about keeping 90 cm far from patients suspicious to respiratory infections and a question about wearing gowns and gloves for those in charge of washing and decontaminating instruments (Table 6).

A weak positive linear correlation was observed only between knowledge and practice (p value 0.01 and correlation coefficient 0.173).

**Discussion**: standard isolation precautions are important measures for prevention of nosocomial infection and protecting health care workers from infection through occupational exposure. Knowledge, practice and attitudes towards standard isolation precautions in nurses and midwifery staff of Shahid Sadoughi hospital were assessed as moderate. The response rate in the present study (87%) was higher than rates in two similar studies from Iran(51.5% and 84.4%) and a Greek study(71.6%) involving doctors and nurses. 2,4, 6 The knowledge score is similar to or in the range of other studies some of them performed in Iran. 2, 8, 9-12 In another Iranian study published locally, practice scores of nurses towards control of nosocomial infections have been reported at the same level [( Karimian,F knowledge and practice of nursing staff of Yasooj hospitals towards control of nosocomial infections Armaghan Danesh, Yasuj University of Medical Research Sciences journal 2004; 31: 42-51].

 Mean attitude score in this study was lower than a study in Shiraz,9 while mean practice score was in the range of some other studies in Iran.9,11 The same practice score was reported by another locally published study in the same country (S. Sepahi Knowledge, attitude and practice of nurses towards control of nosocomial Infections dissertation for M.S graduation Mashhad university of medical sciences Iran 1998).

There was a positive weak linear correlation between knowledge and practice score of study subjects in the present study, this is similar to findings of A.O.Okaro and M.Askarian et al,1,4 this discordance may be due to lack of motivation for improving their practice. There was no significant difference in mean knowledge score between two genders, which is in contrast with another study in Iran.4 Higher practice score was obtained by women; this finding is similar to a Greek and an Indian study.5, 7 it seems that women are more compliant with what they have learned during their profession in this hospital.

Older age and longer duration of employment were associated with higher scores of knowledge in all study subjects which is in line with two other studies, 5,6 also attitude and practice scores were higher in those with longer duration of employment which can be due to effect of continuous education during their career . Relationship between longer experience and more consciousness about infection risks has previously been emphasized. By Gould & Ream.13

Regarding specific precaution questions assessing knowledge about washing hands after contact with blood and body secretion as well as putting on gloves before touching mucosal surfaces and third practice question elicited largest number of correct answers.

This can be partially due to religious faith which dictates cleanliness after touching blood or body secretions while a practice question about hand washing after contact with patient’s surroundings revealed correct answer in only38.5% of respondents, which is similar to findings in another study in Iran(31.9%) and in line with some other studies. 2,14-15 Paying no attention to patient’s surrounding as a source of nosocomial infection in study subjects in the present study is in contrast with a study in Birmingham evaluating attitudes of nurses about washing hands before and after patient contact in which 88.8% of them regarded it as a very important task after patient contact.16

Cross infection via endoscopy should be addressed in future educational programs, putting on gloves should be encouraged and keeping far (9ocm) from patients with respiratory symptoms should be emphasized especially because of concern about pandemic 2009 H1N1 virus. In another study involving attending, residents and students of dentistry faculty in the same country only 36.7% of them practiced keeping far this distance.4Personnel in charge of decontamination of devices should be supervised regarding wearing gloves and gown. Finally hand washing technique should be corrected and applied in different situations including touching fomites surrounding the patients.

Limitation to the present study is that questions in 3 parts were not exactly assessing same concepts of standard isolation precautions so we could not find the correlation between responses between knowledge, practice and attitude towards them specifically. Another limitation was that practice was evaluated by self-assessment not by observation which may not reflect their real practice.

**Conclusion**: Attitude’s and practice’s scores of HCWs towards standard isolation precautions are almost moderate, but serious defects in knowledge of health care workers regarding hand hygiene ,disinfecting endoscopes, avoiding recapping needles and respiratory isolation precautions are present. More educational courses before graduation are needed and more continuing educational programs should be arranged during their career.

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 4.3 **Conflict of interest**: None

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Table 1: mean (SD) scores of knowledge, practice and attitude towards standard isolation precautions in nurses, auxiliary nurses and midwives of study subjects with regard to gender.

|  |  |  |  |
| --- | --- | --- | --- |
| Value | Women Mean±SD | Men Mean±SD | Gender variable  |
| 0.194 | 11.95±1.40 | 11.55±1.41 | Knowledge † |
| 0.963 | 27.01±3.5 | 27.13±2.30 | Attitude ‡ |
| 0.028 | 4.70±1.50 | 4.08±1.37 | Practice § |

† Maximum score = 16.5 ‡ Maximum score = 50 § Maximum score = 9

Analysis was done by Mann-Whitney test.

Table 2: mean (SD) scores of knowledge, practice and attitude towards standard isolation precautions in nurses, auxiliary nurses and midwives of study subjects with regard to age.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| pvalue | 40-50Mean±SD | 30-39Mean±SD | 20-29Mean±SD | Age (years) variable |
| 0.004 | 12.4±1.28 | 12.26±1.3 | 11.56±1.3 | Knowledge†  |
| 0.3 | 27.7±3.2 | 27±3.03 | 26.5±3.4 | Attitude ‡ |
| 0.815 | 4.7±1.85 | 4.5±1.6 | 4.6±1.2 | Practice§  |

† Maximum score = 16.5 ‡ Maximum score = 50 § Maximum score = 9

Kruskal-Wallis test was applied.

Table 3: mean (SD) scores of knowledge, practice and attitude towards standard isolation precautions in nurses, auxiliary nurses and midwives of study subjects regarding duration of employment.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Duration of employment variable | < 5 years Mean±SD | 5-9 years Mean±SD | ≥10years Mean±SD | P value |
| Knowledge† | 11.35±1.46 | 11.93±1.33 | 12.25±1.28 | 0.002 |
| Attitude‡ | 25.98±3.55 | 27.76±2.69 | 27.15±3.68 | 0.032 |
| Practice§ | 4.47±1.21 | 4.7±1.48 | 4.6±1.69 | 0.483 |

† Maximum score = 16.5 ‡ Maximum score = 50 § Maximum score = 9

Kruskal-Wallis test was applied.

Table4: mean (SD) scores of knowledge, practice and attitude towards standard isolation precautions in nurses, auxiliary nurses and midwives according to wards

|  |  |  |  |
| --- | --- | --- | --- |
| Variable  Department | Knowledge | attitude | practice |
| Medicine N=36 | 12.3±1.28 | 26.9±3.05 | 4.53±1.34 |
| Surgery N=13 | 11.7±1.17 | 27.4±2.9 | 4.8±1.6 |
| ICU N=24 | 12.2±1.5 | 28.1±2.9 | 5.3±1.6 |
| Ob gyn N=19 | 11.9±1.35 | 26.7±2.6 | 4±1.45 |
| ENT N=13 | 12.4±1.6 | 26.6±2.2 | 4.8±1.7 |
| LaborN=12 | 11.6±0.67 | 27.5±3.17 | 4.8 ±1.7 |
| CardiologyN=13 | 12.12 ±1.3 | 28 ±4 | 4.2 ±1.31 |
| PediatricsN=16 | 11.15±1.17 | 25 ±3.9 | 5.1 1.18 |
| NICU N=9 | 11.5± 1.28 | 26.8 ±4.9 | 5.3± 1.32 |
| Orthopedics N=10 | 11.5±1.02 | 28.4 ±5.03 | 4 ±1.8 |
| Neurology N=8 | 13 ±1.08 | 26± 2.8 | 5± 2.3 |
| Ophthalmology N=10  | 11.6 ±1.02 | 23.7 ±2.7 | 3.8 ±1.35 |
| Infectious diseases N=10  | 11.7± 1.8 | 26± 3.9 | 4.2± 1.4 |
| Emergency room N=7 | 11.7 ±2.39 | 28.1 ±3.02 | 4.14± 1.21 |
| P value | 0.12 | 0.11 | 0.13 |

Table 5: Frequency distribution of correct and incorrect answers to specific knowledge questions. N =200

|  |  |  |
| --- | --- | --- |
| questions | correct | incorrect |
| 1-Hands should be washed:A: before patient care B:after patient care C:both2- Hands should be washed:A: before using gloves B:after using gloves C:both3- Hands should be washed after: - Taking off gown - Touching wet skin lesions - Touching patients wound dressing - Lifting or drawing patient on the bed4- Gloves should be worn before: (yes, no, I do not know)  - vein puncture - Touching mucosal surface  - Taking out NG tube5- Alcohol rub is adequate for hands hygiene when they are not visibly contaminated with blood or proteinaceous secretions.6- Antibacterial soap and water are adequate for disinfecting hands when they are visibly contaminated with blood or proteinaceous body secretions. 7- gown is necessary when changing: patients dressings if she/he has urinary or fecal incontinence NG tubes8- During respiratory infection outbreaks, warnings regarding respiratory secretions isolation and hand washing after contact with secretion should be available in waiting rooms and Emergency rooms.9- Wearing face masks and goggles are necessary for:  Taking out NG tube  Suctioning tracheal tube10- Endoscope should first be washed with water then be disinfected.11-If you have only one room available for isolating contagious patients, which patient do you allocate it to?A-shigellosis B-cholera C-amoebic colitis D-tetanus12- Patient’s table, door handles of patient’s room and bathroom should be disinfected during a week repeatedly. | 96.5%73%69%84%81.5%52%97%99%95.5%37%52%60.5%40.5%83%58.5%88%24%27%85%&67% | 3.5%27%31%16%18.5%48%3%1%4.5%63%48%39.5%59.5%17%41.5%12%76%73%15%&33% |

Table6: mean score of attitude towards standard isolation precautions in nurses, auxiliary nurses and midwives of study subjects regarding specific questions n=200

|  |  |  |
| --- | --- | --- |
| Attitude item | Mean± SD | Score range |
| 1-One should wear gloves while taking blood or touching patient’s secretions: | 1.3±0.68 | 1-5 |
| 2-Wearing gown prevents me to give care to patients quickly, so I don’t use it: | 3.4±1.4 | 0 - 5 |
| 3-One should wear gown when he/she is going to take NG tube out: | 1.4±0.68 | 1-5 |
| 4-I don’t think that wearing mask and protective glasses are necessary for intubation, extubation and suctioning patient’s secretions because they limit my quickness and convenience: | 3.8±1.16 | 0-5 |
| 5-Wearing gown isn’t necessary for entering ICU:  | 3.4±1.14 | 1-5 |
| 6-Taking contagious infections depends on chance as well: | 3.7±1.16 | 0-5 |
| 7-I don’t think that hand washing is necessary before wearing gloves: | 3.4±1.09 | 1-5 |
| 8-There is no reason to assume all patients contagious unless their infection has been confirmed: | 2.14±1.14 | 0-5 |
| 9-I don’t think it is necessary to begin precautions about communicable patients from reception and waiting room: | 2.17±1.12 | 1-5 |
| 10-I don’t care for keeping me 90 cm apart from patients since it isn’t so effective for transmission:  | 2.15 ±0.99 | 1-5 |

Options were: I fully agree, I agree, I have no idea, I disagree and I fully disagree

Table7: Frequency distribution of correct answers to practice questions regarding standard isolation precautions. n= 200

|  |  |  |
| --- | --- | --- |
| questions | correct | incorrect |
| 1- Do you recap or bend needles after use of syringes?2- I wash my hands after touching patient’s surroundings.3-I wash my hands after accidental contact with blood, mucosal surfaces, fluids or patients body secretions.4-I wear gloves before touching wet instruments, skin wounds, mucosal surfaces, blood or any body fluid, and invasive procedures.5- Have you worn gown in the case there has been risk of splashing blood or body secretions to you?6- Did you use mask in the last occasion which splashing of blood to your face was possible?7- I keep myself 90 cm far from patient suspicious to have respiratory infection.8- I make personnel in charge of decontamination of devices wear gloves and gown for washing them.9- I use separate sterile syringe and needle for aspirating multi dose vials for each episode. | 22%38.5%87.5%54.5%22%49%20.5%80.5% | 78%61.5%12.5%45.5%78%51%79.5%19.5% |