

Knowledge, Attitude and Practices of Infection Control among the Radiology Staff in Radiology Departments, Taif, Saudi Arabia

Rania Mohammed Ahmed¹, Reem AL-Zahrani², Samerah AL-Thomali³, Rasha AL-Gethami⁴, Ahlam AL-Zaydi⁵, Abeer Nasser ALGhalbi⁶, Nada Hassan⁶, Afaf Mohamed Taha Elamin⁷

^{1, 2, 3, 4, 5}Radiology Department, Faculty of Applied Medical Science, Taif University, Taif, Saudi Arabia.

⁶Faculty of Medicine, Taif University, Taif, Saudi Arabia.

⁷Sattam bin Abdul-Aziz University, College of Applied Medical Sciences, Radiology and Medical Imaging Department, Al-Kharj-Saudi Arabia

Abstract: *Hospital infections are serious concerns for patients and radiology health care workers whose numbers increased recently, and as well their duration of patient contact with the usage of new modalities becomes longer. No previous studies has been done to assess knowledge, practice of infection control and attitude towards personal protective equipment's, among radiographers in Taif city, Sothis study aimed to evaluate the knowledge, attitude, and practices of infection control among radiographers in Taif. Knowledge and attitude data were collected by a well-designed questionnaire, and performance data was collected by observation check list, from 50 members of radiology staff (male & female) in radiology departments at King Abdul-Aziz Specialist Hospital (KAASH) and King Faisal Hospital (KFH), Taif City, Saudi Arabia. Majority of radiographers (98%) were of good knowledge about infection control and about three quarters of them demonstrated a good performance .Majority believed that Personal Protective Equipment (PPE) is protective(82%), while (10%) did not believe it is protective, and 8% of our studied sample did not heard about the PPE. As a quarter of radiographers showed poor performance in infection control procedures, and approximately 20% of them either do not believe that PPE is protective or not hear about it, infection control team in both (KAASH) and (KFH) need to perform more training courses about infection control for radiological employee especially those who had diploma certification and older in age.*

Keywords: Infection control, Knowledge, Attitude, PPE, Taif

1. Introduction

Hospital infections are serious concerns for health care workers and patients. Needle stick injuries, blood contacts, airborne infections and any kind of contamination pose a risk for hospital infections. The risk of hospital infection has been increased in radiology since the number of the patients and the exposure time between patients and radiology workers have increased especially with the usage of new modalities in the last three decades.^[1]

Radiology department have a role to diagnosis the patient. For that, the radiology department receive a lot of patients whether outpatient or in patient. We can conclude that radiology department have high risk to spread the diseases from patient to staff, staff to staff, patient to patient, equipment to patient and staff and vice versa.^[2] Some of the equipment that can contribute to spread the disease or pathogens are x-ray couches, chest stands, control panel, exposure buttons, cassette that has been used while mobile radiography and patient gowns. Cassette x-ray is the possible equipment that can be source of the nosocomial infection. However were found a lot of common bacteria in the cassette that has been used while performing mobile radiography. Bacteria that have been found were Coagulase negative staphylococcus, micrococci, diphtheroids and some of the species of bacillus. As we know, cassette is the equipment that always direct contact with patient skin, so from that we can conclude that cassette is one of the most equipment that can be the source of nosocomial infection.^[2]

Radiology clinics have been going through rapid changes in the last three decades. Apart from conventional X-ray applications, techniques that have recently joined the radiology family, namely Ultrasounds, Computed Tomography, and Magnetic Resonance Image, have accelerated the pace of change whereas a new discipline such as interventional radiology has brought new responsibilities. An important outcome of such change has been patient's longer stay in radiology clinics due to the increase in the number of patients and more complicated nature of evaluations. Therefore, radiology clinics are risky places in terms of hospital infections. In addition, because radiology departments do not have standards to control hospital infections, this risk is further aggravated.^[1]

Nosocomial infection is those acquired in the hospital setting. Hospitals and compromised patients provide the optimal environment for nosocomial infection. Sources of this specific type of infection include the hospital proper and the medical personal within, contaminated invasive diagnostic and therapeutic devices, and opportunistic microorganisms that are constituents of the normal flora.^[3]

Through asepsis, environmental control of infection is simple. Various chemical and physical methods may be used to achieve surgical or medical asepsis. The employment of the medically aseptic hand washing technique, standard precaution and transmission-based precautions has contributed significantly in reducing the probability of spreading infection disease.^[3] An infection is considered nosocomial if it becomes evident 48 hours or more after

hospital admission or within 30 days of discharge following inpatient care.^[4]

One of the most recurrent themes with regards to the prevention of nosocomial infections in hospital has been the issue of hand washing among medical personnel. Knowledge and practice of hand washing and Aseptic technique are very important in preventing the transfer of pathogen micro-organisms by nurses to their patients in the course of rendering care. It is considered as one of the most infection control measures.^[5]

Hand washing is one of the most important defenses against the spread of infectious disease. Hands should always be washed with soap and running water following contact with blood or other potentially infectious body secretions, even if gloves have been used for the task. Do remember that hand washing is the most effective way to reduce the spread of disease. Surgical caps or hoods and/or shoe covers or boots shall be worn in instances when gross contamination can reasonably be anticipated (e.g., autopsies, or thopaedic surgery).^[6]

Use of gowns, caps, masks and proper hand washing, ward floor, toilet, wash basins, sinks etc., need to be kept clean by frequent washing. Health education session for the parents, attenders and also for the staff nurses.^[7]

A study conducted in Egypt by Hakim S, et al^[8], indicated that attitude and knowledge among health care workers such as housekeepers, physicians and nurses could also play a vital role in management of wastes.

Correct knowledge, positive attitude and safe practices of health care workers are very imperative while managing this infectious waste. Knowledge, attitude and practice of health care workers have a greater impact on proper waste segregation globally.^[9]

Healthcare workers should have adequate knowledge and practice about standard infection control precautions.^[10]

There was no study has been done to assess knowledge and practice of infection control, universal precautions among radiographers in this locality. So this study aim to evaluate the knowledge, attitude, and practices of infection control among the radiology staff in radiology department, King Abdul Aziz Specialist Hospital (KAASH) and King Faisal Hospital, and to mention some recommendations according to the rustles obtained.

2. Subject and Methods

Research design: Descriptive research design was used in the present study

Setting: The study was conducted in Radiology department, King Abdul Aziz Specialist Hospital (KAASH) and King Faisal Hospital. Taif, Saudi Arabia.

Sample of the Study:

Total number of the study sample was 50 members from the radiology staff (male & female).

Tools of data collection:Data was collected through; a well-designed questionnaire about knowledge, and attitude of infection control among the radiology department personal contain socio-demographic data.It was consisting of two parts classified as follow:

First part: Personal Data Sheet, included items related to name (optional), gender, age, Nationality, years of experience, and attending training course about infection control in radiology department.

Second part:Contain an evaluation of infection control practice among members of radiology department contain questions about ;

- Is radiology technician washed her\his hand after contact with each patient within radiology department ?
- Does he/she wash his/ her hands in between changing gloves ?
- Do radiology technician use personal protective equipment's ?

Administrative Design

An official permission was obtained from the General Director of King Abdul Aziz Specialist Hospital (KAASH) and King Faisal Hospital.

Operational Design

This design explains the steps of actual implementation of the study, including preparatory phase and the field work.

Fieldwork

After ensuring the clarity and understandability of the study tools the actual data collection was started in February till June 2014. The researchers met with all participated ,explained to her/him the purpose of the study, and then the researchers distributed the questionnaire form. The tools of the study were completed and collected during morning shifts.

Ethical considerations

Oral agreement was obtained from all participants after informing them about their rights to participate, refuse, or withdraw at any time. Total confidentiality of any obtained information was ensured. The steps of the study could not entail any harmful effects on participants.

Statistical design

Data entry and statistical analysis were done using SPSS 23 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables. correlation analysis was used for assessment of the inter-relationships among quantitative variables. P>0.05 (Not significance), P<0.05 (Significance).

3. Results

Table 1: Demographic characters of studied sample.(n=50)

Demographic characters	Frequency		Cumulative freq.
	N0.	%	
Age (years)			
25-35 years	41	82	82

36-45 years	7	14	96
46-55 years	2	4	100
Sex			
Male	23	46	46
Female	27	54	100
Nationality			
Saudi	40	80	80
Non Saudi	10	20	100
Number of years of experience of the respondents			
One year	4	8	8

2-5 years	26	52	60
6-10years	14	28	88
11- ≥ 15 years	6	12	100
Tacking any training course about infection control in radiology department?			
Yes	40	80	80
No	10	20	100
Total	50	100	

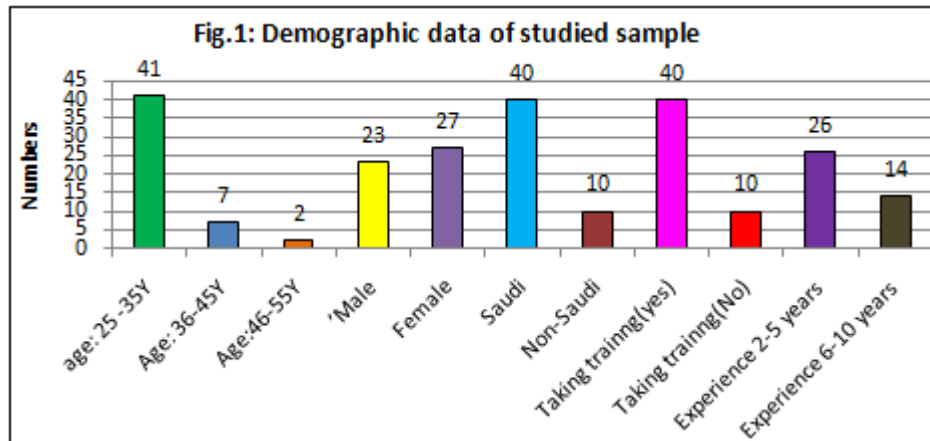


Figure 1: Showed frequency distribution of demographic characters of studied sample. Majority of studied sample were in age group (25-35) years with percentage of (82%), females were (54%), Saudi were (80%). Experience of (2-5) years was (52%), and have had a training course about infection control in Radiology department were only (08%)

Table 2: Knowledge items about infection control among 50 studied Radiology technicians. (n=50)

Knowledge items	Frequency	
	No.	%
Radiology clinics are risky places in terms of hospital infection?		
True	42	84
False	8	16
Radiology department in KAASH \ King Faisal Hospital do not have standards to control hospital infection?		
True	11	22
False	34	68
I do not know	5	10
Source of knowledge regarding infection control		
Through books	3	6
somebody told me about it	8	16
Mass Media	2	4
Conference, seminars, training course	29	58
Rating his/her knowledge on infection control inside the department		
Poor	2	4
Moderate	11	22
Good	32	64
V.Good	5	10
Having all three doses of the vaccine for hepatitis B?		
Yes	40	80
No	3	6
Not sure	7	14
Frequency of cleaning couch, cassette, washing hands or using protective barriers		
After the day's job	5	10
After examining each patient	28	56
Only after examining patients with open wounds	11	22
Before and after work	6	12
Total	50	100

* Majority of study sample their source of knowledge regarding infection control varies from seminars, conferences, and training courses they attend.

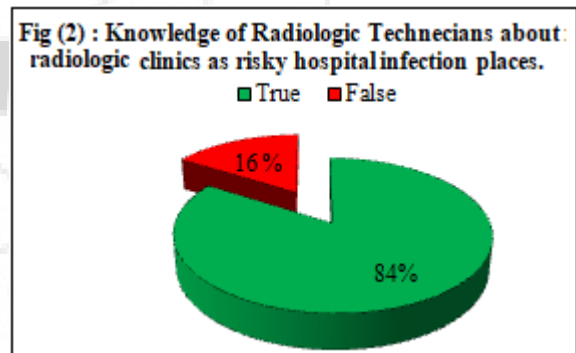


Figure 2: On asking about if the radiology clinics are risky places in terms of hospital infection, (84%) mentioned that this statement is true, while unfortunately, (16%) mentioned that it is false statement.

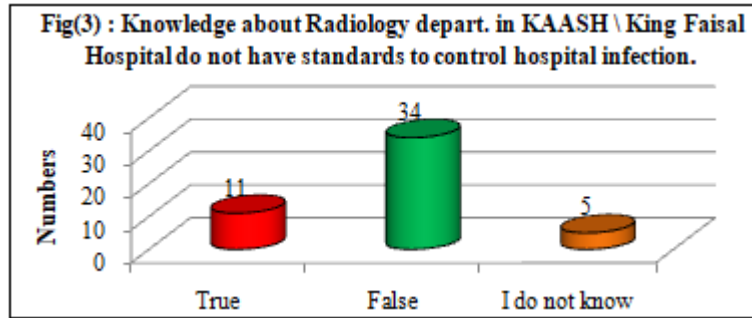


Figure 3: On asking about Radiology department in KAASH \ King Faisal Hospital do not have standards to control hospital infection, only (22%) mentioned it is true, while (68%) mentioned it is false, and (10%) mentioned that they do not know.

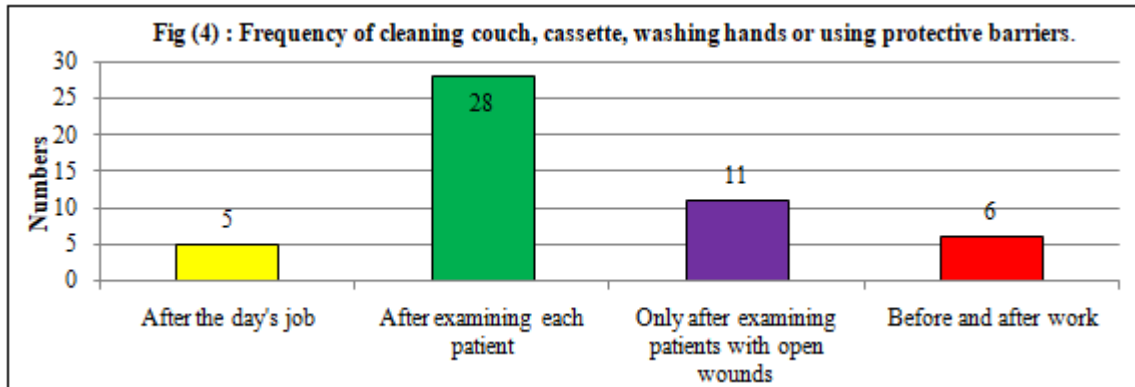


Figure 4: Regarding frequency of cleaning couch, cassette, washing hands or using protective barriers, majority mentioned that after examining each patient (56%).

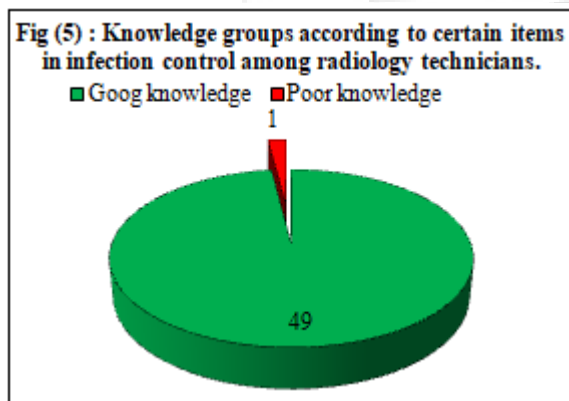


Figure 5: (98%) of study sample have had good knowledge about infection control, compared to only (2%) with poor knowledge. Demonstrate the high level of knowledge of our studied sample.

protective (82%), while 10% did not believe it is protective, and 8% of our studied sample were do not know.

Table 3: Regarding radiological technicians performance towards infection control ,majority have had good performance (72%), while approximately one third were of poor performance. (n=50)

Performance groups	Frequency	
	No.	%
Good performance(16-24)	36	72
Poor performance(25-32)	14	28
Total	50	100

Table 4: The association between tacking of training course about infection control in radiology department and the performance of Radiological technicians. (n=50)

Tack any training course about infection control in radiology department	Radiological Tech. performance groups		Total	P value of difference
	Good performance (16-24)	Poor performance (25-32)		
Yes	34 94.4%	6 42.9%	40 80%	*P=0.000
No	2 5.6%	8 57.1%	10 20%	HS
Total	36 100%	14 100%	50 100%	

*Fisher exact test showed high significant co-relation between the variables represented as (p=0.000). HS(Highly Sign).

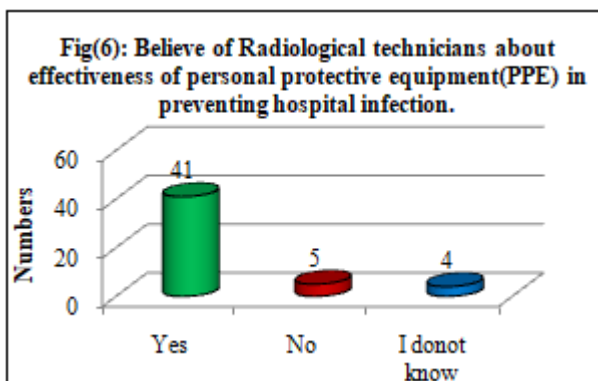


Figure 6: showed believe of Radiological technicians about effectiveness of personal protective equipment(PPE) in preventing hospital infection. Majority believed it is

4. Discussion

This study was conducted among radiology technicians in Taif, Saudi Arabia. Age group (25-35) years represented the higher percentage (82%) of study sample, female represented (54%), (52%) from study sample have experience of (2-5) years, (80%) of study sample have had training sessions about infection control before as in **table (1)**, **fig (1)**. Majority of study sample their source of knowledge regarding infection control varies from seminars, conferences, and training courses they attend, as in **table (2)**. On asking about if the radiology clinics are risky places in terms of hospital infection, (84%) mentioned that this statement is true, while unfortunately, (16%) mentioned that it is false statement regarding standards to control hospital infection at radiology department in KAASH and King Faisal Hospital, only (22%) mentioned it is true, while (68%) mentioned it is false, and (10%) mentioned that they do not know as in **fig (2)** & **fig (3)** respectively. Regarding frequency of cleaning couch, cassette, washing hands or using protective barriers, majority mentioned that after examining each patient (56%), as in **fig (4)**.

This study reported high level of knowledge of our studied sample. (98% of participants have had good knowledge about infection control, as in **fig (5)**). A study was done in Al-Hassa Governorate reported that only (61%) of participants were aware of standard precautions and infection control guidelines. In addition, in Saudi Arabia, it was reported that there was a lack of knowledge of infection control measures by healthcare workers (HCWs) in hospitals as well as at a primary care level. This difference may be due to the high percentage of infection control (IC) training courses in our participants. Also it may be due to performance of other studies in Saudi Arabia on health care workers other than radiological technicians.^[11]

In study carried out among hospital staff in a medical college hospital in Bangalore^[12], showing that doctors and nurses had better knowledge than other staff regarding health-care waste management.

Few studies have reported on medical student's knowledge of standard isolation precautions or sharp injuries^[13,14] and noted a lack of adequate knowledge of standard precautions.^[14]

This study found that; believe of radiological technicians about effectiveness of personal protective equipment (PPE) in preventing hospital infection was high. Majority believed it is protective (82%), while (10%) did not believe it is protective, and 8% of our studied sample were do not know, as in **fig (6)**. While (Amin, 2009)^[11], reported that the importance of standardized patients (SPs) when caring for patients with known infectious conditions was appreciated by (53.8%) of participants. The author highlighted the need for on-the-job practical training in SPs and infection control guidelines was cited by (53.7%) of participants.

This study highlighted that the Radiological technicians performance towards infection control; majority were of good performance (72%), while approximately one third were of poor performance, as in **table (3)**. In Okaro, et al. reported that only (41.7%) of radiographers apply the

principle of universal precaution. It is not achieved among half of the practitioner, so we have to worry with this situation. Most of radiographers only clean their equipments such as cassette and couch after treat patients with open wounds. In this research also most of radiographers clean their hands only after treat the same conditions of the patients.^[15]

This study revealed an association between tacking of training course about infection control in radiology department and the performance of Radiological technicians. This study confirm the good effect of training of Radiological technicians on their performance. Sixty eight percent of those who had training on infection control showed good performance by using our checklist, compared to only (4%) who did not had training courses, the difference was highly significant statistically ($P=0.000$), as in **table (4)**. One study by Kyle et al. 2013^[16], found out that hospital staff was knowledgeable about waste segregation practices, but had poor compliance with national policies. However, after staff training in Healthcare Waste (HCW) management, the correct responses increased and bio hazardous waste disposal at the hospital reduced.

Study in Kenya,^[17] it was found out that health and safety in healthcare waste management was not included in most of the curricula for training the three health professionals (clinicians, nurses, laboratory technologists). However, most of them acquired this through on-job training from seminars and informally through organized talks at workplaces. One study in Nigeria revealed that radiographers claimed to have awareness or recognition for universal blood and body fluid precautions, with various proportions claiming different sources of awareness, the largest proportion being through clinical seminars or symposia. Hospitals provide a good transmission pathway for the spread of nosocomial infections, due to poor infection control practices among health workers. Hands should be washed after attending to one patient but before attending to the next. It must not be missed when contacted is made with body fluids.^[18]

One study^[19] found that though the general medical practitioners and medical college students had sufficient knowledge and attitude towards nosocomial infections, their knowledge was lacking at certain areas. Also both these groups practice approach towards nosocomial infection was not sufficient and it needs improvement. When we compared the knowledge, attitude and practice scores of the general medical practitioners and medical college students, it was found that both these groups having similar knowledge, attitude and practice scores and the difference were not found to be statistically significant.^[20]

Study from India showed that nurses had better attitudes towards separation of waste, proper disposal, implementation of rules and cooperation in programmes than did technicians and housekeeping staff.^[21]

5. Conclusion

This study aimed at to evaluate knowledge, attitude and practices of infection control among the radiology staff in radiology departments of KAASH and KFH, and it is

considered the first study in Taif . (98%) of studied sample were of good knowledge about infection control. In addition, their performance was good in about three quarters of them. This study revealed an association between tacking of training course about infection control in radiology department and the performance of Radiological technicians. Sixty eight percent of those who had training on infection control showed good performance by using our checklist, compared to only (4%) who did not had training courses, the difference was highly significant statistically (P=0.000).

6. Acknowledgements

The authors thanks King Abdul Aziz Specialist Hospital (KAASH) and King Faisal Hospital ,Taif city - Saudi Arabia for their cooperative in data collection , also thanks extended to Dr. Magda Ahmed Mohammed Mansour , Prof. Laila Sh Dorgham and all books authors and sources from where the data discussed and reviewed.

7. Conflict of Interest

None Declared.

References

- [1] Ustunsoz.B. Hospital infection in radiology clinics , Turkish Society of Radiology .2005; 11: 5-9.
- [2] Ochie, K., & Ohagwu, C. C. Contamination of x-ray equipment and accessories with nosocomial bacteria and the effectiveness of common disinfecting agents. African Journal of Basic & Applied Sciences.2009; 1, 1 (1-2), 31-35.
- [3] Adler . A , Carlton .R. Introduction to radiology and patient care .2nd edition . Philadelphia , London , New yourk . st . lonis Sydney Toronto.1990 ; 218 : 5-9.
- [4] Bello AI, Asiedu EN, Adegoke BO, Quartey JN, Appiah-Kubi KO, Owusu-Ansah B; Nosocomialinfections: knowledge and source of information among clinical health care students in Ghana. International journal of general medicine, 2011; 4:571.
- [5] Ojong IN, Etim MI, Nlumanze FF, Akpan MI; The practice of hand washing for the prevention of nosocomial infections among nurses in general hospital IkotEkpene, AkwaIbom State, Nigeria. Archives of Applied Science Research, 2014; 6(1):97-101.
- [6] Occupational Safety and Health Standards, U.S. Department of Labor. Available from URL\ https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=10099-10051. 78 FR 9313, Feb. 8, 2013.
- [7] D'Souza P, Umarani J; Awareness of students on prevention of nosocomial infection in pediatric wards. International Journal of Pharmacy and Biological Sciences, 2014; 4(2):66-71.
- [8] Hakim, S.A., Mohsen, A & Bakr, I. Knowledge, Attitudes and Practices of Health-Care Personnel towards Waste Disposal Management at Ain Shams University Hospitals, Cairo, 2014; 20(5): 347-354..
- [9] Kumar, R., Somrongthong, R. & Shaikh, B.T. Knowledge, Attitude and Practices of Health Staff regarding Infectious Waste handling of Tertiary Care Health Facilities at Metropolitan City of Pakistan, 2013; 25(1-2): 109-12.
- [10] Jayasinghe RD, Weerakoon BS; Prevention of nosocomial infections and standard precautions: knowledge and practice among radiographers in Sri Lanka. J Med Allied Sci., 2014; 4(1): 09-16.
- [11] Amin .T. Healthcare providers knowledge of standard precaution at the primary health care level in Saudi Arabia , ministry of health, Health Directorate- Al-Hassa, Hafuf , Saudi Arabia.2009;14:1-8.
- [12] Madhukumar S, Ramesh G. Study about awareness and practices about health care waste management among hospital staff in a medical college hospital, Bangalore. Iranian Journal of Basic Medical Sciences, 2012, 3:7-11.
- [13] Askarian M, Honarvr B, Tabatabaee HR, Assadian O; Knowledge, practice and attitude towards standard isolation precaution in Iranian medical students. J Hosp Infect., 2004; 58:292-296.
- [14] Koenig S, Chu J; Senior medical students knowledge of universal precautions. Acad Med.,1993; 68:372-374.
- [15] Okaro, A. O., Eze, C. U., & Ohagwu, C. C. Awareness, knowledge, attitude and practice of blood and body fluid precautions among radiographers in Enugu, Nigeria. African Journal of Basic & Applied Sciences.2011; 2, 1-2, 11-17.
- [16] Kyle, M. J., González, M.L., Lourdes, D., Gamero, M., Relyea, G., & Luque, L.E. et all. Improving Waste Segregation while reducing costs in a Tertiary-Care Hospital in a Lower Middle-Income Country in Central America. Waste Management & Research, 2013; 31(7): 733-738.
- [17] Nkonge, N. A., Mayabi. O. A, Kithinji, J. & Magambo, K.J. Knowledge, Attitude and Practice of Health-care Waste Management and Associated Health Risks in the two Teaching and Referral Hospitals in Kenya, 2012; 37(6): 1172-7.
- [18] Jayasinghe RD, Weerakoon BS; Prevention of nosocomial infections and standard precautions: knowledge and practice among radiographers in Sri Lanka. J Med Allied Sci., 2014; 4(1): 09-16.
- [19] SatishPrabhakarMasavkar , Aman Mubarak Naikwadi . Knowledge, Attitude and Practice Regarding Nosocomial Infections among General Health Practitioners and Medical College Students. Sch. J. App. Med. Sci., May 2016; 4(5F):1852-1856.
- [20] Soh KL; Critical care nurses' knowledge in preventing nosocomial pneumonia. Australian Journal of Advanced Nursing, 2007; 24(3):19-25.
- [21] Shafee M, Kasturwar N, Nirupama N. Study of knowledge, attitude and practices regarding biomedical waste among paramedical workers. Indian Journal of Community Medicine, 2010, 35:369-370.