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Original Research Article

Self-Reported Knowledge and Attitude of Emergency Physicians and Residents Regarding Preparedness for Radiological Emergencies in the Aseer Region, Kingdom of Saudi Arabia

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Abstract: Radiological accident can have a huge impact on public health. Emergency physicians should be prepared to respond to potential radiation emergencies by improving their knowledge and attitude regarding radiation emergency response. This study was consisted of a cross sectional survey that conducted among Emergency physicians in Aseer region, southwest of Saudi Arabia by 2015. The questionnaires were distributed during annual emergency physicians meeting in Aseer region of Saudi Arabia and collected in the same event. Data were coded and enter to computer provided with statistical package for social sciences (SPSS 15). The survey response rate was 88%. Only 10.3% of respondents had attended radiation emergency training course. Those who attended training courses and with poor knowledge for utilizing PPE, decontamination, diagnosis and utilizing chelating agents 40%, 40%, 30% and 40% respectively. And those who were not attend training courses and with poor knowledge for utilizing PPE, decontamination, diagnosis and utilizing chelating agents 71.3% ,72.4%,65.5% and 80.5% respectively. 40% of those who attended training courses unlikely to come to work while 44.8% among those who were not attending training courses unlikely to come to work. 40% of attending training courses respondents feels uncomfortable to take care of victims and 30% of them feel uncomfortable to do decontamination for victims. 46% of those who were not attending training courses feel uncomfortable to deal with victims and 42.5 % of them feel uncomfortable to do decontamination for victims. Low level of knowledge and attitude among most of emergency physicians in Aseer region was discovered. Training courses, which were provided improving emergency physicians knowledge but doesn't change their attitude toward attending and caring of victims.

Keywords: knowledge, attitude, radiation, emergency physicians.

INTRODUCTION

Radioactive materials are hazardous and widely available and used in different applications around the world. Radiation emergencies are rare but can be devastating when they happen [2]. Preparedness of the health care system through the training of staff is crucial in the success of a response to an emergency involving radiation or radioactive material [3]. Studies done outside Saudi Arabia have shown that health care providers feel unprepared to respond to radiation emergencies and that training can improve their knowledge and comfort level in caring for radiation emergency victims [1,4,5].

The knowledge and attitude of frontline emergency physicians need to be described in order to identify gaps and potential solutions.

STUDY AIM

Describe the preparedness of emergency physicians in the Aseer region hospitals in KSA regarding radiation emergencies by describing their self-reported knowledge about radiation and attitude towards radiation hazards and incidents.

SUBJECTS AND METHODS

This study consisted of a cross-sectional survey conducted among emergency physicians in the Aseer region, southwest of Saudi Arabia in 2015. The investigator designed the questionnaire based on research conducted in this regard by S. Sheikh *et al* in 2011 [1].

The survey questions were reviewed by four emergency medicine consultants and pilot tested in a group of 10 emergency medicine physicians who practice in the Aseer region of Saudi Arabia.

The survey consisted of the following parts:

1. Demographics and general information about respondents:
2. Gender, level of education, years of clinical experience, and previous attendance of training courses in radiation emergencies.

3. Self-assessment of basic knowledge towards management of radiation-exposed victims: Personal Protective Equipment (PPE), decontamination, radioactive material chelating agents and diagnoses of acute radiation injuries.
4. Self-assessment of attitude regarding responding to a radiation emergency like a dirty bomb or a nuclear detonation. Comfort with decontamination of victims contaminated with radioactive material was also included in the survey.

The study was approved by the institutional review board at the Aseer Central Hospital. In April 2015, all emergency physicians who practice in the Aseer region hospitals were invited to attend a meeting held in Abha, the main city of Aseer region in Saudi Arabia. 110 emergency physicians attended the event and investigators distributed the survey questionnaire to all attendees and then collected the responses at the same event. Data were coded and entered in a secure computer provided with Statistical Package for Social Sciences (SPSS) software version 22.0. Categorical data were presented as number and percentage and compared using Chi-square tests (χ^2). P-value equal or less than 0.05 was considered statistically significant.

RESULTS

The total number of physicians who participated in this study was 97 out of 110 physicians who were present at the meeting (response rate 88%).

Table-1 describes the characteristics of respondents. 70.1% were males and the majority of them were residents (81.4%).Specialists and consultants contributed 9.3% and 8.2% of the responses respectively. 10.3% of the respondents had previously attended a training course in radiation emergencies.
The results of respondents are as follow: -

A. Self-reported knowledge regarding management of radiation emergencies:

1. Familiarity with the use of personal protective equipment (PPE):

a) Total respondents (table 2a), (graph 1a)
The results of total respondents were poor 68.04%, Good 24.74%, Very good 4.12%, Excellent 3.09%

b) Results stratified by previous radiation training (table 3a) (graph 2a)
The results of a group with radiation training courses were Poor 40%, Good 40 %, Very good 10 %, Excellent 10% while the results of a group without radiation training courses were Poor 71.3%, Good 23%, Very good 3.4%, Excellent 2.3% (P-value 0.172)

c) Results stratified by level of education: (table 4a) (graph 3a)
The results of senior staff (specialist, consultant) of respondents were Poor 64.7%, Good 29.4%, Very good 0%, Excellent 5.9% while the results of junior staff of respondents (resident, attending physicians) were Poor 68.8%, Good 23.8%, Very good 5%, Excellent 2.5% (P-value 0.663)

2. Familiarity with decontamination of victims contaminated with radioactive material:

a) Total respondents (table 2a), (graph 1a)
The results of total respondents were poor 69.07%, Good 28.87%, Very good 1.03%, Excellent 1.03%

b) Results stratified by previous radiation training (table 3a) (graph 2a)
The results of a group with radiation training courses were Poor 40%, Good 40%, Very good 10 %, Excellent 10% while the results of a group without radiation training courses were Poor 72.4%, Good 27.6%, Very good 0.0%, Excellent 0.0% (P-value 0.000)

c) Results stratified by level of education: (table 4a) (graph 3a)
The results of senior staff (specialist, consultant) of respondents were Poor 47.1%, Good 47.1%, Very good 0%, Excellent 5.9% while the results of Junior staff (resident, attending physicians) of respondents were Poor 73.8%, Good 25%, Very good 1.3% , Excellent 0% (P-value 0.033)

3. Familiarity with use of chelating agents for radioactive material

a) Total respondents (table 2a), (graph 1a)
The results of total respondents were Poor 76.29%, Good 21.65%, Very good 1.03%, Excellent 1.03%

b) Results stratified by previous radiation training (table 3a) (graph 2a)
The results of a group with radiation training courses werePoor 40%, Good 50 %, Very good 0.0 %, Excellent 10.0% while the results of a group without radiation training courses were Poor 80.5%, Good 18.4%, Very good 1.1%, Excellent 0.0% (P-value 0.002)

c) Results stratified by level of education: (table 4a) (graph 3a)
The results of Senior staff (specialist, consultant) of respondents were Poor 58.8%, Good 35.3%, Very good 0%, Excellent 5.9% while the results of Junior staff (resident, attending physicians) of respondents were Poor 80%, Good 18.8%, Very good 1.3%, Excellent 0% (P-value 0.05)

4. Familiarity with diagnosing acute radiation injuries:

a) Total respondents (table 2a), (graph 1a)
The results of total respondents were Poor 61.86%, Good 26.80%, Very good 10.31%, Excellent 1.03%

b) Results stratified by previous radiation training (table 3a) (graph 2a)
The results of a group with radiation training courses were Poor 30%, Good 30 %, Very good 30 %, Excellent 10% while the results of a group without radiation training courses were Poor 65.5%, Good 26.4%, Very good 8.0%, Excellent 0.0% (P-value 0.002)

c) Results stratified by level of education: (table 4a) (graph 3a)
The results of Senior staff (specialist, consultant) of respondents were Poor 41.2%, Good 41.2%, Very good 11.8%, Excellent 5.9% while the results of Junior staff (resident, attending physicians) of respondents were Poor 66.3%, Good 23.8%, Very good 10%, Excellent 0% (P-value 0.05)

B. Self-reported attitude regarding attending radiation emergency events:

1. Likely to attend during radiation emergency as a result of dirty bomb

a) Total respondents (table 2b), (graph 1b)
The results of total respondents were Unlikely 44.33%, neutral 39.18%, likely 14.43%, and very likely 2.06%

b) Results stratified by previous radiation training(table 3b) (graph 2b)
The results of a group with radiation training courses were Unlikely 40%, neutral 30 %, likely 20 %, very likely 10% while the results of a group without radiation training courses were Unlikely 44.8%, neutral 40.2%, likely 13.8%, very likely 1.1% (P-value 0.269)

c) Results stratified by level of education:(table 4b) (graph 3b)
The results of Senior staff (specialist, consultant) of respondents were Unlikely 11.8%, neutral 52,9%, likely 29.4%, very likely 5.9% while the results of Junior staff (resident, attending physicians) of respondents were Unlikely 51.3%, neutral 36.3%, likely 11.3%, very likely 1.3% (P-value 0.04)

2. Likely to attend radiation emergency event as a result of nuclear detonation

a) Total respondents (table 2b), (graph 1b)
The results of total respondents were unlikely 53.61%, neutral 32.99%, likely 8.25%, and very likely 5.15%

b) Results stratified by previous radiation training(table 3b) (graph 2b)
The results of a group with radiation training courses were Unlikely 50%, neutral 30 %, likely 10 %, very likely 10% while the results of a group without radiation training courses were unlikely 54.0%, neutral 33.3%, likely 8.0%, very likely 4.6% (P-value 0.895)

c) Results stratified by level of education: (table 4b) (graph 3b)
The results of Senior staff (specialist, consultant) of respondents were unlikely 47.1%, neutral 29.4%, likely 11,8%, very likely 11.8% while the results of Junior staff (resident, attending physicians) of respondents were unlikely 55%, neutral 33.8%, likely 7.5%, very likely 3.8% (P-value 0.51)

C. Self-reported attitude regarding comfort to work during radiation emergency

1. Comfort to take care of radiation exposed victims

a) Total respondents (table 2c), (graph 1b)
The results of total respondents were uncomfortable 45.36%, neutral 34.02%, comfortable 11.34%, and very comfortable 9.28%

b) Results stratified by previous radiation training (table 3c) (graph 2c)
The results of a group with radiation training courses were Uncomfortable 40%, neutral 40 %, comfortable 0.0 %, very comfortable 20.0% while the results of a group without radiation training courses were Uncomfortable 46.0%, neutral 33.3%, comfortable 12.6%, very comfortable 8% (P-value 0.418)

c) Results stratified by level of education: (table 4c) (graph 3c)
The results of Senior staff (specialist, consultant) of respondents were uncomfortable 41.2%, neutral 35.3%, comfortable 11.8%, very comfortable 11.8% while the results of Junior staff (resident, attending physicians) of respondents were uncomfortable 46.3%, neutral 33.8%, comfortable 11.3% , very comfortable 8.8% (P-value 0.97)

2. Comfort to do decontamination for radiation exposed victims

a) Total respondents (table 2c), (graph 1b)
The results of total respondents were uncomfortable 41.24%, neutral 37.11%, comfortable 16.49%, very comfortable 5.15%

b) Results stratified by previous radiation training(table 3c) (graph 2c)
The results of a group with radiation training courses were uncomfortable 30%, neutral 40 %, comfortable 20 %, very comfortable 10% while the results of a group without radiation training courses were uncomfortable 42.5%, neutral 36.8%, comfortable 16.1%, very comfortable 4.6% (P-value 0.812)

c) Results stratified by level of education: (table 4c) (graph 3c)
The results of Senior staff (specialist, consultant) of respondents were Uncomfortable 47.1%, neutral 23.5%, comfortable 23.5%, very comfortable 5.9% while the results of Junior staff (resident, attending physicians) of respondents were Uncomfortable 40%, neutral 40%, comfortable 15%, very comfortable 5% (P-value 0.6)

Table 1: Description of the respondents

Variables	No. (%)
Gender	
Male	68 (70.1)
Female	29(29.9)
Qualification	
Resident	79(81.4)
Attending physician	1(1.0)
Specialist	9(9.3)
Consultant	8(8.2)
Experience after internship	
less than 1 year	25 (25.8)
1-2 years	15 (15.5)
3-4 years	30(30.9)
5-10 years	14(14.4)
more than 10 years	13(13.4)
Attended training course	
Yes	10(10.3)
No	87(89.7)

Table 2a: Self-report knowledge for total respondents

	Total respondents (n=97)			
	Poor	Good	Very good	Excellent
Utilizing PPE in radiation	68.04%	24.74%	4.12%	3.09%
Decontamination of radiation exposed victims	69.07%	28.87%	1.03%	1.03%
Utilizing of radioactive chelating agent	76.29%	21.65%	1.03%	1.03%
Diagnosis of radiation manifestations	61.86%	26.80%	10.31%	1.03%

Table 2b: Self-report attitude regarding attending radiation emergencies for total respondents

	Total respondents (n=97)			
	Unlikely	Neutral	Likely	Very likely
Attending dirty bomb	44.33%	39.18%	14.43%	2.06%
Attending nuclear detonation	53.61%	32.99%	8.25%	5.15%

Table 2c: Self-report attitude regarding involvement in radiation emergency management for total respondents

	Total respondents (n=97)			
	Uncomfortable	Neutral	Comfortable	Very comfortable
Caring of victim in radiation EM	45.36%	34.02%	11.34%	9.28%
Doing decontamination to victim	41.24%	37.11%	16.49%	5.15%

Table 3a: Self-reported knowledge differences between those with and without radiation training

	With Radiation Training (n = 10) n (10.3%)				Without Radiation Training (n = 87) n (89.3%)				Fisher ' s Exact Test P-value
	Poor	Good	Very good	Excellent	Poor	Good	Very good	Excellent	
Utilizing PPE in radiation emerge	4 40.0%	4 40.0%	1 10.0%	1 10.0%	62 71.3%	20 23.0%	3 3.4%	2 2.3%	0.172
Decontamination of radiation exposed victims	4 40.0%	4 40.0%	1 10.0%	1 10.0%	63 72.4%	24 27.6%	0 0.0%	0 0.0%	.000
Utilizing of radioactive chelating agents	4 40.0%	5 50.0%	0 0.0%	1 10.0%	70 80.5%	16 18.4%	1 1.1%	0 0.0%	.002
Diagnosis of radiation manifestations	3 30.0%	3 30.0%	3 30.0%	1 10.0%	57 65.5%	23 26.4%	7 8.0%	0 0.0%	.002

Table 3b: Self-reported attitude differences between those with and without radiation training regarding attending work during radiation emergency

	With Radiation Training (n = 10) n (10.3%)				Without Radiation Training (n = 87) n (89.7%)				Fisher ' s Exact Test P-value
	unlikely	neutral	likely	Very likely	Unlikely	neutral	likely	Very likely	
Attending dirty bomb	4 40.0%	3 30.0%	2 20.0%	1 10.0%	39 44.8%	35 40.2%	12 13.8%	1 1.1%	0.269
Attending nuclear detonation	5 50.0%	3 30.0%	1 10.0%	1 10.0%	47 54.0%	29 33.3%	7 8.0%	4 4.6%	0.895

Table 3c: Self-reported attitude differences between those with and without radiation training regarding involvement in radiation victims' management

	With Radiation Training (n = 10) n (10.3%)				Without Radiation Training (n = 87) n (89.7%)				Fisher ' s Exact Test P-value
	Uncomfortable	neutral	comfortable	Very comfortable	Uncomfortedable	neutral	comfortable	Very comfort	
Caring of victim in radiation emergency	4 40.0%	4 40.0%	0 0.0%	2 20.0%	40 46.0%	29 33.3%	11 12.6%	7 8.0%	0.418
Doing decontamination to radiation victim	3 30.0%	4 40.0%	2 20.0%	1 10.0%	37 42.5%	32 36.8%	14 16.1%	4 4.6%	0.812

Table 4a: Self-report knowledge differences between junior and senior emergency staff

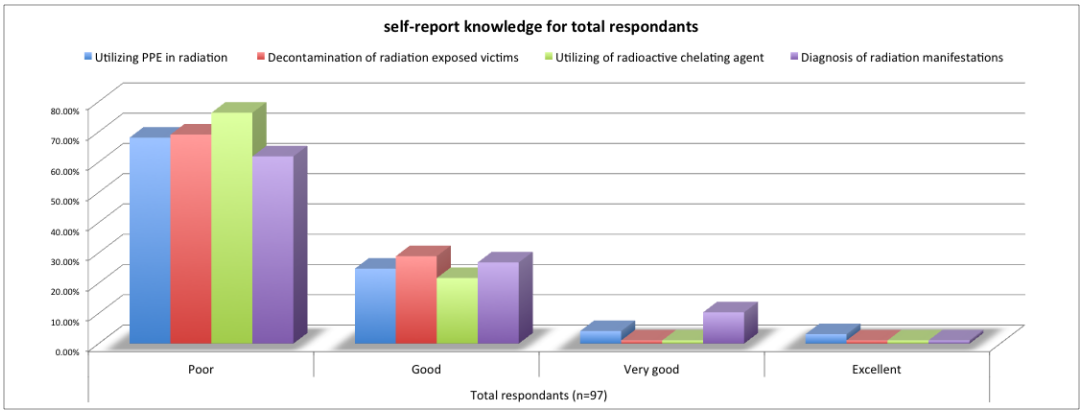
	Junior staff (Residents and attending physicians)				Senior staff (Specialists and consultants)				P-value
	Poor	Good	Very good	Excellent	Poor	Good	Very good	Excellent	
Utilizing PPE in radiation	68.80%	23.80%	5.00%	2.50%	64.70%	29.40%	0.00%	5.90%	0.663
Decontamination of radiation exposed victims	73.80%	25.00%	1.30%	0.00%	47.10%	47.10%	0.00%	5.90%	0.033
Utilizing of radioactive chelating agents	80.00%	18.80%	1.30%	0.00%	58.80%	35.30%	0.00%	5.90%	0.05
Diagnosis of radiation manifestations	66.30%	23.80%	10.00%	0.00%	41.20%	41.20%	11.80%	5.90%	0.05

Table 4b: Self-report attitude differences regarding attending radiation emergencies between junior and senior emergency staff

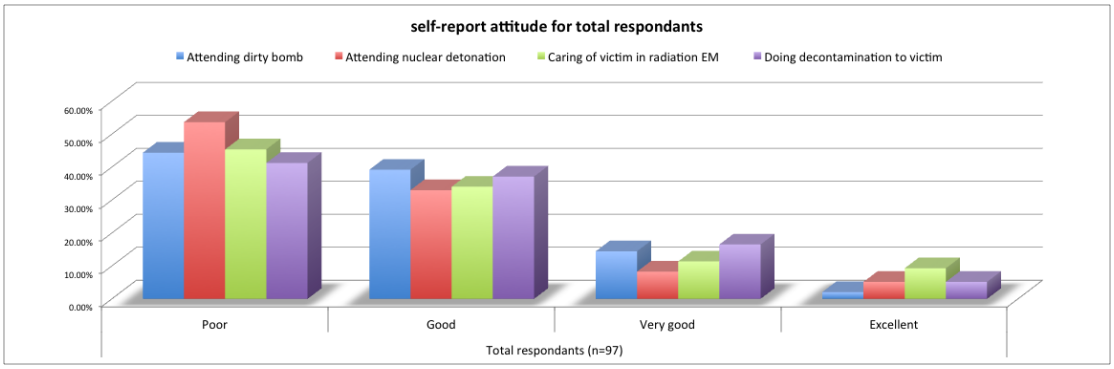
	Junior staff (Residents and attending physicians)				Senior staff (Specialists and consultants)				P-value
	Unlikely	Neutral	Likely	Very likely	Unlikely	Neutral	Likely	Very likely	
Attending dirty bomb	51.30%	36.30%	11.30%	1.30%	11.80%	52.90%	29.40%	5.90%	0.04
Attending nuclear detonation	55.00%	33.80%	7.50%	3.80%	47.10%	29.40%	11.80%	11.80%	0.51

Table 4c: Self-report attitude differences regarding involvement in radiation emergencies management between junior and senior staff

	Junior staff (Residents and attending physicians)				Senior staff (Specialists and consultants)				P-value
	Uncomfortable	Neutral	Comfort	Very comfort	Uncomfortable	Neutral	Comfort	Very Comfort	
Caring of victim in radiation emergencies	46.30%	33.80 %	11.30 %	8.80 %	41.20%	35.30 %	11.80 %	11.80 %	0.97
Doing decontamination to victim	40.00%	40.00 %	15.00 %	5.00 %	47.10%	23.50 %	23.50 %	5.90 %	0.6

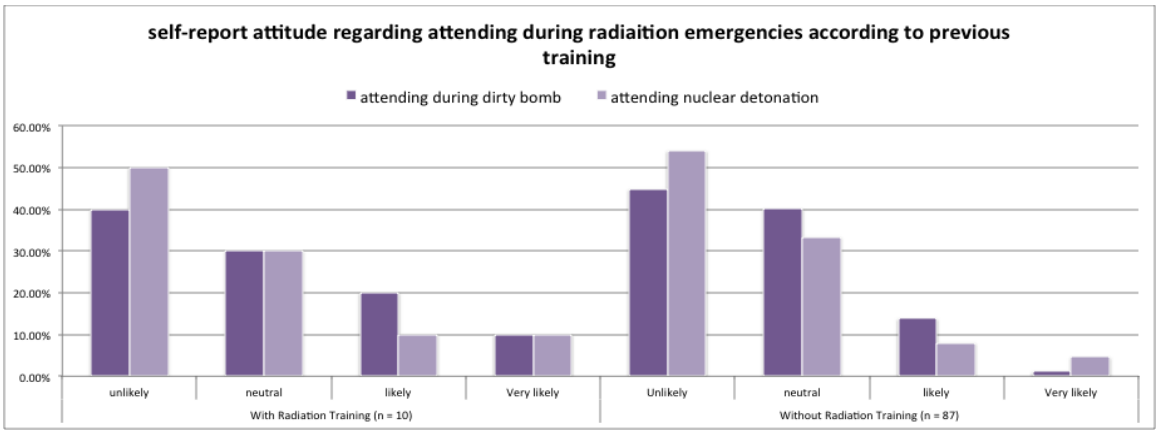


Graph 1a

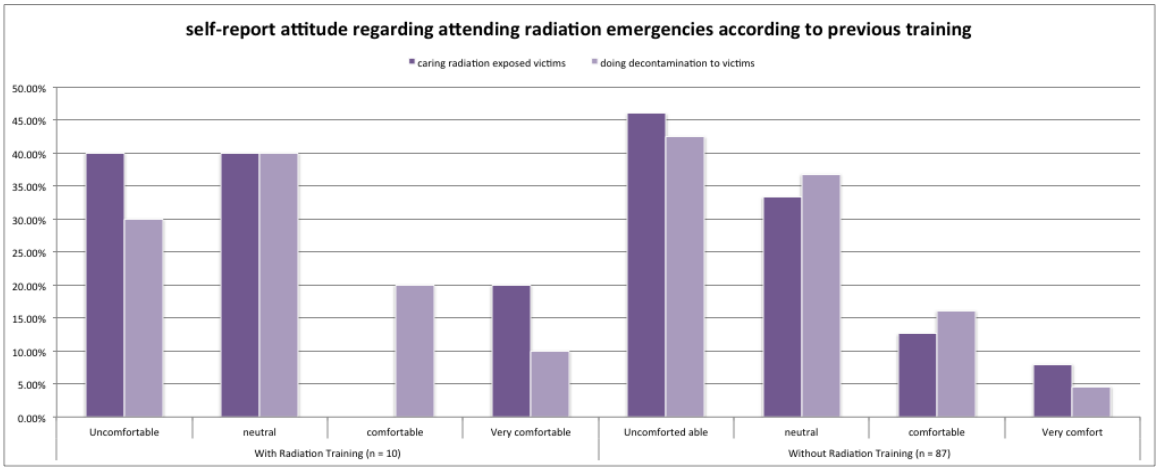


Graph 1b

Graph 2a



Graph 2b



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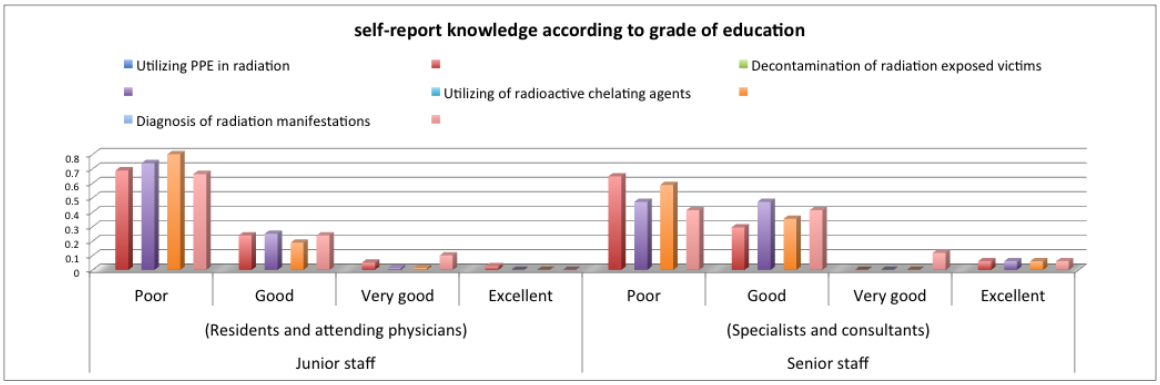
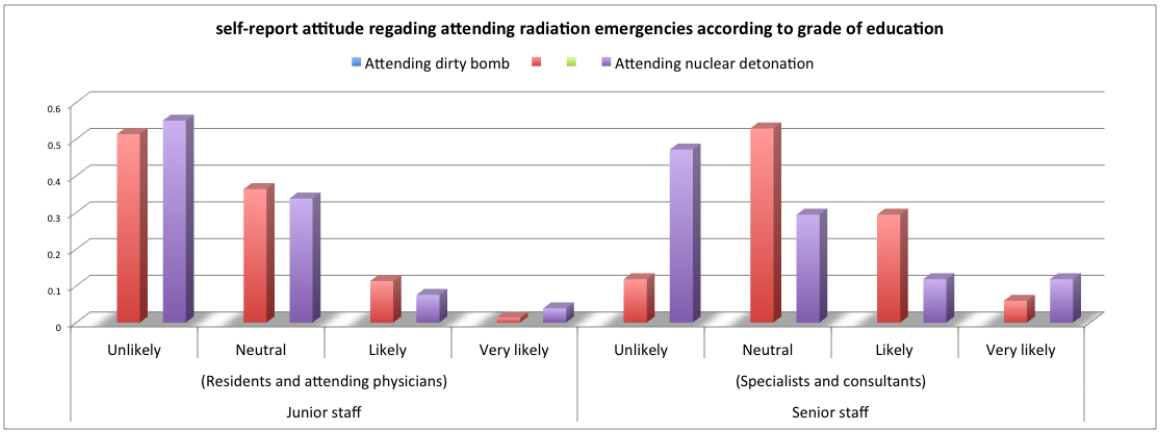
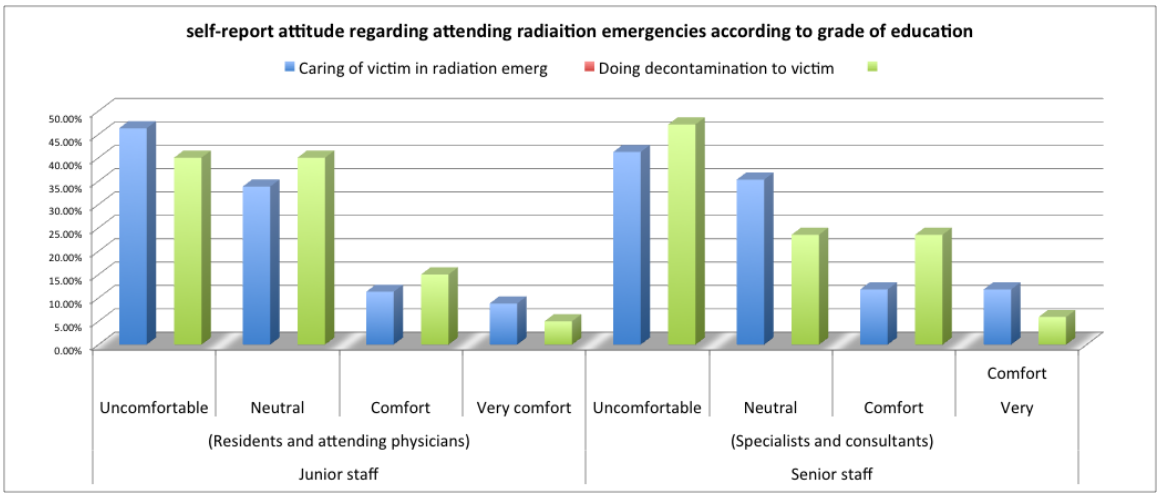


Graph 3a



Graph 3b



Graph 3c

DISCUSSION

Emergency physicians in the area where this study was done are not well prepared to respond to a radiation emergency and lack sufficient knowledge and comfort as noted from the result of this study. Respondents were not satisfied with their knowledge and are not confident that they will be able to care for patients during radiation emergencies. This may be due to the lack of training programs in radiation emergencies. Rareness of specialized courses is due to the rareness of radiation emergencies itself and that led to less concern about such events. Still, awareness about these emergencies is important because they can have devastating consequences when they occur.

Subanalysis of data regarding attending training courses show a significant improvement in the knowledge especially in familiarity to decontaminate a radiation exposed victims and a proper utilizing of specific chelating agents and diagnosing a radiation symptoms and signs of radiation exposure. On the other hand, attending training courses didn't show significant difference between those who had attended training courses and those who had not in utilizing personal

protective equipment, this is due to one of the following two reasons, the first one is that the group with previous training had not have sufficient practical training on how to use personal protective equipment, the second reason is that the group without previous specialized training courses in radiation emergencies were attend other courses that concern about personal protective equipment which led to equalization between two groups. Personal protective equipment training can be obtained in different courses not related to radiation emergencies like Hazardous material training programs.

Our study did not show a positive effect of previous training on attitude. This may be due to inherent weaknesses in the training courses. Another possible reason is the lack of experience in caring for victims of such overwhelming emergencies and the fear of radiation hazards. In contrast to our study, previous research has shown that training improved the comfort level and attitude of health care providers [1].

When analyzing data according to education level, we found a significant difference in knowledge between senior staff and junior staff, which indicates those years of experience can improve the knowledge of health care providers although it does not affect their attitude regarding radiation emergency response.

RECOMMENDATIONS

Based on the findings of this study, it is recommended to increase the number of training courses of radiation emergency and management of their victims with more focused on attitude of the attendee regarding attending and caring of radiation exposed victims.

CONCLUSION

This study revealed that most of emergency physicians and residents in the Aseer region who responded to our survey lack adequate knowledge and skills to deal with victims who were exposed to radiation hazards. This affects their confidence and comfort level in responding to a radiation emergency. Training should be implemented in this group of providers in order to improve their knowledge and comfort level.

REFERENCES

1. Sheikh, S., McCormick, L. C., Pevear, J., Adoff, S., Walter, F. G., &Kazzi, Z. N. (2012). Radiological preparedness-awareness and attitudes: A cross–sectional survey of emergency medicine residents and physicians at three academic institutions in the United States. *Clinical Toxicology*.
2. Meineke, V., &Dörr, H. (2012). The Fukushima radiation accident: consequences for radiation accident medical management. *Health physics*, *103*(2), 217-220.
3. Kollek, D., Welsford, M., &Wanger, K. (2009). Chemical, biological, radiological and nuclear preparedness training for emergency medical services providers. *CJEM*, *11*(04), 337-342.
4. Leoni, N., & Craig, B. (2002). Hawaii medical professionals assessment. *Hawaii medical journal*, *61*, 162.
5. Lim, H. C. S., Ng, K. S., Tan, H. H., & Leong, K. W. G. (2011). Hospital preparedness for radiation emergencies and medical management of multiple combined radiation injury victims. *Proceedings of Singapore Healthcare*, *20*(3), 197-207.