Konfrontasi Journal: Culture, Economy, and Social Changes
p.ISSN: 1410-881X (Print)
e.ISSN: 2716-2095 (Online)

Evaluating Pediatric Radiation Protection Knowledge, Attitudes, and Practices among Physicians: A Case Study of Hospitals in Gambella Town, Ethiopia

Bikila Merga Deresa[1], Belay Sitotaw Goshu[2]
[1]Department of Physics, Gambella University, Ethiopia
[2]Department of Physics, Dire Dawa University, Ethiopia
belaysitotaw@gmail.com

Abstract

The purpose of this study was to assess the knowledge, attitudes, and practices of medical professionals at Gambella City hospitals about child safety. To determine the degree of healthcare workers' comprehension and use of radiation protection measures, both quantitative and qualitative data collection techniques were used. 176 physicians employed by the government in pediatric facilities Gambella Primary Hospital and Gambella General Hospital were included in the study. The results showed that concerning knowledge, attitude, and practice regarding radiation safety precautions, doctors scored 64%, 70%, and 55%, respectively. Of the participants, only 22.2% had prior experience with radiation protection strategies for children. The study emphasizes the continued significance of radiation safety for medical professionals in their day-to-day work and the possibility of improving attitudes and practices through greater awareness and educational programs. To keep healthcare professionals up to date on changing radiation safety best practices, it is advised that they participate in ongoing education programs. The study also highlights how crucial it is to create precise referral standards and protocols for patient imaging as well as to promote efficient communication between radiologists, radiographers, and doctors.

Keywords
Pediatric; Radiation protection; Medical Doctors; knowledge; practice

I. Introduction

Exposure to high radiation levels from medical imaging can have a range of adverse effects on patients and health service providers. Exposure to ionizing radiation during childhood may result in an increased excess risk of cancer compared to adults, pointing toward higher sensitivity to radiation-induced cancers in children [1]. Medical imaging provides potential benefits to the patient’s health care (2); however, there is a potential risk from the associated ionizing radiation dose mainly when performed in young patients (3).

Overexposure to ionizing radiation causes biological diseases such as various cancers, lens opacity, erythema, and genetic mutations can cause grave effects on the digestive system, skin, testicles, ovaries, central nervous system, and ultimately, the entire body (4).

Many studies showed that children are more sensitive to radiation than adults, specifically with a higher relative risk of cancers including other vital organs (brain, breast, skin, and thyroid) following exposures (5).In adolescence, the risk decreased to approach the risk of adults being exposed(6). The result of the study indicated an increased cancer risk associated with CT imaging (7). In the United States, diagnosed cancers annually are estimated by 2% related to CT imaging procedures and comparable to 1.5% to 2.0% in another study. All radiological examinations performed on pregnant patients, young children, and adolescents must be justified and optimized for radiation protection.

Three precautionary measures against radiation sources are indicated as a cardinal rule in the radiation protection field, time, distance, and shielding (8). The longer time exposed to a radiation source, the larger dose is expected (9). Radiation exposure is inversely proportional to the square of the distance (10). Lead has been used most often as the radiation shielding material with a thickness of 2 mm can absorb the entire X-ray energy of 100 Kev (11).

Factors such as disproportionate radiation field, long periods of radiation, and avoiding the use of lead shielding increase the patients' radiation dose. It allows radiologists and radiologists to utilize protective skills to reduce radiation absorption in patients while preserving the diagnostic value of X-ray images (12). Increasing awareness of radiation risks is more effective in determining the level of practice, attitude, and knowledge (13). The current study aims to investigate the organizational and individual factors that influence physicians' knowledge, attitude, and practice (KAP) regarding radiation protection in hospitals in Gambella City, Ethiopia.

II. Research Methods

Both quantitative and qualitative data were analyzed using a cross-sectional study approach in this research. This study's cross-sectional design and mixed techniques enable it to collect data while reflecting current facts and using material that is already true or available. Comparatively, the cross-sectional design is less costly and time-consuming than longitudinal research. The hospitals in Ethiopia's Gambella town served as the study's sites. Every doctor who works in a hospital in Gambella, Ethiopia, participated in this study.

This study was conducted on the census sample of the medical doctors working in hospitals in Gambella, Ethiopia. The sample size of the target population was all medical doctors. This study used a sample of physicians working in a hospital in Gambella, Ethiopia. The target group sample consisted of all physicians. In this study, two sampling methods were used. Her 176 physicians working at primary children's hospitals were included in the census sample. An alternative approach is a consecutive sample of physicians employed at two institutions. After estimating the number of physicians at 240, we used an online monkey survey tool to determine an appropriate sample size with a 95% confidence interval. The result was 148 people. Therefore, there will be a total of 183 participants. The researchers increased the sample size to 190 to account for withdrawals and non-responses

III. Results and Discussions

In this section, the quantitative and qualitative findings are presented. These findings answer the research questions formulated in the introductory section regarding the level of participants' KAP of radiation protection measures and the factors affecting it. Then, we interpreted the key results and compared them with the international findings.

3.1 Descriptive Analysis

Socio-demographic of medical doctors

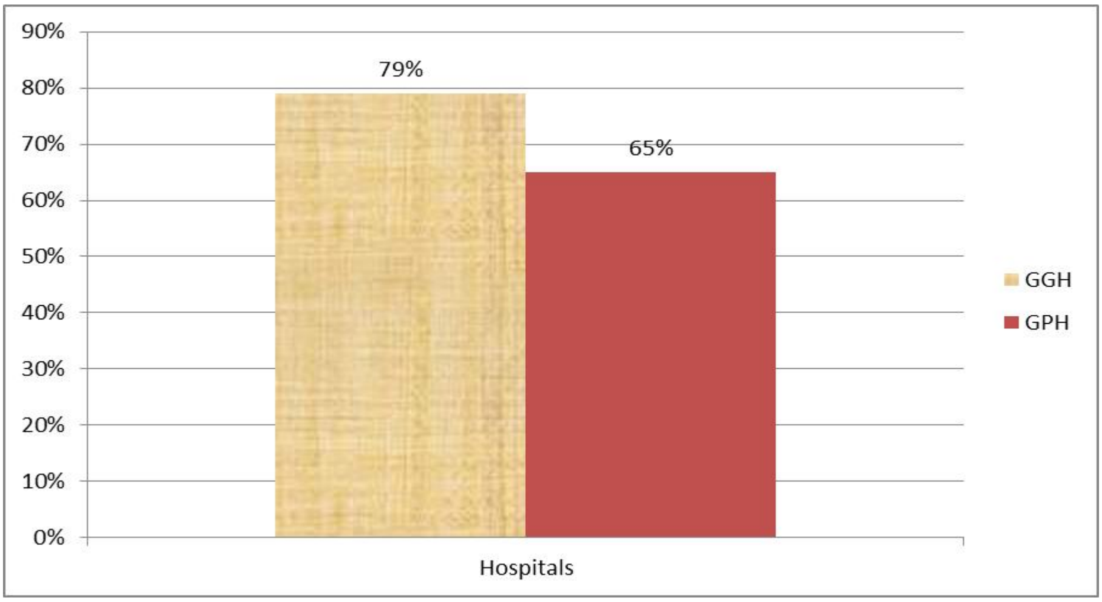

Figure 1. *Distribution of the study participants by their hospitals*

The distribution of study participants at the chosen institutions is displayed in Figure 1. According to the findings, 79% of the research participants have worked at the GG hospital, whereas 65% have worked at the GP hospital.

Table 1. Demographic characteristics of study participants (n= 176)

Variable	Categories	N	Percentage%
Gender	Male Female	118 58	67 33
Age groups	< 26 years 26-35 years >35-45 years >45	20 75 50 31	11.4 42.6 28.4 17.6
Years of clinical practice experience	<=2years >2-10 years > 10-20 years > 20 years	6 86 76 8	3.4 48.9 43.2 4.5
Qualification	Diploma Bachelor degree Master’s degree and above	6 135 35	3.4 76.7 19.9

The demographic characteristics of the respondents are shown in Table 1. Males make up more than two-thirds of the study samples. Seventy-one percent of the participants are between the ages of 26 and 45, while the remaining twenty-nine percent fall into the age groups of below 26 and over 45. Furthermore, the vast majority (96.6%) have practiced medicine for above two years. 76.7% of the participants hold a bachelor's degree, while 19.9% have a higher education degree.

Table 2. Participants in the study were distributed according to their prior radiation protection training and the usage of radiation protective measures (n = 176)

Variable	Categories	N	(%)
Training courses in radiation protection	Yes	39	22.2
	No	137	77.8
Type of training received (lectures, practical)	During undergraduate studies	7	14.3
	During postgraduate studies	15	30.6
	lecture/conference/seminar/ workshop	22	44.9
	Training course in radiation protection	5	10.2
Presence of criteria or guidelines	Yes	92	52.3
	No	84	47.7
Using criteria/guidelines	rarely	8	8.7
	sometimes	46	50.0
	very often	11	12.0
	always	27	29.3
Believe that these criteria/guidelines Assist in the justification of imaging Referrals	never	1	1.1
	rarely	12	11.2
	sometimes	35	37.1
	Very often	14	14.6
	always	30	36.0
Using protective tools	Yes	45	48.9
	No	47	51.1
Using (exposure factor)	Yes	86	93.5
	No	6	6.5

Table 2 shows that participants received training in safety and radiation protection. The results showed that only 39 people, or 22.2% of the total, had previously participated in radiation protection training. According to this study, only a small percentage of radiologists and medical radiologists working in radiation health have prior radiation protection training. Respondents stated there was no radiation protection training, which is consistent with the results. However, despite the lectures and scientific days, the Ministry of Health has little interest in this topic".

44.9% and 30.6% of the respondents attended lectures, conferences, seminars, and workshops or received practical training. Some respondents in the in-depth key informant interviews (KII) stated that courses offered on radiation protection. Two training centers are operated by the Ministry of Health, one in the north and one in the south. MoH established three radiation protection and safety programs. Most of these are not training but short-term practical training, lectures, conferences, seminars, and workshops.

Ninety-two (52.3%) participants reported having standards or norms that helped justify patient recommendations for imaging tests, and reliable to the finding, key informants agree that there should be no such requirement. "There are no written standards or guidelines for medical imaging tests," one interviewee explained. Another said," There are no guidelines for those who have expressed agreement with the existence either misunderstood this or are treating the precautions.'

38% of participants frequently used this criterion (12%) and 29% always responded. Additionally, 44 participants (responding frequently and consistently in 14.6% and 36.0%, respectively) believed that these criteria and standards help justify referral for imaging in pediatric patients. There appears to be an inactive regulation or set of guidelines that defends referring patients for imaging. This kind of global standard exists.

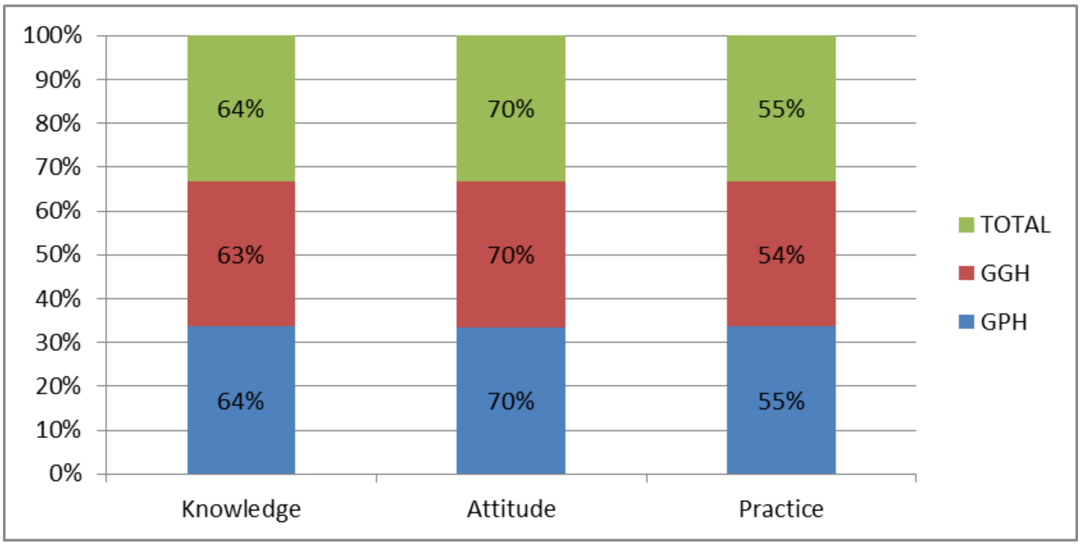

Figure 2. *Knowledge, attitude, and practice of the study participants regarding radiation protection measure*

As shown in Figure 2, doctors' knowledge, attitude, and practice regarding radiation safety measures were 64%, 70%, and 55%, respectively. The results of this study suggest that health professionals working in government facilities in Gambella Town have relatively low or adequate levels of knowledge, attitudes, and practices compared to other countries such as the United States. It was 61.8% for Iranians, 82.5% for Taiwanese, 72% for Pakistanis, and 65.8% for Su et al. (the year of 2000). This is due to inadequate radiation protection training programs for professionals. Their attitude towards radiological protection is appropriate and consistent with other recent studies conducted in neighboring countries. Although their practice level (63.7%) is still below the required level, their scores are higher than others (e.g., 50.7%) and consistent with recent research findings (65.5%). The outcome was attributed to many factors, including the lack of standardized operating procedures and rules, lack of equipment and tools, and inadequate and ineffective oversight by authorities and regulators.

Statistical analysis of respondents' knowledge, attitudes, and practices.

Table 3. The correlation between knowledge, attitude, and practice

Variable		Knowledge	Attitude	Practice
Knowledge	Pearson coefficient P- value	1	0.27** 0.000 0	0.28** 0.000
Attitude	Pearson coefficient P- value	0.27** 0.000	1	0.140 0.064

Practice	Pearson coefficient P- value	0.28** 0.000	0.140 0.064	1

** Correlation is significant at the 0.01 level (2-tailed).

The relationship between knowledge, attitude, and practice is shown in Table 3. The results show that there is a statistically significant, positive, and weak relationship between knowledge and practice (r = 0.28, p-value = 0.000) and knowledge and attitude (r = 0.27, p-value = 0.000). Furthermore, there is a weak positive relationship between attitudes and practices (r = 0.140), although this relationship is not statistically significant (p-value = 0.064). The idea that information influences attitudes, which in turn influences practice, is supported by respondents. According to key informants, practice will increase as both knowledge and attitudes increase.

Effect of training courses on the participants' KAP

Table 4. Differences in participants' KAP level regarding previous training programs in radiation protection (n = 176)

Variable	N	Knowledge	Attitude	practice
Have you ever received any education or training courses in radiation protection?				
Yes No	39 137	69. ±16.2 61.8±14.7	74.6 ± 19.3 68.5±17	57.2±13.6 53.6±13.3
t		2.50	1.80	1.471
p-value		0.015*	0.077	0.147

* Statistically significant

Table 4 shows the changes in participants' KAP values compared to previous radiation protection training. Those who received training, knowledge, attitude, and practice were evaluated with percentage weights of 69, 74.6, and 57.2, respectively. The knowledge level of those who received no training and those who received training differed significantly (t = 2.5, p-value = 0.015). Furthermore, most respondents agreed that the program was successful in increasing the knowledge level of participants. This result is also consistent with another study (Yunus et al., 2014).

The study also shows differences in participants' attitudes toward training. He was 74.6% of those who had an attitude towards previous training, compared to 68.5% of those who had not. However, the difference is not statistically significant at t = 1.8 and p = 0.077. Additionally, the trend in favor of trainees regarding practice level is reversed, although the difference is not statistically significant (t = 1.4, p-value = 0.147). Based on these findings, respondents agreed that training programs were successful in expanding employees' knowledge. "I think programs like this can have some effect not only on health care workers but also on the general public," a GGH official said. Another person said that programs are effective if there is regular monitoring and employee satisfaction and work motivation are at acceptable levels; We attribute our success to monitoring and tracking. The approach to radiological protection reflects this. One of his at GGH said, "I think knowledge and attitude are high, but there are problems in practice due to overload of work," and a key informant said that knowledge and attitude have improved significantly compared to practice. He explained that he did. They have less time to practice their expertise, not to mention a lack of protective equipment.

IV. Conclusion

For all medical professionals, protection from radiation remains a top professional priority. As participants gain a better understanding of radiological protection methods and resources, their attitudes and practices may also improve. The low scores for knowledge, practice, and attitudes highlight the importance of general and children's hospitals to increase awareness of preventive measures. Children's hospitals are more aware of the need for protective measures than hospitals. The participant's knowledge level is influenced by curriculum and training. A radiation protection program was implemented to ensure that radiation workers were aware of the latest advances in the region. When sending a patient for diagnostic imaging, it is vital to adhere to established standards and norms and ensure that the radiologist, physician, and radiologist are on the same page. A consent form before medical radiation procedures and fully explain the pros and cons of the patient’s parents or guardians, including potential risks related to radiation, contrast media, and suspected allergies.

Recommendations

It includes recommendations for policymakers, for health care providers, and recommendations for further research.

1. Learning organizations must be activated to close knowledge and skills gaps in the application of protection measures and tools.
2. To protect the safety of radiologists, radiologists, and patients, this study reinforces the need to emphasize protection and safety principles in radiology.
3. It is important for radiation workers to receive ongoing training to stay current.
4. It is important to use an informed consent form before radiological examinations, especially CT and interventional procedures that require the use of contrast agents.

References

Kamiya, et al. (2015). Long-term effects of radiation exposure on health. The Lancet, 386(9992), 469-478.

Shiralkar, et al. (2003). Doctors' knowledge of radiation exposure: questionnaire study. Bmj, 327(7411), 371-372.

Thomas, et al. (2006). Assessment of radiation dose awareness among pediatricians. Pediatric Radiology,36(8), 823-832.

Hall, E. (2002 a). Helical CT and cancer risk. Introduction to session I. Pediatr Radiol, 32, 225-227

Kutanzi, et al. (2016). Pediatric exposures to ionizing radiation: carcinogenic considerations. International Journal of Environmental Research and Public Health, 13(11), 1057.

Hall, E. (2002 b). Lessons we have learned from our children: cancer risks from diagnostic radiology. Pediatric Radiology, 32(10), 700-706.

Smith-Bindman, et al. (2009). Radiation dose associated with common computed tomography examinations and the associated lifetime attributable risk of cancer. Archives of internal medicine, 169(22), 2078-2086.

Kim. (2018). Three principles for radiation safety: time, distance, and shielding. The Korean Journal of Pain, 31(3), 145.

Shapiro. (2002). Radiation protection: a guide for scientists, regulators, and physicians. La Editorial, UPR.

Chang, et al. (2014). The radiation exposure of radiographers related to the location in C-arm fluoroscopy-guided pain interventions. The Korean Journal of Pain, 27(2), 162.
Rahma, (2017), The study of Lead as a Source X-ray Radiation Protection with an Analysis Grey Level Image, Journal of Physics: Conference Series, (Vol. 824, No. 1, p. 012005), the IOP Publishing.
Rahimi, et al. (2007). Evaluation of the technical, protective, and technological operation of radiologists in hospitals of Mazandaran medical science universities. Journal of Mazandaran University of Medical Sciences, 17(61), 131-140.
Kaliyaperumal. (2004), Guideline for conducting a knowledge, attitude, and practice (KAP) study. The AECS illumination, 4(1), 7-9.