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The effectiveness of radiation protection intervention (RAPI) module on Radiation Literacy among radiation workers in southern region of Malaysia

Background: In Malaysia, the number of x-ray examinations had increased by 19.02 per cent from 805,122 (2015) to 958,230 (2017); hence healthcare workers are at potential risk for occupational radiation hazards. A study in 2018 regarding radiation protection among healthcare workers in Negeri Sembilan showed that the scores on knowledge and practice were marginal despite a positive attitude. Thus, proper training in radiation protection is pertinent to ensure safety and health at work and preserve patient safety.

Objectives: This study aims to develop, implement and evaluate the effect of an educational intervention module based on Protection Motivation Theory (PMT) on the level of knowledge, attitude, and practice (KAP) of radiation protection among radiation workers in Negeri Sembilan and Malacca.

Methodology: This is a single-blind, parallel randomized control trial study involving 158 radiation workers from the Department of Health Negeri Sembilan and Malacca. The sample size required was 79 in intervention and 79 in control groups. A questionnaire about knowledge, attitude and practice regarding radiation protection was distributed among the respondents at the baseline. An educational intervention based on Protection Motivation Theory on radiation protection was introduced to the intervention group, and the median score of KAP level was analysed at one month and three months post-intervention. The data analysis was carried out using SPSS version 25.0. Data for respondents were analysed as per-protocol analysis and based on the intention-to-treat principle. Mann- Whitney U tests, Chi-square tests, Friedman test, Fisher's exact test and multivariate analysis of Generalized Linear Mixed Model was used in the statistical analysis.

Results: The response rate were 95.2% at baseline. Attitude was found significant associated with training on radiation protection ($p < 0.05$) at 1 month post intervention; income ($p < 0.05$), workplace ($p < 0.001$) and age ($p < 0.05$) at 3 months post intervention. Practice was found significant associated with level of education ($p < 0.05$) and workplace ($p < 0.05$) at 1 month post intervention; age ($p < 0.05$) and workplace ($p < 0.05$) at 3 months post intervention. The GLMM analysis showed the intervention did improve knowledge ($F_{(2, 2782)} = 11.068$, $p < 0.001$), practice ($F_{(2, 2782)} = 7.132$, $p < 0.001$) and threat appraisal ($F_{(2, 2782)} = 15.798$, $p < 0.001$) score in intervention group. In intervention group median score of knowledge and attitude of radiation protection increased significantly from baseline to 1-month and 3-month after intervention (35 (IQR 8), 41 (IQR 4), 40 (IQR 4), $p<0.001$) and (41 (IQR 5), 43 (IQR 6.25), 42 (IQR 7), $p< 0.001$) respectively.

Conclusion: In a nutshell, the Radiation Protection Intervention (RAPI) module effectively increased the level of knowledge attitude and practice of radiation protection among radiation workers in public healthcare facilities. Therefore, the Ministry of Health and other relevant authorities must revamp their current radiation protection training policy by standardizing radiation protection curricula nationwide using the RAPI module to increase the radiation workers'knowledge, attitude and practice on radiation protection in Malaysia and worldwide.

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