# RADIOTHERAPY ADVERSE EFFECTS MANAGEMENT TRAINING FOR HEALTH WORKERS IN ANDALAS UNIVERSITY HOSPITAL

**Rhandyka Rafli[1]*, Dian Ayu Hamama Pitra[2], Dita Hasni[3], Debie Anggraini[4], Seres Triola[5], Haves Ashan[6], Laura Zefira[7]**

[1-7]University of Baiturrahmah Padang

Email Correspondence: rhandykarafli@fk.unbrah.ac.id

Submitted: 04 June 2022 Accepted: 14 June 2022 Published: 01 July 2022
DOI: https://doi.org/10.33024/jkpm.v5i7.6865

## ABSTRACT

Cancer services in Indonesia have experienced a rapid increase with the addition of radiotherapy facilities in various hospitals. Increasing radiotherapy facilities will also increase the incidence of adverse radiation effects. Based on the initial survey, it was found that health workers from various professions, including doctors, nurses, and radiographers, did not understand radiotherapy and the side effects that could occur to patients. Training aims: To increase the knowledge of health workers and skills in managing adverse effects according to the competence of each profession. Pre-training survey was used to find the knowledge and skills discrepancy. Online training is provided with knowledge transfer, followed by monitoring practice in the field. It was found that the understanding and skills of health workers regarding the adverse effects of radiation increased, Based on the results of the pre-test, post-test, and practice evaluation of 37 training participants. It is hoped that from this training, the quality of cancer services will be better and can improve the quality of life of patients undergoing radiotherapy treatment

**Keywords**: Radiotherapy, Adverse Effects, Health Workers

## 1. INTRODUCTION

Cancer is one of the most common death causes around the world, including Indonesia. (Siegel et al., 2021) Cancer has caused more than 10 million deaths or approximately one in six deaths in 2020. (Sung et al., 2021) Cancer treatment aims to eradicate groups of cancer cells (tumors)(Lortet-Tieulent et al., 2020). This treatment principle can be met either by surgery, administration of chemotherapy, radiation, or a combination of these modalities. (Zugazagoitia et al., 2016)

Radiotherapy modality, the main principle of which is to use ionizing radiation to damage the genetic material of cancer cells (DNA), causing the cells to die or lose their proliferative ability. Radiation exposure to normal tissues should be considered during radiotherapy treatment. (Allen et al., 2017) All forms of genotoxic treatment affect normal tissues with varying degrees of damage, and it is these side effects can then limit cancer treatment.

The side effects that arise due to radiotherapy will vary depending on each patient's body condition. Some may experience only mild, moderate, or even severe symptoms. Organ tissue affected by radiotherapy adverse

effects will depend on the part of the body exposed to radiotherapy, the radiation tolerance of organ involved, total radiation dosage received by the organ, and various other treatments that may be carried out by the patient while doing radiotherapy. (Defraene et al., 2020)

Side effects of radiation need to be treated quickly and appropriately to maintain the patient's quality of life and treatment adherence. It can even reduce death in cancer patients. (Ge et al., 2020)

Good knowledge and skills to manage radiation side effects according to their respective professional competencies, both doctors, nurses, and radiographers will improve the quality of cancer treatment services. Good and appropriate treatment will improve the patient's quality of life.

## 2. ANALYSIS OF PROBLEMS AND SOLUTIONS OFFERED

Pre-training surveys and interviews were conducted among Andalas University's health workers. Most medical doctors, nurses, radiographers, and other professionals report having difficulties helping radiotherapy patients. These difficulties are due to a lack of radiotherapy education curriculum. Most of the health workers in Indonesia have not been exposed to practical experience with cancer patients with radiotherapy treatment before 2018.

Radiotherapy was considered new technology in West Sumatra Province. Radiotherapy as a cancer treatment has been recently developed in Indonesia. Along with the increasing number of radiotherapy facilities throughout Indonesia, the need for personnel who have the competence and knowledge of radiotherapy is increasingly important. (Vargas et al., 2020)

Cognitive and skill training can solve the gap between the increasing number of patients who need services and the side effects of treatment with the ability of hospital workers to serve.

This training is carried out at the Andalas University Hospital, located in the Andalas University complex, Pauh sub-district, Limau Manis village, Padang city. The training was held on Friday, March 5, 2021, and carried out practical observations for 1 month in the radiotherapy department and ER Unand Hospital.

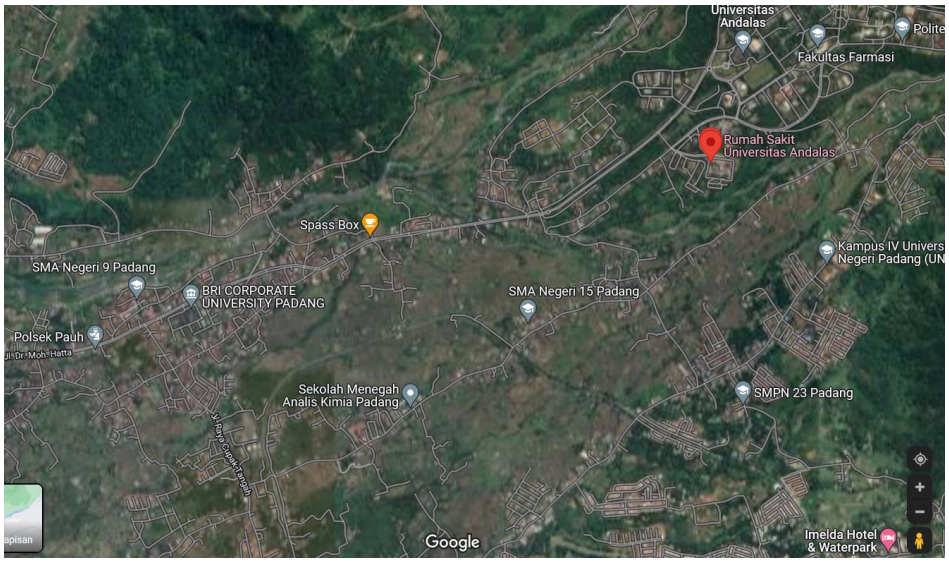


Figure 1. Map of Andalas University Hospital in Padang CIty

## 3. LITERATURE REVIEW

Radiotherapy is one of the main pillars of cancer treatment. Radiotherapy is used as a locoregional treatment for both curative and palliative purposes. Radiotherapy can be used as a single modality or combined with surgery and chemotherapy. Breast cancer, head and neck cancer, lung cancer, cervical cancer, colorectal cancer, and brain tumor were the most common diagnosis for radiotherapy patients. (Badan Penelitian dan Pengembangan Kesehatan, 2018)

Radiotherapy uses ionizing rays to directly break the DNA chain in cells or react indirectly with water molecules resulting in a peroxide that can damage the DNA structures. The goal of treatment is to break the DNA chain in cancer cells to kill cancer cells. However, radiation can also affect normal cells around the radiation field, where this normal cell death will be a side effect of treatment. This side effect occurs when normal cell death exceeds the body's ability to repair and replace new cells, called negative cell turnover. (Martins et al., 2018)

There are two side effects after radiotherapy, namely short-term and long-term effects. Short-term adverse or acute effects will be experienced by the patient immediately during the radiotherapy schedule until two weeks after completion. Acute radiotherapy's adverse effect main mechanism is inflammation and normal cell death. Long-term effects can arise after some time the patient undergoes radiotherapy, or it can be months or years afterward. The main mechanism of long-term adverse effects was fibrosis, obliteration of small blood vessels, or stochastic effects. (Wang M.D. et al., 1998)

Radiotherapy technological developments introduce sophisticated machines such as linear accelerators that have replaced older radiotherapy machines such as telecobalt. Computerized radiotherapy planning enables advanced techniques such as Intensity-modulated Radiotherapy (IMRT) and Stereotactic body radiotherapy (SBRT). These techniques can increase the radiation doses to the target cancer, resulting in better treatment outcomes. Advanced radiotherapy technology also reduces the radiation doses to normal tissue surrounding cancer, resulting in a decrease in the incidence of severe radiotherapy side effects. (Chandra et al., 2021)(Alterio et al., 2019). However, side effects are still found during the radiotherapy process.

The adverse effect of radiotherapy may vary according to the site of treatment. Breast cancer patients during radiotherapy may experience radiodermatitis and dysphagia. Head and neck cancer patients may experience radiotherapy adverse effects such as mucositis, dermatitis, dysphagia, and xerostomia. Cervical cancer patients and colorectal cancer radiotherapy adverse effects were cystitis, enteritis, and hematology depression. (De Sanctis et al., 2016; Singh et al., 2016; van der Veen & Nuyts, 2017)

Cancer patients will be experiencing discomforting symptoms and the long burden of cancer treatment. Adverse effects of radiotherapy can interfere with and worsen the quality of life of cancer patients. (Morrison et al., 2017) Improving and maintaining the quality of life is an important goal of cancer treatment. A comprehensive treatment to control the cancer symptoms, managing treatment adverse effects effectively, and psychological support from family and community were necessary to achieve this goal. (Rafli et al., 2021).

## 4. METHODS

### Target Audience

Andalas University Hospital is a government hospital located in the Andalas University complex in Limau Manis, Padang. This hospital was founded in 2017. Andalas University Hospital has excellent oncology services and has a linear accelerator machine facility that can serve radiotherapy procedures. Andalas University Hospital is also a cancer referral hospital for the central part of Sumatra.

In the initial survey and interviews with representatives of health workers, it was found that there were still many doctors, nurses, and radiographers who did not understand radiotherapy. Health workers have not been able to recognize and identify the grading of radiation side effects and do not know how to manage these side effects. This service targets health workers who will be in contact with cancer patients at the hospital.

### Preparation phase

Service activities began with a survey conducted with short interviews with randomly selected health workers from the professions of doctors, nurses, and radiographers. They traced their experiences interacting with cancer patients who underwent radiation and the side effects while on duty.

From the initial survey, it was concluded that health workers do not understand what radiotherapy is. Health workers have not been able to identify and determine the degree of side effects of radiation. They still do not know the treatment that can be given.

A robust literature study was done to prepare the training material. Several case examples were also prepared to adjust to the knowledge needs.

### Training Phase

The training is carried out using online training methods to maintain health protocols. The topics of training consist of :

a. Basic understanding of radiotherapy.
b. Factors influencing radiotherapy's adverse effects.
c. Identifying radiotherapy's adverse effects signs and symptoms.
d. Radiotherapy adverse effects classification and grading.
e. Treatment of acute Radiotherapy adverse effects

Each health worker's profession type received training according to their job description. A discussion between trainers and trainees followed the training. Several radiotherapy adverse effect cases were used as a trigger for discussion to sharpen understanding of the material. The participant was encouraged to take post-test quizzes to measure their understanding of the training topics. Materials can be accessed via the link: https://bit.ly/pengabdianefeksampingradiasi

### Monitoring Phase

Field monitoring was conducted directly to assess trainees' understanding and skills with patients at the radiotherapy department of UNAND Hospital. The practice experience was discussed further in small groups.

## 5. RESULTS AND DISCUSSION

### Training Activities

The online training was attended by 37 participants, 21 participants from the medical profession, 6 nurses, and 10 professional radiographers. Before the presentation, a pre-test was conducted with the link: https://forms.gle/bGpXhXFmLLGRKS5g7.

A pre-test was conducted to find out the participants' basic knowledge. Thirty-six Of the participants filled out the pre-test. The process of delivering the material went smoothly, and the participants were active in discussing during group discussion. Documentation of activities can be seen in Figure 2. The training pre-test and post-tets can be accessed via the link: https://forms.gle/26bgQKW5XoPaHhLn6.

Table 1. Results of Pretest and Posttest

| No | Question | Pre-test | Post-test |
|---|---|---|---|
| 1. | Types of Cancer Therapy | 12/36 | 32/36 |
| 2. | Types of side effects by time | 8/36 | 30/36 |
| 3. | Radiation side effects | 9/36 | 28/36 |
| 4. | Organ class classification | 6/36 | 29/36 |
| 5. | Radiation side effects grading | 8/36 | 27/36 |
| 6. | Radiation dermatitis cases | 19/36 | 32/36 |
| 7. | Radiation mucositis cases | 17/36 | 33/36 |

From the pre-test results with a low mean, it was concluded that health workers' knowledge about radiotherapy and its side effects was very low. After delivering the training material, most participants answered the post-test results well, showing an increase in understanding of the topics presented.

The participants gained basic knowledge and theory in daily practice with cognitive enhancement when dealing with cancer patients undergoing radiotherapy. Cognitive knowledge adjusts to professional competence. The radiographer profession can recognize side effects and know the danger signs to be forwarded to medical personnel. The nursing profession knows identifying, determining grading, nursing care for radiation side effects, and how to report to doctors. The medical profession is expected to know from diagnosis to managing side effects and when to refer or consult a specialist with higher competence. (Morgan & Tarbi, 2016)(Johansen & Ervik, 2018)

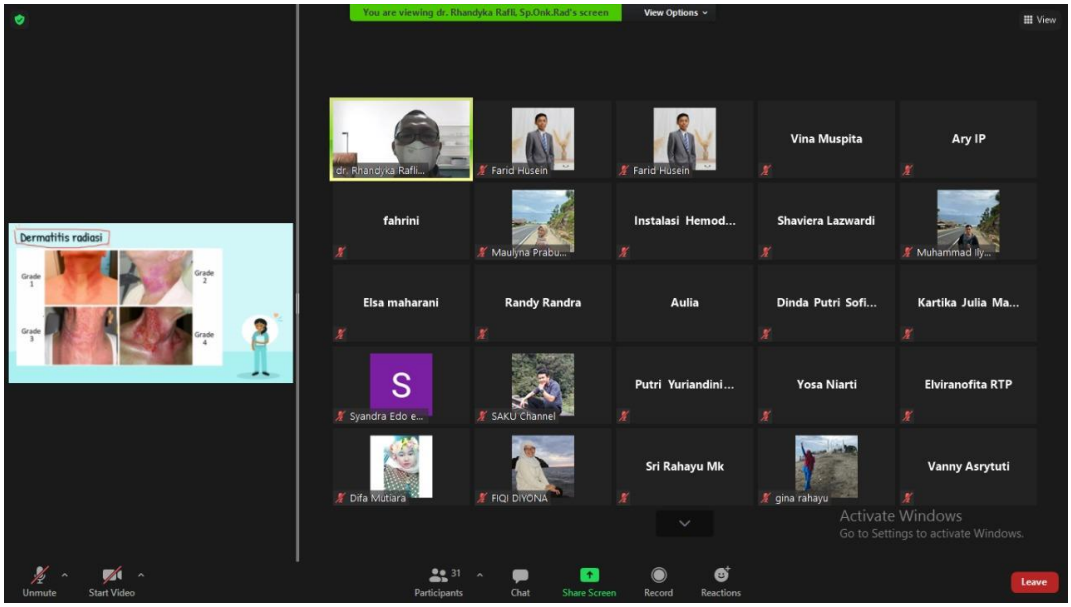

Figure 2. Documentation of training activities

After the training is complete, participants are also asked to self-assess the achievement of knowledge targets. The assessment results become evaluations for service and training implementers and input into practice monitoring. The participants' self-assessment achievement was measured by scoring 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree. Most of the participants were content with the training process. The results of the self-assessment can be seen in table 2.

Table 2. Self-assessment of participants

| No | Question | Score | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| 1. | I understand the radiation side effect factor | - | - | 8/36 | 28/36 |
| 2. | I can recognize the types of radiation side effects | - | - | 6/36 | 30/36 |
| 3. | I can recognize the grading of radiation side effects | - | - | 4/36 | 32/36 |
| 4. | I know the management of radiation side effects | - | - | 8/36 | 28/36 |

**Monitoring Activities**

The ability of trainees to practice the knowledge gained from the training is monitored within 1 month. Participants and trainers arrange a weekly meeting according to the appropriate patient arrival schedule. Participants practice the ability to recognize side effects, determine the grading of side effects, and provide treatment for radiation side effects.

Documentation of trainees' practice of assessing the side effects of radiation dermatitis in breast cancer patients can be seen in Figure 3. Participants were able to identify side effects that occur after giving radiation to the patient's chest wall and aggravating factors. Medical doctors and nurses also identify and treat dysphagia in breast cancer patients. Trainees from the radiographer profession were able to report to medical

personnel if the radiation grading required treatment. It was seen that participants in the nursing profession were able to carry out wound care and communicate with doctors. Participants with medical professions were able to educate and manage side effects well.

Figure 3. Identification and treatment of radiation dermatitis wounds.

Other monitoring is obtained by practice in patients with radiation to the head and neck region. The trainees identified the side effects of mucositis on the patient's oral cavity area. Participants were also able to educate and provide appropriate treatment according to the grading of side effects. The practice documentation can be seen in Figure 4. After the examination, a small discussion was held with the participants discussing the practice process. The participants gave each other suggestions for improvement and received feedback from resource persons

Figure 4. Identification of side effects of radiation to the head and neck area.

## 6. CONCLUSIONS

The trainees' knowledge about the side effects of radiation increased after being given the training. Participants are cognitively able to identify, determine, grade, and know the management according to their respective professional competencies. Based on the results of the post-test evaluation and practice monitoring with patients, each profession can apply for its role and apply knowledge to practice for patients with radiotherapy side effects.

Health workers' knowledge about radiotherapy is still limited, but the number of patients receiving radiotherapy has increased. Additional training is needed on other important topics related to cancer patients. Improving the knowledge and skills of health workers will improve the quality of service and patients' quality of life.

## 7. REFERENCE

Allen, C., Her, S., & Jaffray, D. A. (2017). Radiotherapy for Cancer: Present and Future. *Advanced Drug Delivery Reviews*, *109*, 1–2. https://doi.org/10.1016/j.addr.2017.01.004

Alterio, D., Marvaso, G., Ferrari, A., Volpe, S., Orecchia, R., & Jereczek-Fossa, B. A. (2019). Modern radiotherapy for head and neck cancer. In *Seminars in Oncology* (Vol. 46, Issue 3, pp. 233–245). Semin Oncol. https://doi.org/10.1053/j.seminoncol.2019.07.002

Badan Penelitian dan Pengembangan Kesehatan. (2018). Laporan Nasional Riskesdas 2018. In *Kementerian Kesehatan Republik Indonesia*.

Chandra, R. A., Keane, F. K., Voncken, F. E. M., & Thomas, C. R. (2021). Contemporary radiotherapy: present and future. In *The Lancet* (Vol. 398, Issue 10295, pp. 171–184). Lancet. https://doi.org/10.1016/S0140-6736(21)00233-6

De Sanctis, V., Bossi, P., Sanguineti, G., Trippa, F., Ferrari, D., Bacigalupo, A., Ripamonti, C. I., Buglione, M., Pergolizzi, S., Langendjik, J. A., Murphy, B., Raber-Durlacher, J., Russi, E. G., & Lalla, R. V. (2016). Mucositis in head and neck cancer patients treated with radiotherapy and systemic therapies: Literature review and consensus statements. In *Critical Reviews in Oncology/Hematology* (Vol. 100, pp. 147–166). https://doi.org/10.1016/j.critrevonc.2016.01.010

Defraene, G., Dankers, F. J. W. M., Price, G., Schuit, E., van Elmpt, W., Arredouani, S., Lambrecht, M., Nuyttens, J., Faivre-Finn, C., & De Ruysscher, D. (2020). Multifactorial risk factors for mortality after chemotherapy and radiotherapy for non-small cell lung cancer. *Radiotherapy and Oncology*, *152*, 117–125. https://doi.org/10.1016/j.radonc.2019.09.005

Ge, X., Liao, Z., Yuan, J., Mao, D., Li, Y., Yu, E., Wang, X., & Ding, Z. (2020). Radiotherapy-related quality of life in patients with head and neck cancers: a meta-analysis. *Supportive Care in Cancer*, *28*(6), 2701–2712. https://doi.org/10.1007/s00520-019-05077-5

Johansen, M. L., & Ervik, B. (2018). Teamwork in primary palliative care: General practitioners' and specialised oncology nurses' complementary competencies. *BMC Health Services Research*, *18*(1). https://doi.org/10.1186/s12913-018-2955-7

Lortet-Tieulent, J., Georges, D., Bray, F., & Vaccarella, S. (2020). Profiling global cancer incidence and mortality by socioeconomic development. *International Journal of Cancer*, *147*(11), 3029–3036.

https://doi.org/10.1002/ijc.33114

Martins, I., Raza, S. Q., Voisin, L., Dakhli, H., Allouch, A., Law, F., Sabino, D., De Jong, D., Thoreau, M., Mintet, E., Dugué, D., Piacentini, M., Gougeon, M. L., Jaulin, F., Bertrand, P., Brenner, C., Ojcius, D. M., Kroemer, G., Modjtahedi, N., … Perfettini, J. L. (2018). Anticancer chemotherapy and radiotherapy trigger both non-cell-autonomous and cell-autonomous death article. *Cell Death and Disease*, *9*(7). https://doi.org/10.1038/s41419-018-0747-y

Morgan, B., & Tarbi, E. (2016). The Role of the Advanced Practice Nurse in Geriatric Oncology Care. *Seminars in Oncology Nursing*, *32*(1), 33–43. https://doi.org/10.1016/j.soncn.2015.11.005

Morrison, E. J., Novotny, P. J., Sloan, J. A., Yang, P., Patten, C. A., Ruddy, K. J., & Clark, M. M. (2017). Emotional Problems, Quality of Life, and Symptom Burden in Patients With Lung Cancer. *Clinical Lung Cancer*, *18*(5), 497–503. https://doi.org/10.1016/j.cllc.2017.02.008

Rafli, R., Hanum, F. J., & Abdullah, D. (2021). The emerging cancer support system in traditional and religious values: a qualitative study of the cancer community in west Sumatera, Indonesia | Journal of Positive Psychology and Wellbeing. *Journal of Positive Psychology and Wellbeing*, *5*(3), 1425–1431. https://journalppw.com/index.php/jppw/article/view/1018

Siegel, R. L., Miller, K. D., Fuchs, H. E., & Jemal, A. (2021). Cancer Statistics, 2021. *CA: A Cancer Journal for Clinicians*, *71*(1), 7–33. https://doi.org/10.3322/caac.21654

Singh, M., Alavi, A., Wong, R., & Akita, S. (2016). Radiodermatitis: A Review of Our Current Understanding. *American Journal of Clinical Dermatology*, *17*(3), 277–292. https://doi.org/10.1007/s40257-016-0186-4

Sung, H., Ferlay, J., Siegel, R. L., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F. (2021). Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA: A Cancer Journal for Clinicians*, *71*(3), 209–249. https://doi.org/10.3322/caac.21660

van der Veen, J., & Nuyts, S. (2017). Can intensity-modulated-radiotherapy reduce toxicity in head and neck squamous cell carcinoma? In *Cancers* (Vol. 9, Issue 10). https://doi.org/10.3390/cancers9100135

Vargas, A., Torres, C., Küller-Bosch, A., & Villena, B. (2020). Palliative Care Physicians and Palliative Radiotherapy, Knowledge and Barriers for Referring: A Cross-sectional Study. *Journal of Pain and Symptom Management*, *60*(6), 1193-1199.e3. https://doi.org/10.1016/j.jpainsymman.2020.06.021

Wang M.D., C.-J., Leung M.D. M.S., S. W., Chen M.D., H.-C., Sun M.D., L.-M., Fang M.D., F.-M., Huang M.D., E.-Y., Hsiung M.D., C.-Y., & Changchien M.D., C.-C. (1998). The Correlation of Acute Toxicity and Late Rectal Injury in Radiotherapy for Cervical Carcinoma: Evidence Suggestive of Consequential Late Effect (CQLE). *International Journal of Radiation OncologyBiologyPhysics*, *40*(1), 85–91. https://doi.org/10.1016/S0360-3016(97)00560-9

Zugazagoitia, J., Guedes, C., Ponce, S., Ferrer, I., Molina-Pinelo, S., & Paz-Ares, L. (2016). Current Challenges in Cancer Treatment. In *Clinical Therapeutics* (Vol. 38, Issue 7, pp. 1551–1566). Clin Ther. https://doi.org/10.1016/j.clinthera.2016.03.026