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Socialization of the Role of Chest X-Rays in Patients in the Radiology Installation of M. Zein Painan Regional Hospital, Pesisir Selatan Regency, West Sumatra

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Abstract**:** *Chest X-ray is a fundamental radiographic examination widely used as a first-line imaging modality for screening, diagnosing, and evaluating thoracic diseases, including tuberculosis (TB), lung disorders, and cardiovascular abnormalities. Despite its routine use, many patients have limited understanding of its purpose, benefits, and examination procedures, which may lead to anxiety and reduced compliance. This community service activity aimed to improve patients' knowledge regarding chest X-ray examinations at the Radiology Installation of M. Zein Painan Regional Hospital. The program was conducted on December 23, 2024, using individual (one-on-one) educational sessions involving 14 patients awaiting chest X-ray examinations. Educational materials covered the definition, indications, benefits, examination procedures, patient preparation, radiation safety, and the importance of following radiographer instructions. Effectiveness was assessed using a nine-item questionnaire administered before and after the education. Results demonstrated a marked improvement in patient knowledge, with post-test scores reaching 100% correct responses for most items, compared with 36–79% in the pre-test. The greatest improvements were observed in understanding examination procedures and radiation safety, particularly the need to report pregnancy before exposure. These findings indicate that individualized patient education effectively enhances knowledge and supports better compliance during chest X-ray examinations. Although the small sample size and one-group pre–post design limit generalizability, integrating continuous patient education into radiology services is recommended to improve health literacy and service quality.*

Keywords: Chest X-ray; Patient Education; Radiology; Health Knowledge; Community Service

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INTRODUCTION

Chest X-ray is a first-line imaging modality that plays a crucial role in screening, diagnosing, evaluating, and monitoring various chest diseases. It is used in a variety of clinical conditions, including tuberculosis, pneumonia, chronic obstructive pulmonary disease (COPD), asthma, pleural effusion, pneumothorax, congestive heart failure, pulmonary edema, thoracic trauma, and pre-operative evaluation and monitoring of medical device implantation (Bang et al., 2023). Chest X-ray remains the most widely used examination in radiology settings due to its rapid, simple, relatively affordable process, relatively low radiation exposure, and availability in nearly all healthcare facilities. Furthermore, the development of dynamic imaging techniques has further expanded its clinical benefits (Fyles et al., 2023). The role of chest radiography is increasingly important in the context of tuberculosis screening, considering that the World Health Organization continues to list tuberculosis as one of the leading causes of death from a single infectious disease globally (World Health Organization, 2024), and recent evidence confirms that individuals with positive chest radiography despite negative bacteriological results still require special attention in screening programs (Kendall & Wong, 2023; Sossen et al., 2023).

Some people still don't understand the function, benefits, and indications for chest X-rays. Some assume this examination is only performed on tuberculosis patients, or assume that X-ray exposure is always dangerous, making them reluctant to undergo a necessary examination. This lack of understanding can lead to delayed diagnosis, low patient compliance with radiological examinations, unnecessary anxiety, and inaccurate perceptions about the safety of X-ray examinations (World Health Organization, 2022). Studies in Indonesia also show that patient knowledge is closely related to anxiety levels during radiological examinations, so pre-examination education plays a crucial role in reducing this anxiety (Sugiarti et al., 2024). In addition to patient psychological aspects, challenges in implementing systematic chest X-ray use, for example in tuberculosis screening programs, are also largely influenced by limited understanding of the examination's benefits and procedures among both staff and the public (Abraham et al., 2024; Eneogu et al., 2024).

The World Health Organization (2021) explains that chest imaging, including chest X-rays, plays a crucial role in supporting the diagnosis and management of various lung diseases when used based on appropriate clinical indications. The WHO also emphasizes that radiological examinations must be accompanied by public education to optimize their use and reduce misunderstandings about the benefits and risks of radiation. This is in line with various validation studies of artificial intelligence-based technology for chest X-ray interpretation in tuberculosis screening programs, which consistently emphasize that the success of screening programs depends not only on the accuracy of the technology but also on the understanding and active participation of the community and health workers (Han et al., 2025; Qin et al., 2024; Twabi et al., 2021).

Based on observations at the Radiology Installation of M. Zein Painan Regional Hospital in 2024, the radiographic examinations performed consisted of vertebral, thoracic, cranial, upper extremity, lower extremity, BNO, abdominal, pelvic, and panoramic x-rays. A recapitulation of

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the number of patients in the April–June 2024 period showed that thoracic examinations were the type of examination with the highest number of patients compared to other examinations, namely 1,494 patients who underwent chest x-rays. This high examination volume emphasizes the need for adequate education so that patients understand the purpose, benefits, and procedures of the examination they undergo, as also emphasized in the guidelines for the appropriateness criteria for routine chest imaging (Bang et al., 2023).

Based on these conditions, community service activities are needed in the form of outreach regarding the role of chest X-rays in the Radiology Installation. This activity is expected to increase public knowledge regarding the purpose of the examination, the various diseases that can be evaluated through chest X-rays, the benefits of the examination in assisting doctors in establishing a diagnosis, and the importance of following examination procedures as directed by healthcare professionals. With increased public understanding, it is hoped that a more positive attitude toward radiology services will be created, thus supporting early disease detection, expediting management, and ultimately improving the quality of healthcare services (Akbar et al., 2022).

METHODOLOGY

This community service activity was carried out at the Radiology Installation of M. Zein Painan Regional Hospital on Monday, December 23, 2024, using an individual education approach (one-on-one education) for patients who were about to undergo a chest X-ray examination. The target of the activity was adult patients who were waiting for their turn to be examined and were willing to participate in the activity after receiving an explanation of the educational objectives. Willingness to participate was stated verbally (informed consent) by each participant before completing the questionnaire, and all data collected was treated confidentially and used only for the purposes of activity evaluation.

The program began with a patient approach in the radiology waiting room. After the patient indicated their willingness to participate, participants were asked to complete a pre-test questionnaire to determine their level of knowledge regarding the role of chest X-rays in diagnosing lung and chest diseases. The community service team then provided direct education for approximately 10–15 minutes using leaflets and posters. The material presented included the definition of chest X-rays, the benefits of the examination, indications for the examination, patient preparation, radiation safety, and the role of chest X-rays in aiding the diagnosis of diseases such as tuberculosis, pneumonia, heart disease, and other lung disorders (Lampignano & Kendrick, 2023; Bushberg et al., 2021).

After the presentation, participants were given the opportunity to ask questions, fostering two-way communication between the educator and the patient. Patients were then asked to complete the same questionnaire again as a post-test to assess their knowledge gains following the outreach program. The questionnaire consisted of nine questions with "Yes," "No," and "Don't Know" response options, structured based on the educational material provided. Pre-test and post-test results were then compared descriptively to assess the effectiveness of the educational activities, using an evaluation approach consistent with the one-group pre-test post-test design commonly

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used in similar health education intervention studies (Ayuso-Diaz et al., 2025; Robles-Sánchez et al., 2025).

All activities are carried out without disrupting the radiology service process. Education is only provided to patients still waiting for their turn or after the examination is completed if the waiting time is too short. Radiology staff continue to prioritize patient care according to the established examination process.

RESULTS AND DISCUSSION

The following are the results of community service activities for 14 thorax X-ray patients at the Radiology Installation of M. Zein Painan Regional Hospital.

Table 1. Pre-test results before the socialization of chest X-ray examinations was carried out

No	A list of questions	Answer Results		
		Yes	No	Don't know
1	Do you know that a thorax X-ray is an X-ray examination of the chest?	9	-	5
2	Do you think a chest X-ray can help doctors determine the condition of the lungs and heart?	7	-	7
3	Do you think chest X-rays can be used to help detect tuberculosis (TB)?	10	-	4
4	Do you think that the chest X-ray examination is quick (around a few minutes)?	8	-	6
5	Do you think that patients should follow the radiographer's instructions during the examination so that the photo results are clear?	-	-	14
6	Do you think holding your breath during a chest X-ray is important to produce good images?	-	-	14
7	Do you think that metal objects such as necklaces or brooches need to be removed before a chest X-ray?	5	2	7
8	Do you think that if you are pregnant or suspect you are pregnant, you need to inform the officer before undergoing a chest X-ray?	9	-	5
9	Do you think that chest X-ray results help doctors determine the correct diagnosis and treatment?	11	-	3

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Table 2. Post-test results after the socialization of chest X-ray examinations

No	A list of questions	Answer Results		
		Yes	No	Don't know
1	Do you know that a thorax X-ray is an X-ray examination of the chest?	14	-	-
2	Do you think a chest X-ray can help doctors determine the condition of the lungs and heart?	14	-	-
3	Do you think chest X-rays can be used to help detect tuberculosis (TB)?	14	-	-
4	Do you think that the chest X-ray examination is quick (around a few minutes)?	14	-	-
5	Do you think that patients should follow the radiographer's instructions during the examination so that the chest X-ray results are clearly visible?	14	-	-
6	Do you think holding your breath during a chest X-ray is important to produce good images?	11	-	3
7	Do you think that metal objects such as necklaces or brooches need to be removed before a chest X-ray?	14	-	-
8	Do you think that if you are pregnant or suspect you are pregnant, you need to inform the officer before undergoing a chest X-ray?	14	-	-
9	Do you think that chest X-ray results help doctors determine the correct diagnosis and treatment?	14	-	-

Discussion

The community service activity on the role of chest X-rays in the Radiology Installation aims to increase patient and family knowledge about the benefits, procedures, and importance of chest X-ray examinations in assisting disease diagnosis. Based on the results of the questionnaires completed before and after the socialization (Table 1 and Table 2), there was an increase in respondents' understanding of all nine aspects of chest X-ray examinations, with seven of the nine items achieving 100% correct answers in the post-test.

In the question regarding the definition of a chest X-ray as an X-ray examination of the chest, all respondents after the socialization were able to understand that this examination is one of the imaging modalities used to assess the condition of organs in the chest cavity, especially the lungs and heart, increasing from 9 out of 14 respondents (64%) in the pre-test to 14 out of 14 respondents (100%) in the post-test. A similar increase in understanding was also seen in questions related to the function of chest X-rays in helping doctors determine the condition of the lungs and heart, as well as in detecting tuberculosis (TB). This indicates that the individual education provided can increase patient awareness of the role of chest X-rays as a supporting examination frequently used in clinical practice, in line with the emphasis of various international guidelines that the successful use of chest X-rays—including in population-based

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tuberculosis screening programs—is highly dependent on the community's understanding of the purpose of the examination (Abraham et al., 2024; Twabi et al., 2021).

Regarding examination procedures, respondents demonstrated a significant increase in knowledge regarding the importance of following the radiographer's instructions, holding their breath during the imaging process, and removing metal objects that could interfere with the quality of the radiographic image. These three items achieved 100% correct answers in the post-test for most aspects. This understanding is crucial because patient cooperation during the examination significantly impacts the quality of the resulting image and the accuracy of the radiologist's interpretation, as emphasized in various standard radiographic technique guidelines (Lampignano & Kendrick, 2023; Carlton & Adler, 2020). Patient compliance with these technical instructions also aligns with findings that image quality and examination efficiency are significantly influenced by the subject's understanding and cooperation, both in conventional and computer-assisted screening (Qin et al., 2024; Eneogu et al., 2024).

Furthermore, respondents also gained an understanding of radiation safety aspects, particularly the importance of notifying staff if they are pregnant or suspected to be pregnant, with the proportion of correct answers increasing from 9 out of 14 respondents (64%) in the pre-test to 14 out of 14 respondents (100%) in the post-test. This knowledge is crucial to support the application of radiation protection principles in radiology services and aligns with the basic principles of medical radiation physics regarding the importance of dose optimization in high-risk patient groups (Bushberg et al., 2021; Annggarin et al., 2022). Regarding the final question, all respondents in the post-test understood that chest X-ray results can assist doctors in determining a diagnosis and planning appropriate treatment according to the patient's condition, an increase from 11 out of 14 respondents (79%) in the pre-test.

Overall, the results of the community service activities indicate that the individual outreach method conducted directly with patients in the Radiology Installation waiting room is effective in increasing knowledge regarding the role of chest radiography. This finding is consistent with various health education intervention studies based on pre-test post-test designs in other patient populations, which generally report significant increases in knowledge scores after brief face-to-face education (Ayuso-Diaz et al., 2025; Robles-Sánchez et al., 2025). This increase in knowledge is expected to support smooth examinations, reduce patient anxiety, which is reported to be closely related to the level of radiology patient knowledge (Sugiarti et al., 2024), improve patient compliance with radiology staff instructions, and raise public awareness of the importance of chest radiography examinations in the early detection and management of various chest diseases.

This activity has several limitations that should be considered when interpreting the results. First, the relatively small number of respondents (n = 14) limits the generalizability of the findings to a broader patient population. Second, the one-group pre-test post-test evaluation design without a comparison group does not allow for control of confounding factors, such as the test-retest effect, which could contribute to increased post-test scores. Third, a long-term evaluation of knowledge retention or patient behavior change was not conducted in this activity. Future community service activities are recommended to use a larger sample size and, if possible, a more robust evaluation design, such as a control group or a follow-up study at a specific time after the education.

CONCLUSIONS

Based on the evaluation results using pre-test and post-test questionnaires, the outreach activities were able to increase respondents' knowledge regarding the definition, benefits, functions, and procedures of chest X-ray examinations in the Radiology Unit of M. Zein Painan Regional Hospital. Two main conclusions can be formulated as follows.

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1. After participating in the socialization, respondents demonstrated a better understanding that chest X-ray is a radiographic examination that plays a vital role in helping doctors diagnose various diseases of the chest cavity, such as tuberculosis (TB), pneumonia, and other lung disorders. Furthermore, respondents also understood the importance of following the radiographer's instructions during the examination, holding their breath during the radiation, removing metal objects that could interfere with the examination results, and informing the officer of their pregnancy as part of radiation safety.

2. Overall, this outreach activity proved effective as a health education medium in increasing patient knowledge regarding chest X-ray examinations, although the limited sample size and evaluation design need to be considered in interpreting the magnitude of the impact. Therefore, similar activities need to be implemented continuously in the Radiology Installation as part of promotive and preventive efforts to improve public health literacy and support safe, high-quality, and patient-oriented radiology services.

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