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A Patient-Centered Oral Health Care Model for Enhancing Knowledge, Treatment Compliance, and Anxiety Management in Patients with Irreversible Pulpitis

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Abstract: The population of Jambi City as many as 35.84% experienced cavities or disease, and only 15.59% received treatment. The impact of the disease that becomes severe eating is irreversible pulpitis. This can happen because the patient is poorly informed and feels anxious. Therefore, it is necessary to create a model for managing dental and oral health care related to irreversible pulpitis. This research is to develop a practical and efficient model for dental and oral health care for patients with irreversible pulpitis undergoing root canal therapy in hospitals. Research and development methods were employed in this study, and model trials (*Quasi-Experimental Pretest and Posttest with Control Group Design study*). The 2 groups of participants comprised of both dental and oral health therapists and patients with irreversible pulpitis. The results of the model design are validated by experts. Data collected was done used questionnaire sheets and observation sheets. Data from the research results were tested used *shapiro wilk, paired sample t-test, wilcoxon, mann-whitney and independent t-test.* The results of the dental and oral health care model showed an increase in the knowledge of dental and oral therapists (p=0.047), an increase in the skills of dental and oral therapists (p=0.041), an increase in patient knowledge (p=0.001), an increase in patient control compliance (p=0.000), and a decrease in patient anxiety (p=0.001). The development of a model of dental and oral health care has been shown to improve the knowledge, compliance and anxiety of irreversible pulpitis *patients.* This part should include the main results form the study and suggestions for policies.

Keywords: *Oral Health Care; Pulpitis Irreversible; Knowledge; Compliance; Anxiety*.

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I. INTRODUCTION

Oral health is an essential component of overall well-being and an important indicator of general health. Poor oral conditions can negatively affect daily activities and quality of life, including speech, mastication, and aesthetics [1]. Maintaining optimal oral health requires appropriate self-care practices and access to professional dental services. However, dental caries remains one of the most common oral health problems worldwide. In Indonesia, oral health issues continue to be a major concern, with approximately 45.3% of the population experiencing dental caries. Among individuals requiring dental care, 71% require non-urgent treatment, while only 4.3% need immediate intervention [2]. Data from the 2018 National Basic Health Research (Riskesdas) reported that 35.84% of the population in Jambi City experienced dental caries or toothache, yet only 15.59% had received appropriate dental treatment [3]. Progressive demineralization of the tooth structure may produce clinical symptoms and facilitate bacterial penetration into the pulp tissue. This condition often causes pain when consuming cold or sweet foods and beverages and may indicate irreversible pulpitis. If left untreated, irreversible pulpitis can progress to pulpal necrosis [4].

According to Bloom's theory, health status is influenced by four major factors: genetics, environment, behavior, and health services. Among these determinants, health services play a crucial role in maintaining oral health. Health services represent organized efforts to maintain and improve community health, including dental care. Limited access to dental services and low public awareness regarding oral health often contribute to delayed treatment-seeking behavior. As a result, dental problems such as irreversible pulpitis may worsen, while patients frequently avoid visiting dental clinics due to fear or lack of information [5].

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In the context of root canal treatment, conservative dentistry specialists collaborate with dental and oral therapists to deliver comprehensive care [6]. This collaboration supports integrated dental services, where dental and oral therapists perform assessments, establish diagnoses, plan and implement treatment, and evaluate care outcomes according to their professional scope. Within this framework, therapists also play a key role in improving patients' understanding of root canal procedures through education and health promotion. Educational media are therefore required to support this process, one of which is a handbook that provides accessible and structured information for patients. Such media can enhance patient comprehension of the information delivered during oral health education [7].

A preliminary study conducted in a hospital between September and October 2024 revealed that dental and oral therapists in the endodontic clinic mainly performed initial assessments, established diagnoses, and assisted chairside during treatment procedures. However, care planning and evaluation stages were not implemented, despite being within the therapists' professional authority. In addition, existing oral health services remain general and have not yet incorporated a specific care model for patients with irreversible pulpitis undergoing root canal treatment.

Based on these findings, this study aims to develop and implement a patient-centered oral health care model for individuals with irreversible pulpitis undergoing root canal treatment in hospitals. The proposed model is expected to support dental and oral therapists in delivering more structured and collaborative care while improving patients' knowledge, treatment adherence, and anxiety management.

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II. RESEARCH METHODS

A. Methods and Sample

This study adopted a Research and Development (R&D) approach combined with a quasi-experimental pretest–posttest control group design. The development process consisted of five stages: (1) information gathering, (2) model or product design, (3) expert validation and revision, (4) model testing, and (5) finalization of the developed model.

Sampling was conducted in three phases. During the information-gathering stage, purposive sampling was used to recruit three experts: a conservative dentistry specialist, a general dentist, and a dental and oral therapist. In the expert validation phase, purposive sampling was again applied, involving a conservative dentistry specialist, practicing dental and oral therapists, and representatives from the professional board of oral health services. For the model testing stage, total sampling was used to include 10 dental and oral therapists at Abdul Manap Hospital in Jambi City. In addition, purposive sampling was applied to select 30 patients diagnosed with irreversible pulpitis, who were subsequently assigned to control and intervention groups.

The independent variable in this study was the oral health care model applied to patients with irreversible pulpitis undergoing root canal therapy in a hospital setting. This model was developed based on the Indonesian Ministry of Health Regulation No. 284 of 2006 and adapted to address the specific needs of patients requiring endodontic treatment. The implementation of the model was assessed using a structured questionnaire consisting of 15 items related to oral health care practices in the management of irreversible pulpitis.

B. Data Statistic

The study was conducted in five stages, each involving different data analysis methods. Data collected during the information-gathering phase served as the basis for developing the initial product or model design. During the expert validation stage, the Interclass Correlation Coefficient (ICC) was used to statistically assess the reliability and practicality of the developed model.

In the model testing phase, statistical analyses were performed on ratio-scale data. Because the total number of respondents was fewer than 50, the Shapiro–Wilk test was applied to examine the normality of the data distribution. Comparisons between independent groups were analyzed using the Independent Samples t-test. If the data did not meet the assumption of normal distribution, the Mann–Whitney U test was used as a non-parametric alternative.

The evaluation stage involved comparative analyses of pretest and posttest scores for several variables, including therapists' knowledge and skills, patient compliance, anxiety levels, and patient knowledge. All statistical analyses and hypothesis testing were performed using IBM SPSS Statistics version 26 (IBM Corp., Armonk, NY, USA).

III. RESULT

Based on observations and interviews conducted during the information-gathering phase with a conservative dentistry specialist, a general dentist, and a dental and oral therapist, it was found that irreversible pulpitis is one of the most frequently encountered dental problems and commonly requires root canal treatment. However, there is currently no specific oral health care model designed to manage patients with irreversible pulpitis undergoing this procedure. Therefore, a structured oral health care model tailored to these patients is needed to reduce anxiety levels and facilitate the root canal treatment process, ultimately improving treatment completion and effectiveness.

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In response to this need, the researcher developed an oral health care model that integrates appropriate clinical approaches with patient-centered care for individuals diagnosed with irreversible pulpitis.

The reliability test results from expert validation indicated that the intraclass correlation coefficient (ICC) for one expert was 0.546, suggesting adequate instrument stability since the value exceeded 0.50. Furthermore, the overall ICC value obtained from three experts was 0.774. As this value is greater than 0.75, the instrument can be considered to have high reliability.

A. Knowledge Levels of Dental and Oral Therapists

Table 1 Analysis of the Effectiveness of the Intervention on the Knowledge Levels of Dental and Oral Therapists

Statistic						
Variable	**Group**	**Mean ± SD Pre Test**	**Mean ± SD Post Test**	**Δ ± SD**	**P-value**	**P-value**
Knowledge	Intervention	7,80 ± 0,83	9,60 ±0,54	1,80 ± 0,83	0,047*	0,021**
	Control	8,40 ± 1,14	8,40 ± 0,89	0,40 ± 0,54	0,157*	

*Wilcoxon **Mann-Whitney

Based on the data presented in Table 2, the paired analysis for the knowledge variable in the treatment group produced a p-value of 0.047 ($p < 0.05$), indicating a statistically significant difference between the pretest and posttest scores. This finding suggests that the implementation of the oral health care model contributed to an improvement in the knowledge of dental and oral therapists, with an average increase of 1.80 points.

In contrast, the comparison group did not show a significant change. The pretest and posttest scores remained relatively similar, with an average difference of only 0.40 points and a p-value of 0.157 ($p > 0.05$), indicating that no significant improvement occurred in this group.

Furthermore, the intergroup comparison using an independent statistical test yielded a p-value of 0.021 ($p < 0.05$), demonstrating a statistically significant difference in knowledge improvement between the treatment and comparison groups. These results indicate that the developed oral health care model had a positive effect on improving therapists' competence in managing patients with irreversible pulpitis.

B. Skill of Dental and Oral Therapists

Table 2 Effectiveness Tejst on the Skill of Dental and Oral Therapists in the Intervention and Control Groups

Statistic						
Variable	**Group**	**Mean ± SD Pre Test**	**Mean ± SD Post Test**	**Δ ± SD**	**P-value**	**P-value**
Skill	Intervention	10,80 ± 2,28	15,60 ± 0,89	4,80±2,04	0,041*	0,015***
	Control	13,00 ± 2,55	14,40 ± 1,51	1,40±1,34	0,080**	

*Wilcoxon test, **Paired t-test, ***Independent t-test

Based on the data presented in Table 3, the paired samples t-test for the skills variable in the intervention group produced a p-value of 0.041 ($p < 0.05$), indicating a statistically significant difference between the pretest and posttest scores. This result suggests that the implementation of the oral health care model effectively improved the practical skills of dental and oral therapists, with an average score increase of 4.80 points.

In contrast, the control group showed a p-value of 0.080 ($p > 0.05$), indicating no statistically significant difference between the pretest and posttest scores. The average increase was only 1.40 points, suggesting limited improvement in therapists' skills without the implementation of the model.

Furthermore, the independent samples t-test comparing posttest scores between the two groups yielded a p-value of 0.015 ($p < 0.05$), demonstrating a statistically significant difference in skill improvement between the intervention and control groups. Overall, these findings indicate that the developed oral health care model effectively enhanced the capabilities of dental and oral therapists in managing cases of irreversible pulpitis.

C. Patient Knowledge

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Table 3 Effectiveness Tejst of Patient Knowledge in the Intervention and Control Groups

Statistic						
Variable	**Group**	**Mean ± SD Pre Test**	**Mean ± SD Post Test**	**Δ ± SD**	**P-value**	**P-value**
Knowledge	Intervention	6,8 ± 1,207	9,13 ± 0,64	2,3 ± 0,97	0,001*	0,036**
	Control	5,6 ± 1,454	8,53 ± 0,834	2,9 ± 1,28	0,001*	

**Wilcoxon ** Mann Whitney*

Based on the data presented in Table 3, the paired analysis for the patient knowledge variable in the intervention group produced a p-value of 0.001 ($p < 0.05$), indicating a statistically significant difference between the pretest and posttest scores. This finding suggests that the implementation of the oral health care model effectively improved patients' knowledge regarding root canal treatment.

Similarly, the control group also showed a significant improvement, with a p-value of 0.001 ($p < 0.05$). This result indicates that patient knowledge increased even without full implementation of the model, possibly due to routine explanations provided during treatment.

However, the independent samples t-test comparing posttest scores between the two groups yielded a p-value of 0.036 ($p < 0.05$), indicating that the improvement in patient knowledge was significantly higher in the intervention group. These findings demonstrate that the developed oral health care model had a stronger effect on enhancing patient understanding compared with standard care.

D. Patient Compliance

Table 4 Effectiveness Tejst of Patient Compliance in the Intervention and Control Groups

Statistic						
Variable	**Group**	**Mean ± SD Pre Test**	**Mean ± SD Post Test**	**Δ ± SD**	**P-value**	**P-value**
Compliance	Intervention	2,4 ± 0,91	4,8 ± 0,414	2,4 ±0,74	0,000*	0,188**
	Control	2,93 ± 0,88	4,47 ± 0,74	1,5 ±0,74	0,001*	

**Wilcoxon **Mann-Whitney*

Based on the data presented in Table 5, the paired samples t-test for the patient compliance variable in the intervention group produced a p-value of 0.000 ($p < 0.05$), indicating a significant increase in compliance after the implementation of the oral health care model. This finding suggests that the model contributed to improving patients' adherence to root canal treatment procedures in the intervention group.

Similarly, the control group also showed a statistically significant difference between the pretest and posttest scores, with a p-value of 0.001 ($p < 0.05$). This indicates that patient compliance increased even without the implementation of the intervention model, possibly due to routine care procedures provided during treatment.

However, the independent samples t-test comparing posttest scores between the intervention and control groups yielded a p-value of 0.188 ($p > 0.05$), indicating that the difference in compliance between the two groups was not statistically significant. Therefore, although both groups demonstrated improvements in compliance, the developed oral health care model did not produce a significantly greater effect compared with standard care.

E. Patient Anxiety

Table 5 Effectiveness Tejst of Patient Anxiety in the Intervention and Control Groups

Statistic						
Variable	**Group**	**Mean ± SD Pre Test**	**Mean ± SD Post Test**	**Δ ± SD**	**P-value**	**P-value**
Anxiety	Intervention	7,73± 0,88	5,2 ± 0,414	2,53 ±0,99	0,001*	0,671**
	Control	7,6± 0,83	5,27± 0,46	2,3±0,82	0,001*	

**Wilcoxon **Mann-Whitney*

As shown in Table 6, the paired sample analysis for the anxiety variable in the intervention group resulted in a p-value of 0.001 ($p < 0.05$), evidencing a significant statistical variation between pre and post test scores. This suggests that the implementation of the oral health care model had a significant impact on reducing patient anxiety levels. The control group also demonstrated a significant change, with a p-value of 0.001 ($p < 0.05$), indicating a reduction in anxiety levels even in the absence of the model. Thijs could be attributed to standard clinical procedures or the natural psychological adaptation of patients over time.

Howejvejr, the independent samples test comparing post-test anxiety levels between the intervention and control groups produced a p-value of 0.671 ($p > 0.05$), denoting no significant statical difference in anxiety reduction across the groups. Thus, while both groups experienced a decrease in

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anxiety, the model did not result in a significantly greater effect compared to standard care.

IV. DISCUSSION

A. *Oral Health Care Model for Patients with Irreversible Pulpitis Undergoing Root Canal Treatment*

Based on information obtained from interviews with a conservative dentistry specialist, a general dentist, and dental and oral therapists, most endodontic patients treated at Abdul Manap Regional General Hospital (RSUD Abdul Manap) are referrals from primary health care facilities (FKTP). These patients commonly present with advanced dental conditions such as irreversible pulpitis, pulpal necrosis, or abscesses, which require root canal treatment (RCT)

Despite limitations in resources and infrastructure, the dental team remains committed to delivering optimal patient care. In this setting, dental and oral therapists play an essential supporting role. Their responsibilities include preparing and sterilizing instruments, maintaining patient medical records, providing oral health education, monitoring follow-up visits, and documenting treatment progress. These functions are crucial for ensuring the effectiveness and continuity of care, particularly for patients undergoing root canal therapy. Oral health care delivery involves a series of clinical decision-making processes at every stage of treatment, including patient assessment, diagnosis, care planning, implementation, and outcome evaluation [8].

The developed model aims to improve patient knowledge, reduce anxiety, and enhance adherence to follow-up care among individuals with irreversible pulpitis. In addition, it is designed to strengthen the knowledge and clinical skills of dental and oral therapists. The development of this model was guided by the Decree of the Minister of Health of the Republic of Indonesia No. HK.01.07/MENKES/1513/2022 concerning competency standards for dental and oral therapists. Furthermore, the model was enriched through a comprehensive review of relevant literature, including scientific journals, clinical practice guidelines, and field findings aligned with the needs of patients diagnosed with irreversible pulpitis [6].

The Regulation of the Minister of Health of the Republic of Indonesia No. 20 of 2016 governs the licensing and professional practice of dental and oral therapists. According to the Decree of the Minister of Health No. 284 of 2006, dental and oral therapists are authorized to provide oral health care services within the scope of their professional competence. These services are implemented through a structured process consisting of assessment, diagnosis, planning, implementation, and evaluation. In hospital settings, specialized oral health care services are delivered by authorized health professionals known as Providers of Care (PPA), who apply the SOAPIE approach: Subjective data, Objective data, Assessment, Planning, Intervention, and Evaluation[9].

The oral health care model designed for patients with irreversible pulpitis emphasizes collaborative practice between dental and oral therapists and conservative dentistry specialists. Within this model, dental and oral therapists play a significant role in addressing patients' basic care needs and supporting the success of clinical treatment provided by specialists. In addition to the care model, educational media are used to enhance patient understanding of root canal treatment. One effective tool is a handbook, a printed educational medium selected for its simplicity, concise format, and ability to convey essential information. A pocketbook format allows patients to easily carry and access the material whenever needed. The level of a patient's knowledge is strongly influenced by the quality of information received. This is consistent with Hidayah (2021), who stated that informative and engaging educational materials play an important role in health education and can significantly improve patient knowledge [10].

B. *Evaluation of the Model's Effectiveness of Knowledge and Skills of Dental and Oral Therapists*

According to Khurana (2020), the development of an oral health care framework for patients with irreversible pulpitis aims to enhance the competence of dental and oral therapists in providing high-quality oral health services. The results of this study demonstrated a significant increase in therapists' knowledge after the implementation of the model, as indicated by a p-value of 0.047. This finding supports previous research showing that structured educational interventions are effective in improving professional knowledge outcomes. Delivering relevant and systematic information is essential for strengthening competency development, particularly for dental and oral therapists involved in patient management.

Furthermore, the comparison between the intervention and control groups resulted in a p-value of 0.021, indicating that the developed care model was more effective than routine hospital procedures in improving therapists' knowledge. These findings align with Khurana's (2020) statement that targeted training serves as an effective strategy for increasing professional knowledge [11]. n addition to improving knowledge, such training also equips therapists with practical skills necessary to optimize the quality of oral health services [12].

The study also found significant improvements in therapists' clinical skills, with statistical analysis showing a p-value of 0.041. This indicates that the developed model positively influenced skill development. Moreover, the comparison between intervention and control groups yielded a p-value of 0.015, demonstrating that the developed care model was more effective than conventional hospital practice in enhancing therapists' clinical skills. The improvement in skills observed in the intervention group was closely related to the increase in knowledge gained through the training provided during the implementation of the model. These findings are consistent with previous research stating that the effectiveness of training programs can be measured through participants' improved understanding of the material, which is reflected in behavioral changes and improved clinical practice$_j$ [13].

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The oral health care model program for patients with irreversible pulpitis can therefore be considered successful when health professionals not only understand the developed service model but are also able to simulate and implement the clinical procedures according to the guidelines provided during training. Training programs for health personnel are widely recognized as effective strategies for improving professional competence, service quality, and organizational performance $_j$ [14].

C. Evaluation of the Model's Effectiveness on Patient Knowledge, Treatment Compliance, and Anxiety Levels

Oral health knowledge plays a crucial role in preventing and managing dental health problems. Educational interventions are an important method for delivering this knowledge. Sutowijoyo [15], emphasized that education plays a vital role in shaping awareness and behaviour that supports effective oral health maintenance. In this study, the implementation of the oral health care model combined with a patient pocketbook for individuals with irreversible pulpitis proved effective in increasing patients' knowledge regarding root canal treatment, as indicated by a statistically significant p-value of 0.001.

These findings are consistent with a study conducted at the dental clinic of RS Daerah Beriman Balikpapan, which demonstrated a positive relationship between patients' knowledge of root canal treatment and their adherence to follow-up appointments. Patient motivation to complete treatment can be observed through their willingness to attend subsequent visits, as described in that study [16].

Root canal therapy typically requires multiple treatment sessions. Therefore, it is essential for patients to understand the importance of completing each stage of the procedure. When patients have a clear understanding of the treatment process and its benefits, they are more likely to remain motivated and adhere to the recommended treatment schedule, thereby increasing the likelihood of successful treatment outcomes [17].

Insufficient patient knowledge often leads to poor treatment compliance, which may result in incomplete or unsuccessful root canal therapy. Patients who are reluctant to attend multiple follow-up visits, combined with limited understanding of the treatment process, may experience suboptimal outcomes. This highlights the critical role of patient education in promoting treatment adherence and improving the effectiveness of endodontic care[15].

Another common issue occurs when patients perceive that their condition has improved and therefore assume that further treatment is unnecessary. However, incomplete root canal therapy may allow bacteria to proliferate and cause reinfection. For this reason, dentists must provide clear and comprehensive explanations regarding the patient's condition and the required treatment steps. Effective communication between dentists and patients plays a vital role in building trust and encouraging adherence to treatment protocols. Strengthening this communication can significantly increase the likelihood that patients will complete the full course of root canal therapy [18].

The implementation of the oral health care model combined with the patient handbook significantly improved treatment adherence among patients with irreversible pulpitis, as indicated by a highly significant p-value ($p = 0.000$). The model enhanced communication between patients and dental and oral therapists, enabling patients to receive clearer and more comprehensive information regarding root canal procedures.

Improved communication positively influenced patients' knowledge and awareness of the importance of attending follow-up visits during root canal treatment. These findings are consistent with research by Yulistina (2023), which reported a positive relationship between patients' knowledge of endodontic treatment and their compliance with follow-up dental visits [16].

Furthermore, a patient-centered care approach that emphasizes effective communication between dental professionals and patients can reduce hesitation, fear, and anxiety related to dental procedures. The use of pocketbook media, which provides clear explanations accompanied by illustrations of treatment procedures, also played an important role in reducing anxiety among patients with irreversible pulpitis. The integration of the oral health care model with the handbook effectively lowered anxiety levels associated with root canal therapy, as indicated by a statistically significant p-value of 0.001.

According to Bambang, oral health care should be tailored to the patient's diagnosis. For patients experiencing anxiety, fear, or stress, dental and oral therapists are expected to develop care plans and interventions specifically aimed at anxiety reduction. These interventions typically include patient education and counseling focused on emotional support, which have been shown to effectively reduce anxiety levels in clinical dental settings.

Both the conventional care model and the irreversible pulpitis care model demonstrated effectiveness in improving patient knowledge, treatment compliance, and anxiety levels, as reflected by higher post-test scores compared with pre-test scores. However, the irreversible pulpitis care model resulted in greater improvements across all measured outcomes than the conventional model (Latifah et al., 2017).

The superior performance of the irreversible pulpitis care model can be attributed to its patient-centered design, which was specifically tailored to meet the needs of individuals undergoing root canal treatment. Key components of the model, including detailed procedural explanations, visual illustrations of treatment stages, and a comprehensive patient pocketbook, contributed to increased knowledge, improved treatment adherence, and reduced anxiety. These features helped patients better understand the treatment process and feel more prepared, thereby facilitating a more positive treatment experience.

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D. Study Limitations

During the study period, temporary malfunctions of endodontic equipment occurred at the research site, resulting in the suspension of dental services for several days and requiring the rescheduling of patient appointments. To prevent similar disruptions in the future, health facilities should implement routine maintenance schedules for endodontic instruments and provide backup equipment when possible. Establishing partnerships with external dental service providers or referral centers may also help minimize treatment delays when equipment is under repair.

Another limitation involved difficulties in scheduling follow-up visits through the JKN Mobile application, as some patients were unable to secure available treatment slots. To address this issue, hospitals and clinics should collaborate with the BPJS system to optimize digital queue management and allocate specific appointment slots for continuing care cases such as root canal follow-ups. Providing manual scheduling assistance or alternative booking channels may also help ensure that patients requiring priority care receive timely treatment.

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