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Development of an Oral Health Care Model for Patients Undergoing Tooth Extraction with Fracture Complications: Its Effect on Dental Therapists' Compliance and Patient Satisfaction at Ibnu Sina Hospital, Makassar

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Abstract: The background of this study was the absence of a standardized oral health care model for managing tooth extraction cases with fracture complications in hospital settings. This condition has resulted in the suboptimal role of dental therapists, particularly during the assessment, diagnosis, planning, and evaluation stages of care, potentially affecting therapists' compliance and patient satisfaction. This study aimed to develop a systematic, applicable, and effective oral health care model to improve dental therapists' compliance and patient satisfaction in managing tooth extraction cases with fracture complications at Ibnu Sina Hospital, Makassar. This study employed a mixed-methods approach using a Research and Development (R&D) design consisting of five stages: information gathering, model design, expert validation, model testing, and final product development. The exploratory phase was conducted through observation, interviews, documentation, and literature review. The model trial involved 10 dental therapists and 10 patients undergoing tooth extraction with fracture complications. Qualitative data were analyzed descriptively, while quantitative data were analyzed using the Shapiro–Wilk test and the Wilcoxon Signed-Rank Test, as all data were not normally distributed ($p < 0.05$). The results showed that the implementation of oral health care for tooth extraction cases with fracture complications had not been optimal due to the absence of standardized clinical practice guidelines. The developed model, namely the AKG-FR Model (Oral Health Care–Fracture Model), consists of integrated stages of assessment, diagnosis, planning, implementation, and evaluation, combined with promotive, preventive, curative, rehabilitative, and documentation activities. Expert validation demonstrated that the model had good feasibility, with an Intraclass Correlation Coefficient (ICC) of 0.889 ($p = 0.003$). The effectiveness test showed that the implementation of the model significantly improved patient satisfaction from 62 ± 2.920 to 78 ± 2.920 ($p = 0.000$) and increased dental therapists' compliance from 8.60 ± 1.174 to 9.80 ± 0.422 ($p = 0.016$). In conclusion, the AKG-FR Model is feasible for implementation as a clinical guideline for oral health care in tooth extraction cases with fracture complications, as it has been proven to improve both dental therapists' compliance and patient satisfaction. This model is expected to contribute to improving the quality of specialized dental care services in hospitals.

Keywords: *Oral Health Care, AKG-FR Model, Tooth Extraction with Fracture Complications, Dental Therapist Compliance, Patient Satisfaction, Research and Development.*

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I. INTRODUCTION

Dental and oral health issues remain one of the most prevalent public health problems both globally and in Indonesia. The World Health Organization (WHO) notes that dental and oral diseases impact individuals' quality of life, productivity, and well-being. In Indonesia, high rates of dental caries and periodontal disease have led to an increased need for curative care, including tooth extractions, across various levels of the healthcare system.[1]

Data from the 2023 Indonesian Health Survey (SKI) show that 56.9% of the population aged 18 and older experience oral health problems, yet only about 11.2% receive

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care from oral health professionals.[2] In addition, South Sulawesi Province is one of the provinces with the highest prevalence of oral health problems in Indonesia.[3] This situation has contributed to an increased need for tooth extractions, including in cases involving fractures that require comprehensive treatment.

Tooth extraction with fracture complications is a procedure performed in specialized dental care that involves a higher level of difficulty and a greater risk of complications than routine tooth extraction. Therefore, the success of the treatment depends not only on the clinical skills of the dentist but also on the implementation of a systematic oral health care approach and the compliance of dental therapists with established standards of care to ensure patient safety and improve patient satisfaction.[4]

Sesuai Keputusan Menteri Kesehatan Nomor According to the Indonesian Ministry of Health Regulation No. HK.01.07/MENKES/1513/2022, oral health care is delivered through the stages of assessment, diagnosis, planning, implementation, and evaluation.[5] However, in practice, the implementation of this care process has not been fully optimized, particularly in the management of tooth extractions complicated by fractures. A preliminary study conducted at Ibnu Sina Hospital, Makassar, revealed that dental therapists predominantly perform the implementation stage as chairside assistants, while the stages of assessment, diagnosis, planning, and evaluation have not been comprehensively carried out due to the absence of a standardized oral health care model.[6]
Previous studies have primarily focused on oral health care documentation, oral hygiene services, and the performance of dental therapists, whereas research on the development of an integrated oral health care model for patients undergoing tooth extraction with fracture complications remains very limited.[7–9] This gap highlights the need to develop a systematic, practical, and standardized oral health care model that is aligned with the needs of hospital-based dental services. Based on this background, this study aimed to develop an oral health care model for patients undergoing tooth extraction due to fracture complications and to evaluate the effectiveness of its implementation in improving dental therapists' compliance and patient satisfaction at Ibnu Sina Hospital, Makassar.

II. RESEARCH METHODS AND SAMPLE

This study employed a mixed-methods approach using a Research and Development (R&D) design to develop an oral health care model for patients undergoing tooth extraction with fracture-related complications. The research stages included information gathering, model development, expert validation and revision, pilot testing, and final model refinement.[10]

The information-gathering stage was conducted at the Oral and Maxillofacial Surgery Clinic of Ibnu Sina Hospital, Makassar, through direct observation, in-depth interviews with oral and maxillofacial surgeons and dental therapists, and a literature review to identify the needs and challenges in the implementation of oral health care. Based on these findings, an Oral Health Care Model for Fracture Cases (AKG-FR) was developed and subsequently validated by experts before being implemented in the pilot testing phase. The effectiveness of the model was evaluated using a pre-experimental one-group pretest–posttest design by measuring dental therapists' compliance and patient satisfaction before and after the implementation of the AKG-FR model.[11]

The study population consisted of all dental and oral therapists and patients who underwent tooth extractions complicated by fractures at Ibnu Sina Hospital in Makassar.[12] Sampling was tailored to each stage of the study. During the problem identification stage, a purposive sampling technique was used, involving one oral surgeon and one dental and oral therapist.. The model validation stage involved two experts selected using purposive sampling. In the pilot testing phase, all 10 dental therapists working at the Oral and Maxillofacial Surgery Clinic were included using total sampling, while 20 patients who met the inclusion criteria were recruited as study participants.[12,13]

Data collection was conducted using an observation sheet for the implementation of the oral health care model, an observation sheet for oral health therapist compliance, and a patient satisfaction questionnaire that had undergone a validation process. Qualitative data were analyzed descriptively as a basis for model development, while quantitative data were analyzed both descriptively and inferentially. A normality test was conducted using the Shapiro–Wilk test, and the differences in values before and after the intervention were analyzed using the Wilcoxon Signed-Rank test.

III. RESULTS

A. AKG-FR Information Collection Result

Information was collected through interviews, observations, document reviews, and a literature review involving oral and maxillofacial surgeons, dental therapists, and the management of Ibnu Sina Hospital, Makassar. The findings revealed that the implementation of oral health care had not yet been carried out optimally or in a standardized manner. Although several stages of care had been implemented appropriately, inconsistencies were still identified in documentation, patient education, and post-extraction evaluation for cases involving fracture-related complications. This condition was attributed to the absence of a specific oral health care model to serve as a standardized guideline for dental therapists in the delivery of specialized dental services.[14]

B. Model Design and Construction

The model was developed based on the identified service needs, theoretical review, field observations, and input from oral and maxillofacial surgeons, dental therapists, and patients. The developed model was designed as a guideline for providing oral health care to patients undergoing tooth extraction with fracture-related complications in a hospital setting.

The model consists of five main stages: assessment, diagnosis, planning, implementation, and evaluation, in accordance with the professional standards for dental therapists. In addition, the model integrates therapeutic communication, patient education, and systematic

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documentation of care to support the delivery of comprehensive oral health services.

The development of this model is expected to improve dental therapists' compliance with standard operating procedures, enhance the quality of clinical documentation, and improve the quality of care and patient satisfaction among patients undergoing tooth extraction with fracture-related complications at Ibnu Sina Hospital.

C. Expert Validation

Validation is the process by which experts in the relevant field evaluate the developed model. This process was conducted to obtain data for assessing the feasibility of the oral health care model for tooth extraction with fracture-related complications. The validation involved three experts: a dentist, a dental nurse, and a media expert. Validation was carried out using a questionnaire consisting of eight items. The results of the data were analyzed using the Intraclass Correlation Coefficient (ICC), which can be seen in the following table.

➢ *Validity Test*

Tabel 1 Expert Validation

Variable	Score	*p-value*	Category
ICC	0.889	0.003	Good realiability

Based on Table 1, the reliability test results show a p-value of 0.003 and an intraclass correlation coefficient of 0.889, which meets the criteria for "good." This indicates that the assessment of the oral health care model for patients undergoing tooth extraction complicated by fractures, as performed by specialists, demonstrates a good level of consistency. Based on these results, it appears that the oral health care model for patients undergoing tooth extraction complicated by a fracture is appropriate for use as a means of improving dental therapists' compliance and patient satisfaction at Ibnu Sina Hospital in Makassar.

D. Product Result

Table 2 Frequency Distribution Characteristics of Respondents

Characteristics	N	F%
Dental and Oral Therapy Education		
Diploma III	6	60%
Diploma IV	4	40%
Patient Age		
18 years	2	10%
20 years	4	20%
30 years	8	40%
35 years	4	20%
50 years	2	10%

According to Table 2, the study included 10 dental and oral therapists and 20 patients who underwent tooth extractions complicated by fractures. In terms of educational level, the majority of the dental and oral therapists—6 individuals (60%)—held a Diploma III, while 4 individuals (40%) held a Diploma IV. In this patient group, the largest age distribution was among 30-year-olds, with 8 patients (40%), followed by 20-year-olds and 35-year-olds, with 4 patients each (20%), and 18-year-olds and 50-year-olds, with 2 patients each (10%). These results indicate that the majority of patients who underwent tooth extraction with fracture complications were in the productive adult age group.

Table 3 Normality Test

Variable	p-value	Deskription
Pre-Test on Dental and Oral Therapists' Compliance	0,003	abnormal
Post-Test on Dental and Oral Therapists' Compliance	0,000	abnormal
Pre-Test on Patient Satisfaction	0,017	abnormal
Post-Test on Patient Satisfaction	0,017	abnormal

**Shapiro-Wilk*

Table 3 shows that the p-values for all variables are less than 0.05, indicating that all variables are non-normally distributed; therefore, the decision made was to use a nonparametric test—in this case, the Wilcoxon signed-rank test..

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Table 4 Testing the Effectiveness of a Model on Patient Satisfaction and Compliance with Oral Health Therapy

Variabel	Statistic		p-value
	Pre Test Mean ±SD	Pre Test Mean ±SD	
Patient Satisfaction	62 ± 2,920	78±2,920	0,000*
Dental and Oral Therapists' Compliance	8,600 ± 1,174	9,800±0,422	0,016

Table 4 shows the results of the effectiveness test, indicating that the implementation of the oral health care model led to an increase in patient satisfaction and compliance among oral health practitioners. The mean patient satisfaction score increased from 62±2.920 in the pre-test to 78±2.920 in the post-test. The results of the statistical test showed a significant difference (p=0.000),indicating that the developed model is effective in improving patient satisfaction.

In addition, the average compliance score for dental and oral therapists also increased from 8.60 ± 1.174 before the model was implemented to 9.80 ± 0.422 after implementation. This increase was statistically significant (p=0.016), indicating that the oral health care model is effective in improving the compliance of dental and oral therapists in providing services in accordance with operational standards.

IV. DISCUSSION

➢ *AKG-FR Information Collection*

The results of the data collection indicate that the delivery of oral health care is still not being carried out optimally or in a standardized manner. While several stages of care have been carried out effectively, inconsistencies were still found in documentation, patient education, and post-procedural evaluation following tooth extractions complicated by fractures. This situation is influenced by the lack of a specific care model to serve as a guideline for dental and oral therapists in the delivery of specialized dental care.[14]

During the assessment phase, the patient's subjective and objective data serve as the primary basis for determining the patient's care needs. The assessment includes the patient's identity, chief complaint, general health status, dental history, and intraoral and extraoral examinations. This phase is crucial because it forms the basis for establishing a diagnosis and determining dental and oral health care interventions.[15]

Furthermore, the findings from the data collection indicate that patients undergoing tooth extraction complicated by a fracture often experience anxiety, fear, and discomfort prior to the procedure. This aligns with the theory that dental procedures, particularly tooth extraction and odontectomy, can trigger patient anxiety due to fear of instruments, the sounds of the procedure, or the pain they will experience. [16]

Based on the results of this information gathering, there is a need to develop a more systematic, effective, and practical model of oral health care to improve dental therapists' compliance and patient satisfaction with services for tooth extractions complicated by fractures..

➢ *AKG-FR Design and Expert Validation*

The Oral Health Care Model for tooth extraction cases complicated by fractures (AKG-FR) was developed based on the results of a needs assessment that revealed the lack of a standardized care model at Ibnu Sina Hospital in Makassar. As a result, the role of dental and oral therapists remains focused on assisting with procedures, while the stages of assessment, diagnosis, planning, evaluation, and documentation have not been optimally implemented. This situation highlights the need for a systematic care model in accordance with professional standards.[5,17]

The AKG-FR model integrates the stages of assessment, diagnosis, planning, implementation, evaluation, and documentation into a single comprehensive care pathway. Its development followed the Research and Development (R&D) method, ensuring that the model was designed based on user needs and underwent a validation process prior to implementation.[10,18]

Expert validation results indicate that the AKG-FR Model is suitable for use as a clinical guideline, with an Intraclass Correlation Coefficient (ICC) of 0.889 (p = 0.003). These results indicate agreement among validators and that the model meets the criteria for content, structure, and ease of application. Therefore, the AKG-FR Model is considered valid and has the potential to support improvements in the quality of oral health care for tooth extractions complicated by fractures.[10,18,19]

➢ *Product Result Test*

Training on oral health care models for patients undergoing tooth extraction complicated by fractures was conducted to improve dental and oral health practitioners' adherence to oral health care procedures. The delivery of material on the oral health care model is a planned activity carried out through a training process aimed at fostering compliance, instilling the right attitudes, and developing skills so that individuals can independently and consistently provide care to patients.[20]

- *Effectiveness Test of Dental and Oral Therapists' Compliance*

Based on the results of the paired t-test statistical analysis, there was a significant difference in the compliance scores of dental and oral therapists before and after the intervention using the oral health care model. The mean compliance score for dental and oral therapists before the intervention was 8.6, while after the intervention it increased to 9.8, with a p-value of 0.01. This indicates that the implementation of the developed oral health care model for patients undergoing tooth extraction complicated by fractures is effective in improving dental therapists' compliance.

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The results of this study indicate that the implementation of the oral health care model is capable of improving dental therapists' adherence to service standards and increasing patient satisfaction. These results are consistent with the study by Rahayu et al. (2019), which stated that the implementation of well-documented oral health care is associated with improved service quality. The application of systematic care allows health workers to work according to procedures, making services more focused and consistent.

- *Pasien Patient Satisfaction Effectiveness Test*

Based on the results of the paired t-test, there was a statistically significant difference in patient satisfaction scores before and after treatment using the oral health care model. The mean patient satisfaction score before treatment was 62, while after treatment it rose to 78, with a p-value of 0.00. This indicates that the implementation of the developed dental and oral health care model for patients undergoing tooth extraction complicated by fractures is effective in improving patient satisfaction.

Another study by Sumardi et al. (2021) on the "Dental and Oral Care Model for Inpatients to Prevent the Occurrence of Hospital-Acquired Pneumonia (HAP)" also supports the findings of this study. That study showed that a structured dental and oral health care model is effective in improving healthcare workers' compliance and their skills in performing dental and oral health procedures. These results reinforce the findings of this study that the implementation of a dental and oral health care model can improve dental therapists' compliance and the quality of care provided to patients undergoing tooth extraction complicated by fractures.[21]

The model was tested to determine the effectiveness of the developed oral health care model. This phase involved applying the model to the care of patients undergoing tooth extraction complicated by fractures and evaluating changes in dental therapists' compliance and patient satisfaction.

The results of the model testing showed that the implementation of the model had a positive impact on the delivery of oral health care. Dental therapists became more focused in carrying out the stages of care, from assessment to evaluation of the procedure. Service documentation also became more complete and systematic after the model was implemented.[22]

In addition, the implementation of this model improves communication between dental therapists and patients, so that patients feel more comfortable, better understand the procedure, and experience reduced anxiety before the tooth extraction is performed. This is consistent with the theory that a communication- and education-based approach can help reduce patients' anxiety regarding dental procedures.

V. AKG-FR MODEL'S

The final outcome of this study is the development of a systematic, comprehensive, and practical model for oral health care for patients undergoing tooth extraction complicated by fractures. This model was designed to assist dental and oral therapists in providing services that meet professional standards and patient needs.

The resulting model covers the stages of patient assessment, diagnosis of oral health needs, treatment planning, service implementation, patient education, support during the tooth extraction procedure, and post-procedure evaluation. The model also includes guidelines for service documentation and therapeutic communication procedures with patients.

The application of this model has been shown to improve dental therapists' adherence to oral health care standards and increase patient satisfaction with tooth extraction services for cases involving fracture complications at Ibnu Sina Hospital in Makassar. Furthermore, this model can serve as a service guideline for specialized dental practices, particularly in tooth extraction procedures involving fracture complications..

VI. CONCLUSION

The Oral Health Care Model (AKG-FR) for tooth extractions complicated by fractures has been deemed appropriate and effective for implementation as a service guideline in hospitals. The developed model has been shown to improve dental and oral therapists' adherence to standard care practices and significantly increase patient satisfaction ($p < 0.05$). Furthermore, validation results indicate that the model has a good level of validity (ICC = 0.889; $p = 0.003$), making it suitable for use as a systematic and practical service guideline that supports the improvement of oral health care quality in cases of tooth extraction with fracture complications.

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