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Enhancing Motivation for *Oral Hygiene* Implementation among Immobilized Compos Mentis Patients through The Development of a Dental Care Table in Inpatients Settings

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ABSTRACT Maintaining oral hygiene through tooth brushing is essential for hospitalized patients, particularly those with limited mobility (immobilized compos mentis), as poor oral hygiene can lead to nosocomial infections and systemic complications. However, patients with limited mobility often face significant challenges in performing oral hygiene independently due to discomfort or inadequate supportive infrastructure. This study aimed to evaluate the effectiveness of a Dental Care Table (DCT) in enhancing motivation for oral hygiene practices among immobilized compos mentis patients in inpatient settings. This research employed a Research and Development (R&D) approach using a pre-experimental design (pretest-posttest group) with purposive sampling involving 32 hospitalized respondents. Motivation levels were measured using the Treatment Self-Regulation Questionnaire (TSRQ), while product feasibility was assessed through expert validation based on David Garvin's Eight Dimensions of Quality. Data analysis included Aiken's V for validity, Intraclass Correlation Coefficient (ICC) for reliability, and the Wilcoxon test to assess differences in motivation scores. The DCT product demonstrated high feasibility with a score of 85.16% and excellent reliability (ICC = 0.958). Motivation to perform oral hygiene improved significantly from a pretest average of 74.93% to a posttest average of 80.60% (p = 0.046), indicating that the DCT effectively enhanced patient motivation. Motivation levels among participants remained within the strong category (67%–100%). In conclusion, the development and application of the Dental Care Table significantly increased the motivation of immobilized patients to maintain oral hygiene during hospitalization. This assistive device offers both functional and psychological benefits, serving as a practical intervention to support personal care and improve quality of life for patients with limited mobility. Future research is recommended to explore ergonomic refinement and broader clinical applications of the DCT.

INDEX TERMS Dental care table, oral hygiene, patient motivation, immobilized patients, inpatient care

I. INTRODUCTION

Oral hygiene is a fundamental component of general health, yet it remains a frequently overlooked aspect in hospitalized patients, particularly those who are immobilized. According to the Global Burden of Disease Study, dental caries and periodontal disease continue to be prevalent worldwide, affecting over 3.5 billion people [1]. In Indonesia, the 2018 Riskesdas survey reported that 45.3% of the population suffers from caries, with 14% experiencing gingival inflammation [2]. Among inpatients, especially those with limited mobility, maintaining oral hygiene becomes increasingly difficult due to physical restrictions, lack of supportive infrastructure, and reduced awareness, ultimately increasing their susceptibility to systemic complications, including hospital-acquired infections [3]–[5].Brushing teeth is a routine self-care activity that can prevent oral infections and support vascular health when done regularly and effectively [6]. However, for immobilized patients, physical limitations make this task challenging, especially in settings where conventional tools like basins or sinks are not ergonomically accessible. Existing oral hygiene interventions in hospitals often focus on staff-administered care or education, with limited emphasis on empowering patients through assistive tools that promote autonomy [7]–[9].Recent studies have proposed various health promotion interventions in hospital environments, including multimedia tools, educational sessions, and caregiver involvement, to improve patients' knowledge and behavior regarding oral hygiene [10]–[12]. While these approaches have demonstrated positive outcomes in increasing awareness and compliance, they often fall short in addressing the structural barriers that immobilized patients face in

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performing independent oral hygiene [13]. There is a growing consensus that motivation plays a crucial role in encouraging self-care behavior, especially in patients who are mentally competent (compos mentis) but physically limited [14]–[16].

Despite the availability of theoretical models such as Vroom's expectancy theory [17] and the Self-Determination Theory (SDT) by Deci and Ryan [18], few studies have explored the role of assistive devices in enhancing intrinsic motivation for oral hygiene in hospitalized patients. This gap indicates a need for innovation in supportive infrastructure that enables patients to overcome physical barriers while simultaneously fostering self-determined behavior.

This study aims to develop and evaluate the feasibility and effectiveness of a Dental Care Table (DCT) specifically designed for immobilized, compos mentis inpatients. The DCT is conceptualized to facilitate independent oral hygiene activity directly at the bedside, thereby promoting autonomy and comfort. Through an R&D-based intervention followed by a pretest-posttest design, this study evaluates both the motivational impact on patients and the technical feasibility of the product. The key contributions of this study are as follows:

1. Design and development of an ergonomic Dental Care Table (DCT) based on anthropometric data tailored to the needs of immobilized patients.
2. Empirical validation of the DCT's impact on patient motivation, using standardized tools such as the Treatment Self-Regulation Questionnaire (TSRQ).
3. Assessment of product feasibility through expert validation using Garvin's Eight Dimensions of Quality framework and statistical reliability analysis (Aiken's V and ICC).

II. METHOD

A. STUDY DESIGN

This study employed a research and development (R&D) approach incorporating a pre-experimental, one-group pretest-posttest design to evaluate the feasibility and effectiveness of a Dental Care Table (DCT) in enhancing oral hygiene motivation among immobilized, compos mentis inpatients. This design was selected to measure the impact of the intervention without a control group and to support iterative product improvement based on field testing and expert feedback [26].

B. STUDY SETTING AND DURATION

The research was conducted in G1 and G2 inpatient wards at RSPAL Dr. Ramelan Hospital, Surabaya, Indonesia. The study took place over one month, from February 15 to March 15, 2024, coinciding with patient hospitalization and rehabilitation periods where oral hygiene support was most needed.

C. POPULATION AND SAMPLING

The study population comprised hospitalized adult patients experiencing immobilization due to medical conditions but maintaining full consciousness (compos mentis).

1. Inclusion criteria were as follows:
   a. Aged between 20 and 60 years
   b. Diagnosed as immobilized but mentally alert (Glasgow Coma Scale = 15)
   c. Hospitalized for a minimum of three consecutive days
   d. Able to communicate and comprehend instructions
   e. Provided informed consent
2. Exclusion criteria included:
   a. Severe cognitive impairment or psychiatric disorders
   b. Terminal illness or palliative care status
   c. Active oral infection or bleeding disorders
   d. Purposive sampling was used to select participants who met the criteria. A total of 32 patients were enrolled in the study.

This non-randomized sampling technique was chosen for practical and ethical reasons, given the need to select participants with specific physical limitations [27].

D. ETHICAL CONSIDERATIONS

This study received ethical approval from the Health Research Ethics Committee of RSPAL Dr. Ramelan Surabaya. All participants were informed about the purpose, procedures, risks, and benefits of the study. Written informed consent was obtained from each participant in accordance with institutional and national ethical guidelines.

E. INSTRUMENTATION

Two primary tools were employed in the study:

1. Treatment Self-Regulation Questionnaire (TSRQ): A validated instrument consisting of 12 items designed to measure intrinsic and extrinsic motivation related to health behaviors. It uses a 5-point Likert scale and has been adapted for the context of oral hygiene in hospitalized individuals [28].
2. Product Feasibility Evaluation: This involved a customized assessment tool based on David Garvin's Eight Dimensions of Quality, covering performance, reliability, durability, usability, aesthetics, serviceability, features, and perceived quality. The tool consisted of 32 items rated by three expert evaluators, including clinical practitioners and ergonomic engineers [29].

F. PRODUCT DEVELOPMENT AND INTERVENTION

The DCT was developed through iterative prototyping based on ergonomic principles and patient anthropometric data. Initial observations and interviews with nursing staff and patients informed the product design to ensure usability and safety in a lying or semi-reclined position. The materials used for the DCT included stainless steel frames and food-grade plastic trays, with adjustable height and angle features to support independent oral hygiene activity.Once the prototype was finalized and reviewed by expert evaluators, it was introduced into patient rooms for usability trials.

G. RESEARCH PROCEDURE

The study was conducted in three main phases:

1. Pretest Phase: Patients completed the TSRQ to assess their baseline motivation for performing oral hygiene.
2. Intervention Phase: Patients were introduced to the DCT and instructed in its use. The DCT was positioned

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bedside and used for tooth brushing and related oral hygiene activities over a period of two days**.** Nursing staff and researchers assisted only when needed to ensure safety and encourage independent use.

3. Posttest Phase: Following two days of DCT use, participants completed the TSRQ again to assess changes in motivation levels.

In parallel, the feasibility of the DCT was evaluated through **e**xpert assessment, focusing on its ergonomic, functional, and design attributes. Feedback from patients and staff was recorded to guide future improvements.

H. DATA ANALYSIS

Quantitative data were analyzed using SPSS version 25.0**.** The Wilcoxon Signed-Rank Test was used to assess differences in pretest and posttest motivation scores, as the data were non-normally distributed and the sample size was small. Aiken's V index was employed to assess content validity of the feasibility questionnaire, while Intraclass Correlation Coefficient (ICC) was used to determine inter-rater reliability. Acceptable thresholds for Aiken's V were >0.70, and for ICC, >0.75, indicating high reliability [30].
Product feasibility was categorized into four levels:

1. Not feasible: 0–19%
2. Less feasible: 20–39.9%
3. Fairly feasible: 40–59.9%
4. Feasible: 60–100% [31]

I. LIMITATIONS

The study did not include a randomized control group, which may limit the ability to generalize findings to a broader population. However, the use of pre-post comparisons and standardized tools helps ensure internal validity. Future research should include a controlled design and larger sample size to strengthen the findings

III. RESULT

TABLE 1
Respondent Characteristics

Characterization		Frequency	Percentage (%)
Gender	Male	16	50
	Female	16	50
Age	20-25 y o	11	34,4
	26-31 y o	5	15,6
	32-37 y o	6	18,8
	38-43 y o	7	21,8
	44-45 y o	3	9,4

TABLE 2
Frequency Distribution of Pre-Test and Post-Test Oral Hygiene Motivation

Variable	Mean	SD
Pre test		
Motivation to perform oral hygiene (male)	73.05 %	13.32%
Motivation to perform oral hygiene (female)	76.82 %	8.26%
Post-test		
Motivation to perform oral hygiene (male)	78.52 %	11.07%
Motivation to pe rform oral hygiene (female)	82.68 %	6.96%
p- value	0.046	

Based on the data presented in TABLE 1, it can be concluded that the number of male and female respondents has 50% each. In terms of age, the majority of respondents were aged 20-25 years (34.4%). TABLE 2, shows that there is a difference in motivation to implement oral hygiene between men and women, with a pre-test difference of 3.77% ± 5.06%. While for the post-test difference value of 4.16% ± 4.11%. With a p- value of 0.046, it can be interpreted that there is a significant difference after using the dental care table (DCT). In TABLE 3, the Aiken V validation result is 0.802 with high validity and the ICC value is 0.958. With a feasibility percentage of 85.16%.

TABEL 3
Expert Validation Test Results

Variables	Question item	Score	Category
Aiken V validity	32	0.802	High validity
ICC	32	0.958	Reliability
Feasibility	32	85.16%	Worth

IV. DISSCUSSION

A. THE INFLUENCE OF THE DENTAL CARE TABLE (DCT) ON PATIENT MOTIVATION

The study revealed that the application of the Dental Care Table (DCT) significantly enhanced the motivation of immobilized, compos mentis inpatients to perform oral hygiene activities. The average motivation score increased from 74.93% before the intervention to 80.60% after two days of DCT use. This improvement suggests that the DCT is effective in promoting self-determined behavior by minimizing environmental barriers and increasing patient autonomy. The DCT enabled patients to perform oral hygiene tasks with greater ease, comfort, and confidence, thereby supporting their psychological needs for competence and independence.

These findings align with the principles of Self-Determination Theory (SDT), which emphasizes the importance of autonomy, competence, and relatedness in fostering intrinsic motivation [33]. By facilitating independent action in a hospital setting, the DCT aligns with these psychological needs. The increase in motivation indicates that the presence of appropriate assistive devices can directly influence patient behavior in clinical environments.

This result is also consistent with studies that show physical tools tailored to patient needs can improve engagement in self-care practices. For example, Wahyuni et al. demonstrated that the use of ergonomic aids in elderly care improved oral hygiene compliance and reduced plaque accumulation [34]. Similarly, Kusumaningrum et al. found that providing educational tools alongside physical aids significantly enhanced dental care outcomes in geriatric patients [35].

The motivational improvement observed in this study indicates that even short-term exposure to supportive devices can lead to behavioral change. This is critical in the inpatient context, where maintaining hygiene not only enhances patient comfort but also reduces the risk of nosocomial infections.

B. COMPARISON WITH SIMILAR STUDIES

The findings of this study are in line with previous research that emphasizes the effectiveness of behavioral and structural interventions in healthcare settings. A study by

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Setiawan et al. employed a multimedia educational approach to increase oral hygiene awareness among inpatients and reported a similar upward trend in motivation levels [36]. However, unlike the current study, Setiawan's intervention lacked a physical support component, indicating that combining educational efforts with ergonomic solutions may yield more comprehensive outcomes.

In addition, a study by Santoso et al. on elderly patients found that motivation levels significantly increased after introducing a personalized hygiene tool, highlighting the importance of tailored design in healthcare products [37]. The present study reinforces this perspective by providing quantitative evidence of motivation enhancement through the use of the DCT.

Contrastingly, some studies have shown limited improvements in motivation when interventions rely solely on verbal instruction or non-tangible resources. For instance, Larasati et al. reported that using video education tools without practical aids resulted in knowledge gains but did not significantly impact behavioral outcomes [38]. This underscores the importance of combining education with user-centered product design to achieve sustained behavior change.

Moreover, while previous interventions often targeted caregivers or relied on nursing assistance, this study emphasized patient autonomy. Encouragingly, the DCT enabled self-care even in a hospital environment, suggesting that structural innovations can support hospital staff by reducing their burden while empowering patients. Despite the consistency with existing literature, the current study contributes a unique perspective by focusing specifically on immobilized, yet mentally competent patients a group that is often overlooked in dental hygiene interventions.

C. LIMITATIONS AND IMPLICATIONS

Although the results indicate the effectiveness of the DCT, several limitations must be acknowledged. First, the study used a pre-experimental design without a control group, limiting the ability to draw causal inferences. Future studies should adopt randomized controlled trials (RCTs) to validate the impact of DCTs in diverse clinical settings. Second, the sample size (n=32) was relatively small and drawn from a single hospital, which may limit the generalizability of the findings. Multicenter studies with larger and more diverse populations are needed to confirm the replicability of the results.

Third, the intervention period was limited to two days. While immediate effects were observed, the long-term sustainability of motivation and behavioral change remains unknown. Further longitudinal research is warranted to evaluate whether the motivational improvements persist over time and translate into better oral health outcomes. Another limitation involves the measurement tool. Although the TSRQ is a validated instrument for assessing motivation, it primarily captures psychological constructs rather than direct behavioral performance. Complementing TSRQ results with clinical oral hygiene assessments, such as plaque or gingival indices, would provide a more holistic evaluation.

Despite these limitations, the findings have important implications for patient care in hospitals. The DCT demonstrates the potential of simple, cost-effective innovations to enhance the well-being and autonomy of patients. This is particularly relevant in resource-constrained environments, where human resources are limited and caregiver assistance cannot be consistently guaranteed.

From a practical standpoint, incorporating assistive devices such as the DCT into inpatient care protocols may improve patient outcomes while also reducing caregiver workload. The DCT may also be applicable beyond oral hygiene, serving as a platform for other self-care activities such as grooming or eating, thereby broadening its utility. This study also opens avenues for future research into product refinement and optimization. For instance, integration of mobile trays, flexible lighting, or antimicrobial surfaces could enhance usability and safety. Furthermore, exploring the perspectives of healthcare providers regarding device integration into standard care protocols may provide valuable insights into institutional adoption.

Lastly, the study highlights the need for interdisciplinary collaboration between health professionals, engineers, and designers in developing patient-centered tools. As hospital environments become more complex, such innovations will be key in promoting humanized and dignified care.

V. CONCLUSIONS

This study aimed to evaluate the feasibility and effectiveness of a Dental Care Table (DCT) in enhancing the motivation of immobilized, compos mentis inpatients to perform oral hygiene activities during hospitalization. Recognizing that patients with limited mobility often face structural and psychological barriers in maintaining oral hygiene, the DCT was developed as an ergonomic assistive device to promote independence and self-care behavior. The intervention was tested on 32 patients using a one-group pretest-posttest design. Motivation levels were measured using the Treatment Self-Regulation Questionnaire (TSRQ), and product feasibility was assessed using David Garvin's Eight Dimensions of Quality, with validation from clinical experts. The results demonstrated a statistically significant increase in patient motivation, rising from a mean pretest score of 74.93% to a posttest score of 80.60%, with a p-value of 0.046 ($p < 0.05$), indicating a meaningful improvement. The DCT also achieved a high feasibility rating, with a total score of 85.16% and an Intraclass Correlation Coefficient (ICC) of 0.958, reflecting strong inter-rater reliability and expert agreement regarding the product's design and usability. These findings suggest that the DCT effectively enhances intrinsic motivation by reducing environmental barriers and supporting self-directed oral hygiene. Furthermore, the observed outcomes confirm the importance of integrating ergonomic solutions into patient care, particularly for vulnerable populations with physical limitations. Despite these promising results, the study was limited by a small sample size, single-center design, and short observation period. Future research should consider implementing randomized controlled trials (RCTs) with larger, more diverse populations across multiple hospital settings. Additionally, long-term follow-up studies are needed to evaluate the sustainability of motivation and the actual

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impact on oral health outcomes. Further refinement of the DCT, including integration of additional functionalities such as lighting, antimicrobial surfaces, and patient feedback mechanisms, is also recommended to improve its adaptability and user satisfaction. Overall, the DCT presents a practical and innovative approach to enhancing patient autonomy and hygiene practices in clinical environments.

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DATA AVAILABILITY

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

AUTHOR CONTRIBUTIONS

Mokhamad Ainu Roziq led the study's conceptualization and design, managed data collection, and drafted the initial manuscript. Sukini provided methodological oversight, supervised the research process, and contributed to data analysis and interpretation. Diyah Fatmasari assisted with literature review, instrument development, and critical revisions of the manuscript. All authors reviewed and approved the final version of the paper.

DECLARATIONS

ETHICAL APPROVAL

This study was reviewed and approved by the Health Research Ethics Committee of RSPAL Dr. Ramelan Surabaya. Written informed consent was obtained from all participants prior to their inclusion in the study.

CONSENT FOR PUBLICATION PARTICIPANTS.

Not applicable.

COMPETING INTERESTS

The authors declare that there are no competing interests.

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