JCNSP
https://journal.stikespemkabjombang.ac.id
Journal of Clinical Nursing Studies and Practice
Volume 01 Number 02
November 2025
e-issn: xxxx-xxxx

THE ASSOCIATION BETWEEN CONTROL REMINDER MESSAGE USAGE AND PATIENT ADHERENCE TO FOLLOW-UP APPOINTMENTS

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Submitted:
31 Oktober 2025
Accepted:
20 November 2025

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ABSTRACT

Patient adherence to control schedules is key to successful chronic disease management. Non-adherence primarily caused by forgetfulness remains a major challenge in clinical practice. This study aimed to examine the association between the use of control reminder messages and patient adherence to follow-up appointments at Manguharjo's Pulmonary Hospital. This quantitative correlational study with a cross-sectional design involved 161 patients (N=161) using a convenience sampling technique. Data were collected from medical records regarding reminder reception and attendance status. The Chi-Square test results showed a highly significant association between reminder use and patient adherence ($p < 0.001$). The adherence rate in the group that received reminders was 64.6%, substantially higher than the non-reminder group (35.4%). It is concluded that reminder messages are an effective intervention to mitigate forgetfulness and should be formally integrated into the care system. The main limitation is the cross-sectional design. Prospective Randomized Controlled Trials (RCTs) are recommended to establish causality and optimize message format.

Keywords: Patient Adherence; Reminder Messages; Follow-up Control; Chronic Disease; Health.

Introduction

Patient adherence to appointment schedules and prescribed treatment regimens is the primary foundation for successful chronic disease management and is crucial for optimizing clinical outcomes and patient quality of life (Pernell, B. M., DeBaun, M. R., Becker, K., Rodeghier, M., Bryant, V., & Cronin, R. M., 2017; Tao, Xie, & Wang, 2014). Globally, the issue of non-adherence poses a serious challenge, contributing to uncontrolled disease progression, increased morbidity, and significant financial burdens on healthcare systems, with non-adherence rates in long-term therapy often reaching 50% (Adesina & Abiodun, 2012; Thakkar, Kurup, & Laba, 2016). In specialized clinical contexts, such as chronic respiratory care at Manguharjo's Pulmonary Hospital, adherence to follow-up controls is vital for preventing acute exacerbations and ensuring appropriate adjustment of treatment plans, making it a critical priority for nursing professionals and clinicians (Maleki, Azami, & Sadeghigolafshanl, 2020).

One of the most frequently identified primary causes of non-adherence is the cognitive factor of *forgetfulness* (Liew, Tong, & Lee, 2009; Fenerty, S. D., West, C., Davis, S. A., Kaplan, S. G., & Feldman, S. R., 2012). To address this barrier, reminder-based interventions have become one of the most impactful and readily implemented strategies. The evolution of mobile health (mHealth) technology, such as Short Message Service (SMS) and application notifications, has facilitated the shift from traditional reminders to efficient and cost-effective digital solutions (Huang, H., Zhang, L., & Yang, Y., 2024; Chen, Li, & Rodriguez, 2021). The key advantages of digital reminder messages include low operational costs, instantaneous delivery, high personalization potential (Prawatwong, Chiaranai, Chantira, Chularee, Saranya, Prawatwong, Warithorn, Punyakaew, & Sujirat., 2023), and broad reach, even in remote areas (Salve, Vishakha, Pattalwar, & Shirish., 2025). The international research consensus strongly supports the effectiveness of these interventions. Various randomized controlled trials (RCTs) and systematic reviews have demonstrated the success of reminder messages across a range of clinical applications, from enhancing medication intake in diabetic patients to reducing appointment non-attendance across specialties (Maleki, Azami, & Sadeghigolafshanl, 2020; Dulle & Moshi, 2024; Shaha, S. K., & JHA,A., 2022). In general, reminder messages function as timely external cues, effectively shaping patient behavior, and are consistently reported to improve overall adherence (Sugiharto, A., Khoe, L.C., Sabarguna, B. S., & Pramastuty, A., 2019). This indicates that reminder intervention is a universal and essential tool in the effort to achieve optimal patient self-management control.

Despite the widely proven efficacy of general reminder messages at the global level (Pernell, B. et al, 2017; Tao, Xie, & Wang, 2014; Thakkar, Kurup, & Laba, 2016), a research gap exists regarding the specific implementation and effectiveness of routine "control reminder messages" within the

context of specialized healthcare in Indonesia. The effectiveness of this intervention may be uniquely influenced by local contextual, cultural, and infrastructure variables at Manguharjo's pulmonary hospital. Therefore, this study aims to fill that gap by providing data-driven evidence from a unique patient population. The primary research aim of this study is to determine the statistical association between the use of control reminder messages and patient compliance with follow-up appointments at Manguharjo's pulmonary hospital.

Methods

This quantitative, non-experimental correlational study utilized a cross-sectional design to investigate the association between Control Reminder Message Usage (the independent variable) and Compliance with Follow-up Appointments (the dependent variable). Data were collected during January 2025 at Manguharjo's Pulmonary Hospital, East Java, Indonesia. A convenience sampling approach was employed, yielding a final sample size of 161 patients (N=161). Data were obtained via secondary extraction from patient records, recording the patient's status regarding reminder reception (used/not used) and attendance (compliant/non-compliant). The primary research hypothesis was statistically evaluated using the Pearson Chi-Square test within IBM SPSS Statistics, with the level of significance predetermined at $p<0.05$.

Results

1. **Sample Characteristics**

Table 1. Frequency Distribution of Respondents

Gender	Frequency	Percentage (%)
Female	61	37.9
Male	100	62.1
Total	161	100

The study involved a total of 161 patients (N=161). The sample distribution based on gender indicated that the majority of respondents were male (100 individuals), and the other were female (61 individuals).

2. **Distribution of Compliance Based on Control Reminder Message Usage**

Table 2. Frequency Distributopn of

Control Reminder Message Usage	Non Compliance	Compliance	Total	Percentage Compliant (%)
No Reminder	26	31	57	35.4%
Reminder (Yes)	3	101	104	64.6%
Total	29	132	161	100%

Patients who received control reminders exhibited a substantially high compliance rate of 64.6%, whereas patients who did not receive reminders only achieved a compliance rate of 35.4%. This marked percentage difference clearly supports the effectiveness of using reminders in improving patient adherence.

3. SPSS Statistical Test Analysis

Table 3. Chi Square Test Results

Statistical Test	Chi-Square Value	df	Significance Value
Pearson Chi Square	45.521	1	<0.001

Bivariate analysis using the Chi-Square test was conducted to determine the association between the use of control reminders and patient compliance with follow-up appointments. The Chi-Square test yielded a significance value of $p<0.001$. As this p-value is far smaller than the standard significance level of $\alpha=0.05$, the Null Hypothesis (H0) stating there is no association is rejected. This result demonstrates a highly significant statistical association between the use of control reminders and patient compliance with follow-up appointments.

Discussion

The discussion of these findings focuses on three main aspects: sample characteristics, the descriptive distribution of compliance based on reminder usage, and the statistical significance of the association, all contextualized within the international literature. The study sample comprised N=161 patients, with a male predominance (62.1%) over female respondents (37.9%) (Table 1). This gender distribution is noteworthy, as international literature presents mixed evidence regarding the role of sex in healthcare adherence behavior. Some research suggests that demographic factors may moderate the effectiveness of digital interventions (Tao, Xie, & Wang, 2014), while other studies maintain that simple reminder interventions possess universal effectiveness, transcending demographic differences (Adesina & Abiodun, 2012; Thakkar, Kurup,

& Laba, 2016; Banda, Tizora & Chipeta, 2025). Crucially, the observed success of control reminders at Rumah Sakit Paru Manguharjo, despite the male-dominated sample, strongly supports the notion that the reminder intervention is a powerful and essential strategy regardless of the patient's demographic background.

The descriptive analysis of compliance with follow-up appointments (Table 2) demonstrates a stark disparity between the intervention and control groups. Patients who received the control reminder messages achieved a compliance rate of 64.6%, substantially higher than the 35.4% compliance rate recorded for patients who received no reminder. This significant absolute difference of 29.2% provides compelling empirical evidence that reminder messages function as an effective behavioral prompt to mitigate forgetfulness, which is cited internationally as the primary barrier to non-adherence (Sugiharto, A., Khoe, L.C., Sabarguna, B. S., & Pramastuty, A., 2019; Fenerty, S. D., West, C., Davis, S. A., Kaplan, S. G., & Feldman, S. R, 2012). This finding is corroborated by numerous international Randomized Controlled Trials (RCTs) that confirm the efficacy of message-based interventions, including SMS reminders shown to be as effective as traditional phone calls (Liew, Tong, & Lee, 2009) and highly cost-efficient (Salve, Vishakha, Pattalwar, & Shirish (2025). Furthermore, this effectiveness extends across various clinical contexts, from chronic disease management in remote areas to complex application-based reminders (Chen, Li, & Rodriguez, 2021; Huang, Zhang, & Yang, 2024).

The primary hypothesis was tested using the bivariate Chi-Square test, which yielded a highly significant *p*-value of < 0.001 (Table 3). This value, being far below the standard significance threshold of alpha $= 0.05$, confirms a highly significant statistical association between the use of control reminder messages and improved patient compliance. This outcome unequivocally warrants the rejection of the null hypothesis (H0), providing robust statistical backing for implementing reminders as an integral component of patient management, especially within nursing care models. The strength of this association is heavily supported by vast meta-analyses in the literature, which consistently conclude that electronic reminders significantly improve adherence in chronic disease care (Pernell, B. M. et al, 2017; Tao, Xie, & Wang, 2014). This consistent effect is observed even across specialized patient populations, such as those with diabetes (Maleki, Azami, & Sadeghigolafshanl, 2020; Chiaranai et al, 2023) or in addiction control (Dulle & Moshi, 2024), underscoring the universal applicability of timely reminders for enhancing patient control and optimizing clinical outcomes.

Conclusion

The study's findings confirm the crucial role of external, timely cues in successfully mitigating the primary barrier of forgetfulness, thereby reinforcing the established international consensus on the universal effectiveness of reminder systems in chronic disease management. This conclusion validates that reminder systems are an essential tool for local clinical practice in specialized settings. However, this research faces limitations: the reliance on a cross-sectional design prevents the establishment of a definitive causal relationship, and the use of convenience sampling restricts the generalizability of the findings. Furthermore, this study did not investigate critical modulating factors such as the type of message used, content personalization, or optimal timing, which international literature identifies as crucial for maximizing effectiveness. Consequently, recommendations for practice involve healthcare facilities systematically integrating and formalizing digital reminder systems as an essential component of chronic care management. For future research, a prospective Randomized Controlled Trial (RCT) design is advised to establish causality, along with in-depth studies to identify the most effective content and timing combinations for reminder messages within the Indonesian healthcare context.

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