

Karakteristik dan Tingkat Readmisi Pasien Trakeostomi yang Menerima Perencanaan Pulang Individu: Studi Retrospektif

Characteristics and Readmission Rates of Tracheostomy Patients Receiving Tailored Discharged Planning: A Retrospective Study

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ABSTRACT

Background: Tracheostomy patients often face difficulties after hospital discharge and are at increased risk of readmission. Although discharge planning has proven benefits, studies focusing on tracheostomy patients, particularly those involving case managers, remain limited.

Objective: To investigate the characteristics of tracheostomy patients, their readmission rates after individualized discharge planning led by case managers, and 30-day readmission outcomes.

Method: A descriptive retrospective study was conducted using electronic health records from 2021 to 2023. Samples were selected through consecutive sampling, including patients who underwent tracheostomy, had been discharged, and received case management services. Data on sociodemographic characteristics, clinical conditions, and 30-day readmission rates were collected and analyzed descriptively using frequency distributions, percentages, medians, and ranges with SPSS 26.

Results: Among 50 patients, most were aged 41–65 years (54%) and male (72%). The main indication for tracheostomy was prolonged mechanical ventilation (72%), with a median length of stay of 40,5 days. About 54% were discharged with a tracheostomy tube and other invasive devices, including nasogastric tubes (62%) and urinary catheters (28%). A total of 94% of patients had no readmission within 30 days post-discharge.

Conclusion: Tracheostomy patients have complex conditions requiring continued home care; however, readmission rates are low. Case management and individualized discharge planning may help prevent readmissions in high-risk patients.

Keywords: Case manager; discharge planning; readmission; tracheostomy.

INTISARI

Latar belakang: Pasien trakeostomi sering menghadapi kesulitan setelah pulang dari rumah sakit dan memiliki risiko tinggi untuk mengalami readmisi. Meskipun manfaat perencanaan pulang telah terbukti, studi yang berfokus pada pasien trakeostomi, khususnya yang melibatkan manajer kasus, masih terbatas.

Tujuan: Menyelidiki karakteristik pasien trakeostomi, tingkat readmisi setelah mendapatkan perencanaan pulang individual yang dipimpin oleh manajer kasus, serta luaran readmisi dalam 30 hari.

Metode: Penelitian deskriptif retrospektif dilakukan menggunakan data rekam medis elektronik dari tahun 2021 hingga 2023. Sampel dipilih melalui *consecutive sampling*, meliputi pasien yang menjalani trakeostomi, telah dipulangkan, dan menerima layanan manajemen kasus. Data mengenai karakteristik sosiodemografi, kondisi klinis, serta tingkat readmisi 30 hari dikumpulkan dan dianalisis secara deskriptif dalam bentuk distribusi frekuensi, persentase, median, dan rentang menggunakan SPSS 26.

Hasil: Dari 50 pasien, sebagian besar berusia 41–65 tahun (54%) dan berjenis kelamin laki-laki (72%). Indikasi utama trakeostomi adalah ventilasi mekanik berkepanjangan (72%), dengan median lama rawat 40,5 hari. Sekitar 54% pasien dipulangkan dengan kanul trakeostomi serta alat invasif lain, seperti

selang nasogastrik (62%) dan kateter urine (28%). Sebanyak 94% pasien tidak mengalami readmisi dalam 30 hari setelah pulang.

Simpulan: Pasien trakeostomi memiliki kondisi yang kompleks dan memerlukan perawatan lanjutan di rumah, namun, tingkat readmisi relatif rendah. Manajemen kasus dan perencanaan pulang individual dapat membantu mencegah readmisi pada pasien berisiko tinggi.

Kata kunci: Manajer pelayanan pasien; perencanaan pulang; readmisi; trakeostomi.

INTRODUCTION

The transition from hospital to home is a complex and vulnerable phase for patients.^{1,2} Several adverse events might occur during this period leading to readmission.³ According to the US Index of Admissions, the readmission rate within 30 days following discharge is 11,6%.⁴ Meanwhile, two studies conducted in Australia and Indonesia revealed that the hospital readmission rates are approximately 17,5% and 20,1%, respectively.^{5,6} The prevalence of these rates is higher among individuals with chronic diseases or complex circumstances, such as those with tracheostomies. Previous studies have shown that the readmission rate for patients following a tracheostomy, regardless of age, varies between 33% and 45,9%.^{7,8}

Patients and families with tracheostomies experience a significantly greater disease burden compared to those with other illnesses.⁹ Tracheostomy may lead to several issues, including limitations on vocal communication and activities, discomfort due to pain and sleep disturbances, as well as mood disturbances and anxiety, all of which ultimately affect the quality of life.¹⁰

In addition, to avoid potentially fatal consequences, individuals with a tracheostomy must adhere to a comprehensive therapeutic regimen, which includes cleaning the cannula, caring for the stoma, and changing dressings.¹¹ Inadequate self-care of the tracheostomy tube at home can lead to complications, such as respiratory infections, which may worsen the prognosis and increase the risk of mortality.¹² Therefore, it is essential to adequately prepare discharge planning for these high-risk patients prior to their departure from the hospital and to provide them with clear, patient-centered instructions.

Discharge planning services provide numerous advantages to patients, particularly by facilitating their immediate adaptation to home care following hospital discharge. These services empower patients to maintain their ability to live independently, perform self-care tasks, and minimize post-discharge complications.^{13,14} Prior research has demonstrated that the implementation of discharge planning services can effectively reduce the duration of hospital stays and enhance communication and collaboration among various healthcare professionals.^{15,16} Furthermore, the implementation of a comprehensive discharge planning strategy can significantly reduce the rate of readmissions within 30 days, decreasing from 27,29% to 3,57% following the intervention, thereby resulting in cost savings.^{17,18} It is reasonable to note that the direct expenditures for patients who were readmitted to the hospital were 1,42 times higher than those for patients who did not require readmission.¹⁹

Discharge planning for patients with complex conditions is a collaborative process that involves a multidisciplinary team, including physicians, nurses, social workers, physiotherapists, occupational therapists, and dietitians, with additional specialists incorporated as necessary.^{20,21} Within this framework, the case manager serves as the central coordinator, responsible for comprehensive assessment, individualized care planning, interprofessional communication, patient advocacy, post-discharge service coordination, and systematic follow-up.^{22,23} In Indonesia, the important role of case managers in managing patients with chronic diseases has grown due to their mandatory inclusion in hospital accreditation processes, with their primary role focused on cost and quality control.^{24,25}

Despite numerous studies supporting the benefits of discharge planning services for patients, there remains a lack of studies specifically examining the impact of these programs on patients with tracheostomies, particularly those led by case managers. In patients with complex health conditions, case managers play crucial roles in coordinating, facilitating, and advocating for discharge planning, collaborating with other healthcare providers to ensure continuity of care.²⁶ Moreover, previous research primarily focuses on hospitalization rates for pediatric patients or adults with tracheostomies without considering discharge planning. Therefore, this study investigated the characteristics of tracheostomy patients, their readmission rates after receiving individualized discharge planning led by case managers, and their 30-day readmission rates.

METHODS

A descriptive retrospective method was employed, utilizing data extracted from electronic health records. Samples were selected using consecutive sampling based on the following inclusion criteria: patients who underwent tracheostomy surgery, were discharged, and received case management services. Exclusion criteria included patients who died during hospitalization and those referred to other hospitals. The sampling process began with screening the patients who underwent tracheostomy, using data from the case manager implementation report, followed by cross-checking the discharge summaries in the electronic health records to ensure that the participants met the inclusion criteria. Of approximately 109 tracheostomies performed during this time period, 50 patients were enrolled in this study. The primary reason for patients not being enrolled was their demise during hospitalization due to severe medical conditions or their transfer to another medical facility.

According to the hospital's protocols in this study, all patients who underwent tracheostomy were required to receive case management services. A case manager prepared the patient and family for the transition to home several days prior to discharge. First, the case manager assessed the care needs and established the necessary support system at home in collaboration with the family. The case manager then coordinated with the multidisciplinary team to prepare for discharge planning. Subsequently, all patients and their families received

tailored health education from the multidisciplinary team, which included a pharmacist for medication management, a dietitian for dietary intake, a physician for future care plans, and nurses and a case manager for guidance on home care.

The educational material provided by all healthcare providers was compiled into an individualized discharge booklet under the supervision of the case manager. The nurse in charge would deliver this booklet to the patient and review its contents prior to discharge. The discharge booklet includes information about the patient's identity, necessary tools for home care, a medication schedule, instructions for patient care (such as wound care, tracheostomy tube care, discharge care, and mobility training), guidance on modifying the environment to meet the patient's needs and promote well-being, identification of emergency signs and symptoms along with their management, a control schedule, and contact details for home care services and emergency situations.

An observation sheet was developed to collect data from electronic health records, encompassing the following information: (1) sociodemographic characteristics, including gender and age; (2) clinical characteristics during hospitalization, which involved patient diagnosis, indication for tracheostomy, timing of the tracheostomy, days intubated prior to the procedure, length of stay, type of decannulation, and medical equipment utilized after hospital discharge; and (3) hospital readmission status.

This research was approved by the Medical and Health Research Ethics Committee (MHREC), Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada, with ethical approval number KE/FK/0481/EC/2026. Data were collected from medical records covering the period from January 1, 2021, to August 31, 2023, to obtain the necessary information. Throughout the study, patient privacy and anonymity were strictly protected.

Descriptive analyses were employed to assess participants' characteristics, hospitalization, transition, and readmission status. All statistical analyses were conducted using SPSS 26 software.

RESULTS

Patient characteristics and demographics are presented in Table 1. Among the 50 participants who met the inclusion criteria, the majority were aged between 41 and 65 years (27,54%) and were male (36,72%). The most common indication for tracheostomy was prolonged mechanical ventilation (36,72%), followed by airway obstruction (14,28%).

Regarding the timing of tracheostomy, more than half of the participants received early tracheostomies within ten days of initial mechanical ventilation (27,54%), while only two participants (4%) underwent tracheostomies without prior mechanical ventilation. The median duration of mechanical ventilation before tracheostomy was 9 days (range 0–46), and the median length of stay was 40,5 days (range 7–106). Furthermore, 46% of patients (n = 23) underwent tracheostomy decannulation during hospitalization, while more than half (n = 27,54%) required decannulation after discharge from the hospital.

Table 1. Patients' Demographics and Tracheostomy Information (n=50)

| Characteristics | Frequency | Percentage (%) | Median (Min-Max) |
|---|-----------|----------------|------------------|
| Age (years) | | | |
| 18- 40 | 8 | 16,0 | |
| >41-65 | 27 | 54,0 | |
| >65 | 15 | 30,0 | |
| Gender | | | |
| Male | 36 | 72,0 | |
| Female | 14 | 28,0 | |
| Indication for tracheostomy based on primary diagnosis | | | |
| Prolonged mechanical ventilation | 36 | 72,0 | |
| Airway obstruction (neoplasm & trauma) | 14 | 28,0 | |
| Cerebrovascular disease | 11 | 22,0 | |
| Chronic respiratory disease | 9 | 18,0 | |
| Tetanus | 6 | 12,0 | |
| Spinal Cord Injury | 6 | 12,0 | |
| COVID-19 | 3 | 6,0 | |
| NSTEMI | 1 | 2,0 | |
| Tracheostomy timing | | | |
| Without initial mechanical ventilation | 2 | 4,0 | |
| Early ≤ 10 days after mechanical ventilation | 27 | 54,0 | |
| Late > 10 days after mechanical ventilation | 21 | 42,0 | |
| Days intubated prior to tracheostomy | | | 9 (0 - 46) |
| Length of Hospital Stay (days) | | | 40,5 (7 - 106) |
| Decannulation type | | | |
| Inpatient decannulation | 23 | 46,0 | |
| Outpatient decannulation | 27 | 54,0 | |

Regarding the condition prior to discharge (as shown in Table 2), the majority of patients had two or more diagnoses (88%). Among the participants, nearly two-thirds were discharged with medical equipment at home (74%), with more than half requiring the use of two or more medical devices. Specifically, the majority of participants were discharged with a nasogastric tube (62%), followed by a tracheostomy tube (54%) and a urinary catheter (28%). Notably, 94% of the patients who had a tracheostomy and were discharged did not experience readmission to the hospital.

Table 2. Patients' Characteristics Before Discharge and Readmission Rates (n = 50)

| Characteristics | Frequency | Percentage (%) |
|---|-----------|----------------|
| Patient diagnosis | | |
| Single diagnose | 6 | 12,0 |
| 2-3 diagnoses | 30 | 60,0 |
| > 3 diagnoses | 14 | 28,0 |
| Patients with medical equipment after hospital discharged | | |
| Without equipment | 13 | 26,0 |
| 1 equipment | 11 | 22,0 |
| 2 equipment | 16 | 32,0 |
| > 2 equipment | 10 | 20,0 |
| Medical equipment after hospital discharged compared to total patients | | |
| Tracheostomy tube | 27 | 54,0 |
| Nasogastric tube | 31 | 62,0 |
| Urinary catheter | 14 | 28,0 |
| Other equipment | 2 | 4,0 |
| 30-day readmission | | |
| Readmission | 3 | 6,0 |
| No Readmission | 47 | 94,0 |

DISCUSSIONS

This study examined the characteristics of patients who underwent tracheostomy during their hospital stay, their condition at the time of discharge, and their likelihood of readmission after receiving personalized discharge planning from a case manager and other healthcare professionals.

Overall, the male patient population who underwent tracheostomies was three times greater than the female patient population, corroborating prior research findings. Studies conducted in the United States, Brazil, and Indonesia reported similar results, indicating that the proportion of male patients who received tracheostomies was approximately two to three times greater.^{27,28} This disparity may be associated with the diagnoses and underlying indications for tracheostomy that are more prevalent in male patients, such as tetanus, head and neck cancer, trauma, and cardiovascular disease, among others.^{29–32}

The primary indication for tracheostomy in the majority of patients in this study was prolonged mechanical ventilation. Consistent with these findings, other investigations have reported that tracheostomies were performed in 93,8% of trauma patients and 80,5% of intensive care unit patients due to prolonged intubation.³³ An additional retrospective analysis identified the most common indications for tracheostomy as follows: protracted intubation (35%), upper airway obstruction (28%), neurological disorders, and nonracial anomalies (12%).³⁴

In terms of tracheostomy timing, just over half of the patients in this study underwent early tracheostomy surgeries. Two systematic reviews have demonstrated that performing a tracheostomy early leads to improved outcomes compared to delaying the procedure. The benefits include reduced mortality rates during hospitalization and post-discharge, a shortened duration of mechanical ventilation, and fewer days spent in the hospital.^{35–37}

Additionally, the median duration of hospitalization in this study was 40,5 days, which is comparable to the 42–49 days reported in previous tracheostomy research.³⁸ Nevertheless, there was a substantial disparity between the minimum and maximum durations of hospital stays observed in this study. The plausible reasons for this variation include the presence of different and multiple diagnoses among patients. A systematic analysis revealed that the duration of hospitalization can differ significantly, ranging from 2 to over 50 days, even among patients with identical diagnoses.³⁹ The variability may arise from various factors, including the patient's characteristics, social conditions, and the complex nature of the illness and treatment.^{40–42}

Notably, the latest study found that a larger percentage of patients underwent outpatient decannulation, suggesting that the interval between tracheostomy and decannulation was likely extended. It is important to acknowledge that while performing a tracheostomy early has advantages, it may not directly influence the duration required for decannulation.^{43,44}

This research demonstrates that a significant proportion of tracheostomy patients have complex healthcare needs. It is evident from the numerous diagnoses and medical devices

that they must adjust to and maintain at home. Furthermore, there is a high likelihood that patients with multiple comorbidities will be prescribed various medication regimens, which can lead to medication noncompliance. This is particularly true when the timing of drug administration is inconsistent or when multiple medications are administered at frequent or irregular intervals throughout the day.⁴⁵ Prior research has indicated that patients who fail to comply with their medication regimen have a 20% higher likelihood of being readmitted to the hospital. Interestingly, many factors influencing this adherence could potentially be mitigated through comprehensive education.^{46,47}

Furthermore, patients who have undergone a tracheostomy must adhere to a comprehensive therapeutic regimen that includes cleaning the cannula, caring for the stoma, and changing dressings. This adherence is essential to prevent potentially fatal complications.^{7,11} However, many patients in this study not only returned home with a tracheostomy but also with other medical equipment, such as nasogastric tubes and urinary catheters, due to their medical conditions. These devices not only impact their daily lives but also increase the risk of infection.^{48,49} Therefore, it is advisable to establish a customized program that enhances the self-care abilities of patients and their families in adjusting both physically and socially to medical equipment, while also boosting their confidence in maintaining such equipment prior to discharge.

Among the 50 tracheostomy patients who survived and returned home in this study, only six percent experienced readmission within one month after discharge. This rate is significantly lower than the readmission rates reported for tracheostomy patients in other countries, which range from 22% to 33%.⁷ A prior study revealed that more than 90% of readmissions among tracheostomy patients were unplanned, with respiratory infections being the predominant cause of readmission.²⁷ In addition, tracheostomy patients frequently experienced post-discharge issues such as mucus plugs and tracheostomy infections, which resulted in respiratory difficulties and necessitated readmission to the hospital.⁷ Despite the classification of tracheostomy patients as high-risk for complications, it remains uncertain whether all hospitals have a multidisciplinary tracheostomy team dedicated to their care and the implementation of various safety protocols, particularly concerning discharge planning.^{50,51}

The current research demonstrated that tracheostomy patients who received tailored discharge planning from the case manager and multidisciplinary team experienced low hospital readmission rates. A plausible reason for this is that many unplanned readmissions were related to the quality of care after discharge, including poor disease management and inadequate post-hospital care, both of which are modifiable factors.¹ The earlier systematic review and meta-analysis confirmed that older adults who undergo discharge planning experience a reduced likelihood of readmission.⁵² Nevertheless, this study did not conduct further analysis or exploration into the specific mechanisms underlying these findings.

There are several limitations that could be addressed in future studies. First, due to the retrospective nature of this study, which relies on medical records, it is challenging to determine the extent to which personalized discharge planning provided by a case manager and multidisciplinary team benefits patients and their families at home. Consequently, verifying and assessing the advantages of personalized discharge planning and case management services is difficult. Further investigation employing diverse research methodologies is necessary to support the efficacy of discharge planning. Second, after their discharge, some tracheostomy patients may seek medical treatment at other hospitals or be readmitted to the hospital. This study faced challenges in obtaining relevant medical records from other facilities, which may have led to an underestimation of the readmission rate.

CONCLUSIONS AND IMPLICATIONS

The tracheostomy patients experienced complex health issues during hospitalization and required ongoing care at home. Nevertheless, the participants of this study exhibited a notably low rate of hospital readmission after 30 days, suggesting the benefits of tailored discharge planning led by a case manager. Hospital stakeholders can identify the potential obstacles faced by high-risk patients during home care and implement preventive measures before discharge by engaging a multidisciplinary team and case manager.

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