

Profile of Chronic Wound Cases Treated at a Tertiary Hospital in Surabaya, Indonesia

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ABSTRACT

Background: Chronic wounds are wounds that fail to heal within the expected time to heal due to the prolongation of the inflammatory phase in wound healing due to certain factors such as poor blood circulation, infection, and comorbidities that can worsen wound healing. Chronic wounds require specialized and ongoing care to prevent complications such as severe infection, amputation, and even death. Common chronic wounds are diabetic ulcers, decubitus or pressure ulcers, arterial ulcers, and venous ulcers. **Objective:** Knowing the profile of chronic wound patients treated at Dr. Soetomo Hospital in 2020-2022. **Methods:** This study uses secondary data from medical records with a retrospective method and is presented descriptively. The study sample was taken by total sampling using all patients who met the inclusion criteria. **Result:** There were 69 chronic wound patients admitted to Dr. Soetomo Hospital in 2020-2022 who met the inclusion criteria. The research shows that the chronic wound patients treated were predominantly male, with pressure ulcers being the most common diagnosis. The majority of chronic wounds were caused by pressure, most commonly found on the lower extremities, with wound sizes ranging from 4 to ≤ 16 cm². The most frequent treatment provided for these wounds was wound closure using the skin graft method.

Keywords: chronic wounds; wound healing; profile; ulcers.

INTRODUCTION

Wounds are not a simple issue and are often only recognized for their complexity when difficulties arise in their healing process, leading to prolonged recovery times beyond initial expectations. A wound is defined as a disruption in the continuity of tissue, which can result from trauma, surgery, neuropathic issues, vascular problems, pressure, or malignancy [1]. Any tissue damage, whether structural or functional, can be categorized as a wound [2].

Based on the healing onset, wounds are classified into acute and chronic wounds. Acute wounds are typically the result of trauma and receive prompt treatment, allowing them to heal well or within the expected timeframe, provided no complications arise. Chronic wounds, on the other hand, are characterized by prolonged healing or failure to heal

within the anticipated period due to disruptions in the healing process, often attributed to multifactorial issues by the patient [3].

All wounds have the potential to become chronic. A wound is classified as "chronic" when it fails to progress through the normal, orderly, and timely stages of repair, or when the healing process does not restore anatomical and functional integrity within the expected timeframe. Such wounds may respond poorly to treatment and tend to recur [4]. An international study reported that 1.15 to 2.21 per 1,000 people worldwide experience chronic wounds, with this number projected to increase [5]. According to the Riset Kesehatan Dasar (Riskesdas) 2018, Basic Health Research held by the Ministry of Health of Indonesia, East Java, where Dr. Soetomo General Hospital is located ranks as the province

with the second-highest prevalence of chronic wound cases in the country [6]. Chronic wounds vary significantly and are classified based on their location, depth, and appearance. These variations are commonly referred to as ulcers, which are open wounds caused by damage to the epithelium and basement membrane. The Wound Healing Society categorizes commonly occurring chronic wounds into four types: arterial ulcers, venous ulcers, diabetic ulcers, and pressure ulcers (decubitus) [7].

The wound-healing process is a complex sequence of events that begins immediately after injury and continues until the wound is completely closed. This process involves three overlapping phases: the inflammatory phase, the proliferative/fibroplasia phase, and the maturation/remodeling phase [8,9]. In chronic wound healing, the inflammatory phase is prolonged, preventing the wound from progressing to the subsequent proliferative phase. The proliferative phase is crucial for forming collagen, which acts as a scaffold to bridge the gap created by the wound. Without this phase, epithelialization cannot occur, and the wound remains unhealed [4].

Chronic wound healing can be delayed by various factors, which are categorized into local and systemic factors. Local factors include age, nutritional intake, genetics, and sepsis, while systemic factors encompass comorbidities, infection, wound management practices, hypovolemia, foreign bodies, and others [9]. These factors must be addressed in managing chronic wounds to ensure optimal healing. Before determining appropriate treatment options, a comprehensive wound evaluation is necessary. This includes assessing the wound mechanism, risk of contamination, deeper structural injuries, perfusion deficits, tetanus status, functional impairments, and the extent of tissue loss [10].

Chronic wounds are closely associated with reduced quality of life, high treatment costs, and prolonged care durations [11]. They also pose a serious health problem, as inadequate management can lead to complications such as infections, amputations, and even death [12]. Optimal care is essential for chronic wounds. The TIMERS principle is used to guide the evaluation and structured management of wounds to maintain them in an optimal state before surgical closure by a plastic surgeon. The TIMERS components are: Tissue (assessing and managing wound tissue), Inflammation/Infection, Moisture Balance, Edge of the Wound, Repair and Regeneration, and Social and Patient-Related Factors. After implementing these general measures, ulcers should be diagnosed and classified to ensure appropriate treatment [13].

The high prevalence of chronic wounds and their significant consequences underscore the importance of this research. From 2020 to 2022, the profile of chronic wound cases at Dr. Soetomo General Academic Hospital had not been studied or analyzed. Through this study, the author aims to provide valuable data on chronic wound cases, contributing to future strategies for managing and improving chronic wound care services.

METHODS

This was an observational descriptive study with a retrospective study design using secondary data. The instruments used were collected from medical records of patients with chronic wound cases treated in the Department of Plastic, Reconstructive, and Aesthetic Surgery at Dr. Soetomo General Academic Hospital Surabaya from 2020-2022. The variables in this study include diagnosis, gender, cause of the wound, wound location, wound size, and management in the Department of Plastic, Reconstructive, and Aesthetic Surgery. This study used a total sampling technique by evaluating all medical records and then taken to inclusion and exclusion during a specific period.

Inclusion and Exclusion Criteria

The inclusion criteria for this study are patients with chronic wounds who were treated, either as outpatients or inpatients, at Dr. Soetomo General Academic Hospital during the 2020–2022 period. Patients with chronic wounds whose medical records were missing or incomplete were excluded.

Ethics

The Dr. Soetomo General Academic Hospital's Committee for Research Ethics has accepted this study (No. 2867/108/4/IV/2024). To ensure confidentiality, the identities of the patients are not disclosed in this study. The authors will be the only ones to keep and utilize all of the collected data for the aim of this research.

RESULTS AND DISCUSSION

The total number of chronic wound cases treated at Dr. Soetomo General Academic Hospital Surabaya during the 2020–2022 period was 71. However, only 69 cases met the inclusion criteria and were included as study subjects.

TABLE 1: Wound Diagnosis Distribution of Patients with Chronic Wound.

Diagnosis	Frequency (n)	Percentage (%)
Pressure ulcers	19	28
Diabetic ulcers	17	25
Chronic burn wounds	16	23
Venous ulcers	5	7
Arterial Ulcers	3	4
Others	9	13
Total	69	100

Based on the data that has been collected, the most common diagnosis among chronic wound cases was diabetic ulcers with 19 patients (28%), followed by pressure ulcers with 17 patients (25%). However, the least common diagnosis was arterial ulcers, with only 3 patients or 4% of the total chronic wound cases. The formation of pressure ulcers is not immediate but is a complex process influenced by multiple factors [14]. This aligns with the situation at Dr. Soetomo General Academic Hospital, a tertiary care hospital, where most patients treated have

significant comorbid risk factors such as neurological disorders, cardiovascular conditions, malnutrition, and metabolic disorders. These conditions often lead to decreased mobility, making it difficult for patients to change their posture or perform active movements independently [15]. Conditions like malnutrition and tissue hypoperfusion also worsen wound healing, making pressure ulcers more likely to become chronic [16]. In tertiary care settings, intensive or palliative patients are often exposed to these risk factors, leading to a higher prevalence of pressure ulcers compared to other healthcare facilities. These results align with a study from Dealey that found that pressure ulcers are the most common diagnosis in referral hospitals due to higher risks among patients with mobility impairments, prolonged immobilization, and medical device use [17].

TABLE 2: Gender Distribution of Patients with Chronic Wound.

Gender	Frequency (n)	Percentage (%)
Male	42	61
Female	27	39
Total	69	100

Table 2 shows the gender distribution of patients with chronic wound, with the highest Based on Table 2, the gender distribution of patients with chronic wound cases treated at Dr. Soetomo General Academic Hospital Surabaya during 2020–2022 shows that 42 patients (61%) were male, while 27 patients (39%) were female. The number of male patients with chronic wounds was higher than that of female patients. This aligns with the study by Rahrovan, which highlights physiological and biological differences between males and females that influence wound healing. Estrogen, more dominant in females, has anti-inflammatory effects that accelerate wound healing, whereas testosterone, more dominant in males, can slow the process [18]. Another study also demonstrated that estrogen increases TGF-beta1 levels, a key factor in wound healing. Additionally, differences in gene expression and skin tissue composition after injury were observed. Males show higher mRNA expression levels for collagen I, collagen VI, and elastin, whereas female skin tends to accumulate more collagen III post-injury. Collagen III plays a crucial role in regenerative wound healing and promotes better adipogenic potential. The higher collagen III content in female skin contributes to a more regenerative healing process, giving women an advantage in wound healing [19].

TABLE 3: Cause of Wound Distribution of Patients with Chronic Wound.

Cause of Wound	Frequency (n)	Percentage (%)
Surgery	2	3
Vascular	5	7
Trauma	14	20
Pressure	23	33
Neuropathy	21	30
Malignancy	4	6
Total	69	100

Table 3 illustrates the various causes of chronic wounds treated at Dr. Soetomo General Academic Hospital Surabaya from 2020 to 2022. The most common cause was pressure, accounting for 23 cases or 33% of the total, while the least common cause was surgery, with 2 cases or 3% of the total. The most common cause, pressure, is closely related to the highest reported diagnosis, pressure ulcers. Sustained pressure impedes blood flow to tissues, leading to tissue hypoxia and necrosis, ultimately resulting in chronic wounds. Studies have shown that pressure-induced wounds develop due to disrupted microcirculation and oxygen supply to the tissues [20]. According to the European Pressure Ulcer Advisory Panel 2017, pressure ulcers frequently occur in patients with reduced mobility or those unable to perceive or respond to discomfort caused by excessive pressure [21].

TABLE 4: Wound Location Distribution of Patients with Chronic Wound.

Wound Location	Frequency (n)	Percentage (%)
Cranial region	15	20
Thoracic region	6	8
Sacral region	8	11
Pelvic region	5	7
Upper extremities	15	20
Lower Extremities	27	36

Note: one patient can have more than 1 wound site.

Table 4 presents the distribution of chronic wound locations among patients at Dr. Soetomo General Academic Hospital Surabaya from 2020 to 2022, categorized by anatomical regions. Among the 69 patients studied, 76 wounds were identified, with 63 patients having a single wound and 6 patients diagnosed with multiple wounds. Among those with multiple wounds, one patient had wounds in both the sacral and thoracic regions, and another in the sacral and lower extremity regions. Additionally, one patient had three wounds in the upper extremity region, another had two wounds in the lower extremity region, one patient had two wounds in the pelvic region, and another had two wounds in the cranial region.

The most common location for chronic wounds among patients at Dr. Soetomo General Academic Hospital was the lower extremities. Chronic wounds frequently occur in this region due to factors such as poor blood circulation, mechanical pressure, and medical conditions like diabetes. This aligns with the hospital’s most prevalent wound diagnosis, diabetic ulcers, which typically manifest in the lower limbs. This highlights a strong correlation between diabetes and chronic wounds in the lower extremities. Poor circulation reduces oxygen and nutrient supply essential for tissue regeneration, making wounds in the lower extremities difficult to heal and more likely to become chronic [22]. Additionally, these wounds are often exacerbated by mechanical pressure, such as ill-fitting footwear or

foot deformities in diabetic patients, which increase the risk of injury, especially in weight-bearing areas like the heels or toes [23]. Another contributing factor is chronic venous insufficiency, which leads to blood pooling in the lower extremities. Increased venous pressure can cause chronic edema and skin ulceration in the affected area, further impeding healing and worsening the wound condition [24].

TABLE 5: Wound Size Distribution of Patients with Chronic Wound.

Wound Size (cm ²)	Frequency (n)	Percentage (%)
<4	16	21
4 - ≤16	22	29
16 - ≤36	12	16
36 - ≤80	10	13
>80	16	21

Note: one patient can have more than 1 wound site.

The size of chronic wounds was categorized into five groups based on the Bates-Jensen Wound Assessment Tool [25]. Wound size was calculated using the area formula, length multiplied by width. In this study, 76 wounds were identified in 69 patients, with 63 patients having a single wound and 6 patients presenting with multiple wounds simultaneously. The largest chronic wound observed measured 30 x 20 cm², classified as a chronic burn wound located in the thoracoabdominal region. In contrast, the smallest chronic wound was a pressure ulcer on a postoperative patient, measuring 0.6 x 0.4 cm², located in the orbital area.

In general, chronic wounds such as pressure ulcers on the extremities often start as small lesions, especially in the early stages when care is delayed or suboptimal. A study by Padula found that ulcers are frequently detected at an intermediate stage, with sizes ranging from small to medium [26]. This aligns with findings from Järbrink which demonstrated that wounds are often categorized as medium-sized due to delays in treatment or ineffective initial management [27]. The characteristics of chronic wound causes among patients at Dr. Soetomo General Academic Hospital during 2020–2022, including malignancy and trauma, may also contribute to the wound sizes observed. These conditions tend to produce wounds that initially measure small to medium in size but can progress further if not properly managed.

TABLE 6: Management Distribution of Patients with Chronic Wound.

Management	Frequency (n)	Percentage (%)
Wound bed preparation	14	20
Wound closure		
Skin flap	11	16
Skin graft	35	51
Direct suture	9	13
Total	69	100

The management of chronic wound patients at Dr. Soetomo General Academic Hospital included various techniques, tailored to the patient's condition and wound characteristics, such as wound bed preparation and wound closure through surgical procedures, consisting of skin flap, skin graft, and direct closure or primary suture. A study by Perdanakusuma explained that before managing chronic wounds, it is essential to assess the wound for existing problems [14]. If issues are identified, wound bed preparation must first be performed to optimize healing. This includes debridement to remove necrotic tissue, administering antibiotics to reduce bacterial load, and managing exudates to ensure a clean and well-vascularized wound base. Once the wound problem is resolved, closure can proceed via secondary or primary closure, skin graft, or skin flap. The choice of wound closure technique depends on the wound's location, the size of the defect, and the expertise of the treating physician. Even if wounds share the same diagnosis, changes in their appearance and associated issues necessitate adjustments in management.

The majority of chronic wound patients treated at Dr. Soetomo General Academic Hospital from 2020 to 2022 underwent wound closure using skin grafting. Skin grafting is a surgical procedure involving the transfer of skin from one part of the body (donor site) to the wound area requiring coverage (recipient site). This technique is highly effective in covering large wound areas, particularly those that are challenging to heal with primary closure methods [28]. The use of autografts—skin taken from the patient's own body—minimizes the risk of immune rejection and enhances healing success. Another research by Perdanakusuma indicates that skin grafting facilitates re-epithelialization and helps restore the critical barrier function of the skin in wounds that might otherwise remain open for extended periods [29]. In chronic wounds, which are often associated with delayed healing, skin grafting has been shown to improve both functional and aesthetic outcomes. Skin grafting can reduce hospitalization duration and expedite recovery compared to other methods. Skin grafts can survive with minimal support from local blood flow and, during the initial healing phase, they derive nutrients from the underlying tissue through a process known as plasmatic imbibition and inosculation [30]. Unlike skin grafts, flaps require robust vascularization, whereas skin grafts can be applied to wounds with limited vascular supply, such as pressure ulcers or burns, which are common in chronic wound patients [31].

CONCLUSIONS

The results of this study which included 69 patients show that the profile of chronic wound patients treated at Dr. Soetomo General Hospital during 2020-2022 was predominantly male, with pressure ulcers being the most common diagnosis. The majority of chronic wounds were caused by pressure, commonly found on the lower extremities, with wound sizes ranging from 4 to ≤16 cm².

The most frequent treatment provided for these wounds was wound closure using the skin graft method.

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