

Chronic wounds: magnitude, socioeconomic burden and consequences

Authors:

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Chronic wounds are a global public health concern that demands significant resources from the healthcare system. The incidence of chronic wounds has been growing like a ‘silent epidemic’. The consequences of a wound can include pain associated with the wound as well as the social, physical, or psychosocial impact of the wound. The right approach to wound management should consider how to reduce the economic burden while lowering morbidity and mortality. Developing new preventive and therapeutic technologies will have significant results, especially in low- and middle-income countries (LMICs) where affordability and accessibility to quality healthcare is a challenge.

Wounds, particularly those which are chronic, are a matter of concern for patients and health professionals alike. Chronic wounds are defined as wounds that have failed to progress in an orderly and timely manner to restore the anatomic and functional integrity of the injured site. These wounds are also referred to as hard-to-heal, difficult-to-heal or non-healing wounds and the time span required for chronicity is up to three months (Lazarus et al, 1994). All chronic wounds have a clear underlying cause and are generally assigned to one of the following clinical categories: leg ulcers, which are frequently a consequence of venous or arterial deficiencies, venous or arterial leg ulcer (VLU or ALU, respectively); diabetic foot ulcers (DFU); or pressure ulcers (PU), which were known as bed sores or decubitus ulcers (Nunan et al, 2014).

Some common features shared by these wound types include prolonged or excessive inflammation, persistent infections, formation of drug-resistant microbial biofilms and the inability of dermal and/or epidermal cells to respond to reparative stimuli (Pant et al, 2019; Calvin, 1998). These pathophysiological phenomena prevent these wounds from healing. Correctly identifying the aetiology of a chronic wound, as well as the local and systemic factors that may be contributing to poor wound healing, is key to successful wound treatment (Pant et al, 2016). The care and management of patients with chronic

wounds presents a huge challenge to the patient, their families and their healthcare providers (Collier, 2004).

A global public health concern: perspectives from developed countries

Globally, many people suffer from chronic or complex wounds that can be extremely hard-to-heal, causing severe pain and hardship. In recent years, the incidence of chronic wounds has been growing like a ‘silent epidemic’ (Järbrink et al, 2016). This is due to the ageing population and the concurrent increase in comorbidities and lifestyle diseases such as diabetes, obesity, venous hypertension and peripheral vascular diseases (Šitum, 2014). These wounds not only represent a significant health problem but also have a profound financial and psychological impact. Treating patients with these wounds is costly, in terms of both time and resources required. The amount of money spent on wound care, the loss of productivity for afflicted individuals and the families who care for them, and their diminished quality of life (QoL) come at great cost to society (Hjort and Gottrup, 2010).

It is estimated that 1–2% of the population in developed countries suffer from chronic wounds at any time (Gottrup et al 2001; Sen et al, 2009). As the population ages, the number of chronic wounds is expected to rise significantly. There will be more than 400 million diabetics worldwide by 2025, with the greatest increases in Asia, Africa, and South America (Figure 1). Yazdanpanah et al (2018) estimate that 15–25%

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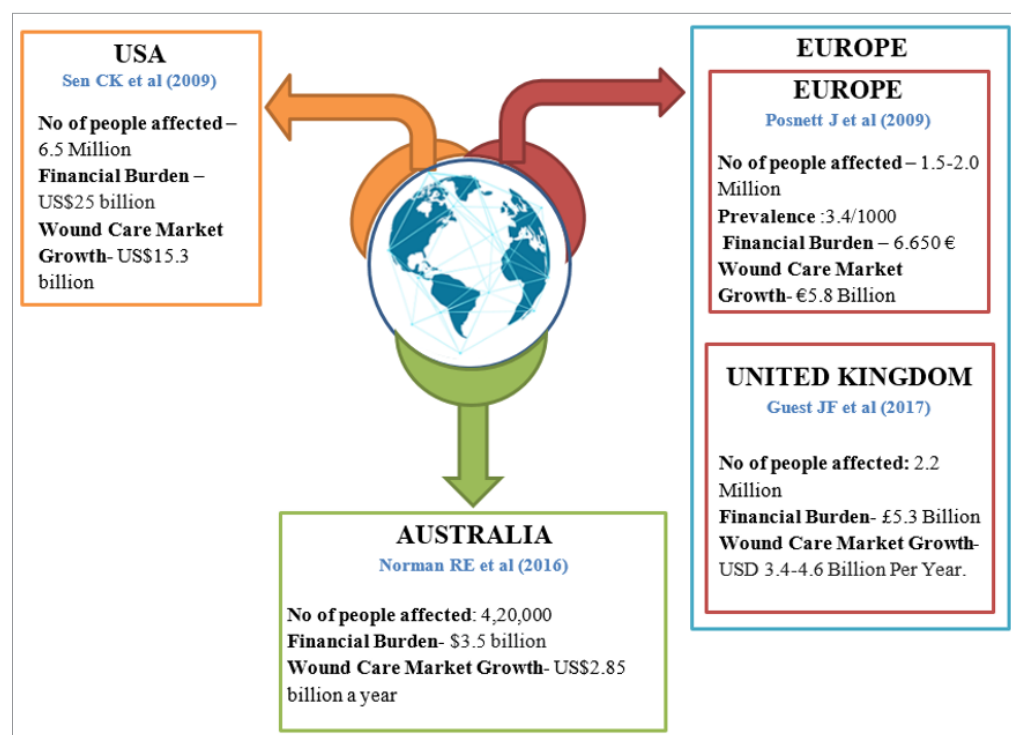


Figure 1. Economic and epidemiological burden of chronic wounds in Australia, Europe, the US and UK

of these patients will develop DFUs during their lifetime.

In the US, in 2009, more than 6.5 million patients suffered from chronic wounds, which cost US\$25 billion to the healthcare system annually (Sen et al, 2009). The cost of treating chronic wounds in the US grew from US\$ 1.3 billion in 1992 to US\$ 17.2 billion in 2003. In a typical hospital setting, patients with wounds occupy 25–40% of beds.

UK's National Health Service managed 2.2 million patients with wounds at a cost of £5.3 billion according to the study of 2012/2013. The study estimates of 2017/2018 depicts that the cost of managing acute and chronic wounds were 68% and 85% respectively when incurred in the community and the remainder was in secondary care. The annual cost of NHS of wound management was £8.3 billion, of which £2.7 billion and £5.6 billion which was associated to manage the healed and non healed wounds. (Guest et al, 2020). According to the Australian Wound Management Association (AWMA), an estimated 420,000 cases from the hospital and residential care setting in Australia each year had a chronic wound or ulcer at any given time in 2014. These wounds comprise PUs (84%), VLU (12%), DFUs (3%) and arterial ulcers (1%) (Pacella, 2017). The estimated hospital costs per bed-day in Australia are between

AUS\$699–840, depending on the location and hospital size. This high incidence of chronic wounds and expensive treatment translates into a major burden on the healthcare system, and annual costs are estimated to be AUS\$3 billion (Norman et al, 2016). In 2015, more than 35 million people in the Middle East and North Africa (MENA) had diabetes, and this number is expected to double by 2040 (Petropoulos et al, 2014). This alarming increase in prevalence will result in an increase in related complications, such as DFUs. These countries showed that DFUs are more prevalent and associated with worse health outcomes when compared with those in other developed countries (Petropoulos et al, 2016). In Norway, the prevalence of DFUs is 7–10%. In Finland, the prevalence of chronic wounds is estimated to be 1.3–3.6% (Probst et al, 2014). In the Scandinavian countries, associated wound care costs account for 2–4% of the total healthcare expenditure (Gottrup et al 2001; Sen et al, 2009). A cost-modelling study conducted in Denmark suggests that chronic wounds cost DKK56 million in 2009, and this cost will increase to DKK224 million in 2020 (Hjort and Gottrup, 2010).

The Indian scenario: perspectives from a developing country

In developing countries like India, the problem of wounds is further compounded by other

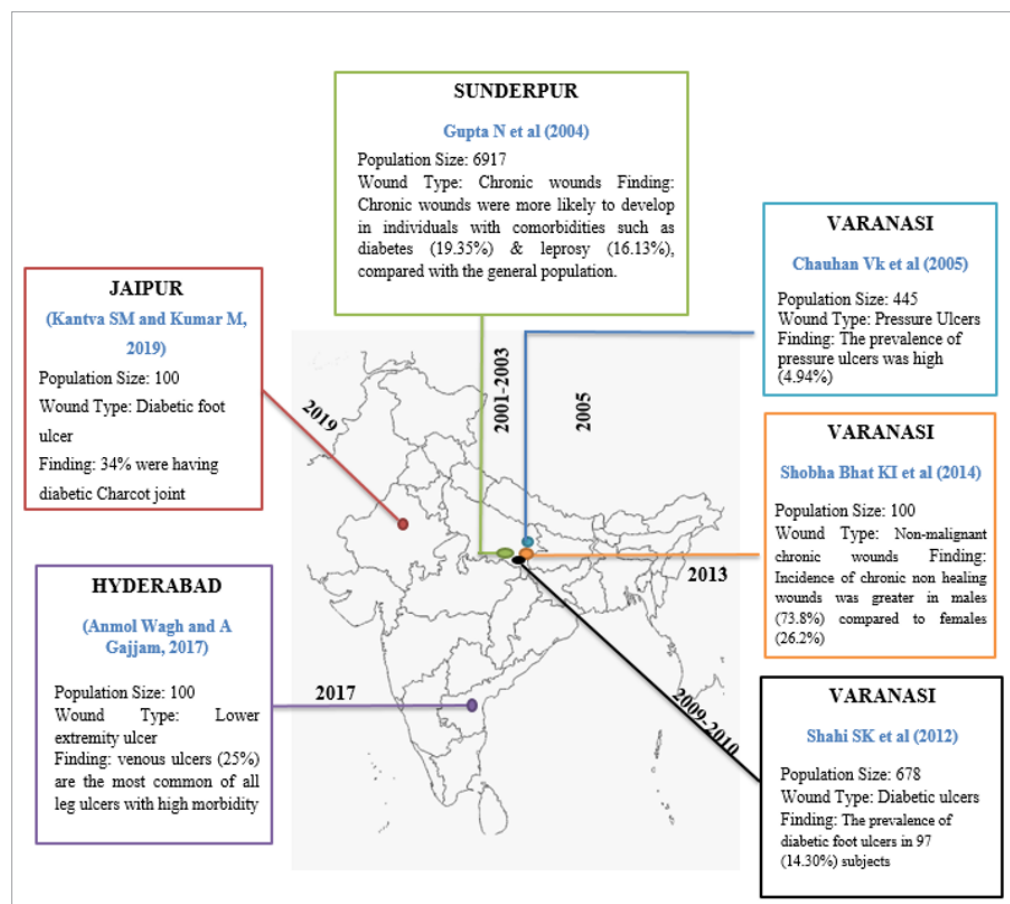


Figure 2. Summary of small-scale studies for epidemiology of chronic wounds in India

factors such as low literacy rates, poor access to quality healthcare, inadequate health infrastructure, imported medical equipment, affordability and lack of universal health insurance coverage (Shukla et al, 2005). Health professionals and society in general are not fully aware of the indirect complications and socioeconomic burden of chronic wounds (Macdonald and Geyer, 2010). This problem is exacerbated by the relatively low levels of specific wound training in many healthcare settings. Owing to a lack of access to specialist skills in wound care, wounds are typically managed as a comorbidity of other conditions, which limits the efforts to overcome the growing challenge they represent (Sibbald et al, 2012). Health professionals often lack specialised training in the diagnosis and treatment of wounds because it is not a defined speciality. In home care and long-term care, chronic wounds such as DFUs and VLU are often managed by general nurses as part of the patient's ongoing care (Järbrink et al, 2017). Affordability and accessibility of quality wound care further complicates the issue in

resource-constrained settings. The high cost of medical treatments and limited resources prevent patients from receiving available care, which leads to the development of severe complications associated with chronic wounds (Gupta et al, 2004).

There is a lack of comprehensive research and data on the epidemiology and social, psychological, and financial burden of chronic wounds in India. Such scarce data make it difficult to monitor the healthcare resources consumed by wound care and, in turn, to implement evidence-based management of wounds in developing countries. According to Järbrink et al (2016), only a few studies have reported the incidence and prevalence of chronic wounds, and the cost of treating these wounds. These studies also mainly considered the direct costs associated with wound care, whereas in actuality a substantial portion of this is attributable to indirect costs of wound care, such as daily loss of productivity and absence from work. Approximately 3–4% of all people with diabetes have a foot problem and use 12–15% of the healthcare resources

for diabetes. In some developing countries, foot problems may account for up to 40% of available resources. The recurrence of foot infection was common among Indian patients with diabetes (52%) (Bakker et al, 2006; Viswanathan, 2007).

There are only a few regional studies (with small population sizes) that have reported the prevalence and aetiologies of chronic wounds in particular parts of India. Most of these studies are summarised in *Figure 2*. The major community-based cross-sectional study in India was conducted in 2001–2003 by Gupta et al (2004). The study reported that the overall prevalence of wounds per 1000 of the population was 15.03. Another study by Langer in 2014 reported that the aetiology of chronic wounds mainly included systemic conditions such as diabetes and atherosclerosis. Other major causes included PUs, vasculitis and trauma. According to data from epidemiological studies, the incidence of chronic ulcers in surgical hospitalised patients in China is 1.5–20.3% (Sun et al, 2017). In China, 1.77% of inpatients are found with non-healing chronic ulcers. Owing to increasing incidences and high therapy costs, chronic ulcers have seriously affected patients' health, mental state, and quality of life. The mean treatment cost of a chronic

wound was 12055.4 ± 9206.3 (Chinese yuan (CNY) Sun et al, 2017).

Consequences of non-healing chronic wounds

Wounds can lead to various consequences during the entire cycle from occurrence to treatment and healing. These may result from the wound itself, the pain associated with the wound, and the social, physical, or psychosocial consequences and psychological impact of the wound. The overall consequences are summarised in *Figure 3*.

Physical impact

Chronic wounds can take several years to heal, some remaining unhealed for decades. During this time, people can experience severe pain, significant physical distress, reduced mobility, and social isolation (Upton and Upton, 2015). Studies also show that chronic wounds not only cause severe emotional and physical trauma to the patient but also to their families (Eaglstein and Falanga, 1997). Chronic wounds can result in disabilities even after all available therapeutic interventions have been exhausted, and an amputation may be necessary. DFUs precede 85% of all amputations and DFUs are the reason

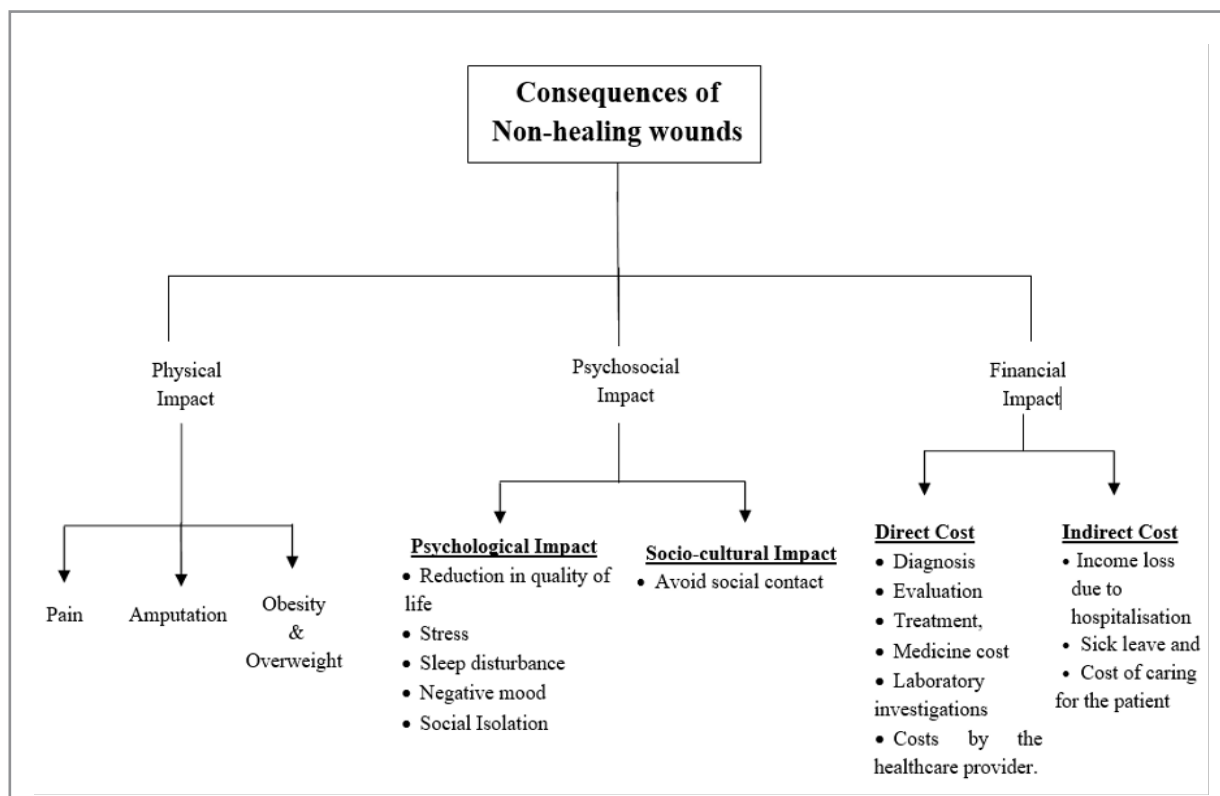


Figure 3. Multiple-level impact of hard-to-heal wounds

for 70% of all lower-limb amputations. Globally, there is an amputation every 30 seconds due to a non-healing DFU and the 5-year mortality rate following amputation is 40–70% (Bowers and Franco, 2020). Surgical site infection (SSI) is another common wound complication that has an impact on patient morbidity and treatment costs (Coello et al, 2005). These wound complications are associated with longer and more intensive treatment, extended hospital stays, readmission and surgical intervention. The SSIs in low- and middle-income countries (LMIC) were at significantly higher risk than those in developed countries (Leaper and Edmiston, 2017). SSIs are the most common infectious complications among hospitalised patients in developing countries, with a pooled cumulative incidence of 5.6 infections per 100 surgical procedures (Rickard et al, 2020). Unfortunate events such as infections, amputations, and sometimes death are common consequences of a wound but could be avoided with early appropriate treatment such as negative pressure wound therapy (NPWT) or hyperbaric oxygen therapy (HBOT) (Wolcott et al, 2008; Armstrong et al, 2005).

Psychosocial impact

Psychosocial consequences can arise from the associated physical effects of the wound, such as pain or high volumes of exudate, mobility issues or malodour. Sometimes even the anticipation of pain leads to stress among patients (Gouin and Kiecolt-Glaser, 2011). That is, patients who experienced higher anxiety levels anticipated more pain than patients with lower levels of anxiety. Stress may bring with it negative physiological consequences, including increased cortisol levels. This hormone not only has a negative impact on the immune system, but it can also lead to delayed wound healing, subsequent reduction in QoL, and increased chronic stress. High levels of exudate and malodour can also lead to social isolation because of a negative body image and reduced self-esteem (Woo, 2012). Pain is also associated with sleep disturbances, which can be a major source of fatigue and worry, because patients spend a great deal of time thinking about their wounds (Hyland et al, 1994; Persoon et al, 2004).

Chronic wounds also affect an individual's ability to perform daily activities, which further contributes to social isolation. Reduced mobility can restrict an individual's ability to work, perform household tasks and attend to personal hygiene. Patients describe mobility restrictions as one of the worst things about having a

wound, as it can affect independence and QoL. The loss of independence associated with functional decline and social isolation affects overall health and wellbeing (Alexander, 2013).

Financial impact

Chronic hard-to-heal wounds present a substantial economic burden to healthcare systems, including direct as well as indirect costs. Direct costs include any costs involved in the diagnosis, evaluation, treatment, medicine, laboratory investigations and long-term facility care or care at home by an agency and are usually the costs considered by the healthcare provider. Indirect costs include issues such as lost productivity for the patient, income loss during hospitalisation and sick leave and the cost of caring for the patient by friends or family. Indirect costs are generally difficult to measure, but they contribute significantly to the overall financial burden of wound care. A major cost component of wound care is the dressing change frequency — notably the health provision time, the duration of treatment along with hospital stay, and the incidence of complications (Kapp and Santamaria, 2017).

Need of the hour: the perspective of developing countries

The present article shows the clear magnitude and consequences of chronic wounds, particularly in developing countries. Chronic wounds affect the patient, their families, the healthcare system and society as a whole. It is imperative to develop the right approach in wound management to reduce the economic burden on people while at the same time lowering wound-related morbidity and mortality. We need attention and action to improve outcomes for wound care and tackle this growing silent epidemic. A few recommendations based on this study are:

- Regular and continuous assessment and reassessment of wound care in order to consider both intrinsic and extrinsic factors related to healing (Fletcher and Barrett, 2018)
 - Health professionals should receive a properly structured training programme of wound care in order to reduce variation in practice and provide standard guidelines to follow
 - We need to quantify comprehensively the burden of chronic wounds to the individual and healthcare system. Accurate and robust measurement of disease burden is necessary to plan the future of healthcare services and optimise clinical pathways.
- Information about cost is useful for raising the

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profile of the problem among decision-makers and also provides estimates of potential savings if the problem is reduced. Cost analysis will help to develop more affordable solutions of wound care.

Developing new low-cost preventive and therapeutic technologies to address the needs of a particular healthcare setting will be of great use, especially to LMICs where affordability and accessibility to quality healthcare is a challenge.

There is a need for wound registry in hospitals (in addition to patients treated in home care settings) as this will provide a reliable data collection instrument. It will be useful as a continuous quality-improvement tool or for standardisation of wound surveillance. It will also help develop wound care modalities needed in hospitals and in home care settings.

Patients can be involved in their own clinical management through the principles of self-help. There are a number of reasons for this, i.e. the care programme encourages concordance with treatments and activities, and also helps them monitor and treat their own wounds (White, 2016).

This approach will be highly useful in the current pandemic situation. Many wound care clinics are running a reduced service and some patients are frightened of COVID-19 infection, so may not allow a nurse into their home. It may be helpful for them to administer self-care during a crisis situation like COVID-19. In the pre-pandemic model, wound care was performed in hospitals, at off-site healthcare facilities and at home, but the scale was weighted at the top. However, during the pandemic, more care in less risky environments (e.g. at home, where not all procedures will be available) must be facilitated (Rogers et al, 2020).

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