Impact of Ulceration

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2.1 Introduction

Wounds, particularly chronic wounds, are an area of concern for patients and clinicians alike. They not only represent a significant health problem but also have a profound socioeconomic impact. Chronic wounds are conventionally defined as wounds that have failed to progress in an orderly and timely reparative process over a maximum period of 6 weeks to restore the anatomic and functional integrity of the injured site.

2.2 Prevalence

There are wide geographical variations in both the prevalence and the etiology of chronic wounds. In Europe, the prevalence ranges from 0.18 to 1 % with venous ulcers accounting for the majority of these cases followed by diabetes and arterial disease. Data from India are limited. The etiology of chronic wounds in the hospital setting is different from that seen in the community. While hospital-based studies are easier to carry out, they do not reflect the true population-based statistics. In a community-based study from Northern India, the prevalence of chronic wounds was 4.48 per 1000 population with lower-extremity involvement being much more common than the involvement of the upper extremity [1]. The most common etiology for chronic ulcers in the above study was untreated or improperly treated acute traumatic wound followed by diabetes. In contrast, most studies indicate that diabetic ulcers are the most common cause of lower-extremity ulceration in the hospital setting [2, 3].

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2.3 Quality-of-Life Issues

Chronic wounds represent a heterogeneous group which shares the common characteristic of delayed wound healing due to an underlying disease. Most patients have a poor quality of life including pain, physical discomfort, functional limitations, social and economic burden, and psychological distress. The negative socioeconomic impact of chronic ulceration plays a huge strain not only on the patient and his/her family but also on the society. In the United States, chronic wounds affect around 6.5 million patients resulting in expenditure of an estimated US$ 25 billion annually on treatment. In the Scandinavian countries, the cost of treatment of chronic wounds accounts for 2–4 % of the total healthcare expenses. In developed countries approximately 1–2 % of the population will experience a chronic wound during their lifetime. The economic burden is growing rapidly across the globe due to increasing healthcare costs, an aging population, and an increasing incidence of diabetes [4–6].

2.4 Cost of Ulcer Prevalence

According to the Center for Disease Control and Prevention, 7.8 % of the population in the United States had diabetes in 2007 which equals almost 24 million persons. In the same year, diabetes and its complications cost the exchequer $174 billion of which $116 billion were in direct costs and the rest $58 billion were indirect costs such as loss of productivity, disability, and early mortality. An analysis of Medicare claims from 1995 to 1996 showed that expenditures for diabetic foot patients were three times higher than for the general population ($15,309 vs. $5526) yielding a total Medicare cost of $1.5 billion in 1995. In a study in which patients with diabetic foot ulcers were prospectively followed up, it was shown that 54 % patients healed in 2 months, 19 % healed in 3–4 months, and 27 % healed in >5 months. Healing without amputation costs an average of $6664 against healing by amputation which averaged $44,790. The Wagner grade was also related to the cost, being $1892 for Wagner grade 1 ulcer while a Wagner grade 4/5 ulcer averaged $27,721. Presence of vascular disease and neuropathy adds to the costs of treating diabetic foot ulcers. In India, the expenditure incurred in treating diabetic foot ulcers (DFU) varied from Rs. 10,000 in patients in urban areas to Rs. 6260 in patients in rural areas. Patients in urban areas spent a significantly higher amount on medications as well as for laboratory tests and consultations than patients in rural areas. The median costs of surgical treatment were also considerably higher in urban patients (Rs. 21,000 vs. Rs. 6500). Expenditure increased with increased duration of diabetes as well as with the number of complications in both groups. In a recently published study, the cost of treating DFU in five different countries was estimated based on a hypothetical model [5]. While the cost of treatment varied from the lowest in Tanzania to the highest in the United States for two different types of diabetic foot ulcers, the burden for the patient cannot be determined by the adjusted absolute cost but by the patients' responsibility for bearing the cost. The

cost to the patient is a function of both insurance cover and annual per capita purchasing power parity (PPP) adjusted gross domestic product (GDP). The authors concluded that India is the most expensive country for treatment of DFU, where approximately 5.7 years of income are required to pay for treatment compared to only 3 months of income in Chile and in China [5]. Several investigators have reported marked differences between the costs in urban versus rural settings, being considerably higher in the latter. These differences are due to poor access to healthcare facilities and mismanagement due to lack of adequately trained healthcare providers. It is thus obvious that in countries where the cost of treatment to the patient is so high, many patients will decline treatment, while those who chose treatment will face financial ruin [6].

2.5 Risk of Amputation

Diabetic neuropathy contributes to foot deformities and ulcers, which, if left untreated, increase the likelihood of lower-extremity amputations. It is estimated that up to 25 % of diabetics will develop a foot ulcer. In the United States, nearly 71,000 lower-limb amputations were performed in people with diabetes in 2004 costing approximately 3 billion dollars per year. 67 % of all lower-extremity amputations have diabetes. Majority of the amputations (nearly 80 %) are preceded by an ulcer. Every year 5 % of diabetics develop foot ulcers and 1 % will require amputation. Recurrence rate of diabetic foot ulcers is 66 %, and the amputation rate rises to 12 % with subsequent ulcerations. The age-adjusted lower-extremity amputation rate for people with diabetes (5.5 per 1000 people) was 28 times higher than in people without diabetes (0.2 per 1000 people). Amputation rates also rise with increasing age varying from 3.9 per 1000 in diabetics who are less than 65 years of age to 7.9 per 1000 in diabetics more than 75 years of age. Amputation rates are also influenced by race being 1.5 times more common in blacks than in whites. Men are twice as more likely to have a lower-extremity amputation than women. The 5-year survival rate after a major lower-extremity amputation is about 50 %. Once amputation occurs, 50 % will develop an ulcer in the contralateral limb within 5 years. According to estimates, a staggering $9 billion were spent on the treatment of diabetic foot ulcers in 2001 [4].

2.6 Venous Ulceration and Cost

In developed countries, venous ulcers account for 70–90 % of ulcers on the lower leg. In the United States, 1.69 % of the population aged 65 years or older are affected by venous ulceration. The prevalence of venous ulcers is approximately 600,000 annually. The annual cost of treating these ulcers ranges from $ 2.5 to 3.5 billion. Similar figures have been observed in Europe and Scandinavian countries. In Germany, the average cost of treating a patient with venous ulceration ranged from 9900 to 10,800 Euros. The incidence of venous ulceration increases with increasing

age. The recurrence rates following healing are high with up to one third of treated patients experiencing four or more recurrences. Estimates suggest that venous ulcers lead to loss of 2 million working days per year in the United States [7].

The socioeconomic burden of wound complications is worsened by the aging global population. As the global population ages, so does the population of elderly in the hospitals which leads to increased socioeconomic burden in caring for people with lower-extremity ulcerations.

2.7 Loss of Work

Patients with chronic wounds are often forced to abstain from their work in order to get proper medical management of their wounds. Some of them may be unable to carry out their occupation due to wound-related disability. Chronic wounds cause disability which in turn is associated with poor outcome leading to a vicious cycle. The loss of wages places a heavy socioeconomic burden not only on the patient but also on his/her family and the society. Venous ulcers lead to an early retirement in nearly 12.5 % of workers. Venous ulcers are responsible for a staggering 2 billion dollars in lost wages. An overwhelming majority of patients complain that their mobility is adversely affected by the ulcer. In younger, working patients, leg ulceration correlated with time lost from work, job loss, and deleterious effects on their finances. They found caring for their wounds burdensome leading to feelings of anger and resentment. Majority of the patients felt that chronic wounds had a profound negative emotional impact and were associated with feelings of fear, social isolation, anger, depression, and negative self-image [8]. Accurate assessment, prompt treatment, and suitable follow-up are essential for minimizing the long-term disability caused by chronic wounds.

2.8 Psychological Impact

Pain is also a major problem for venous leg ulcer patients which leads to depression, irritation, and reduced social activity. The pain is often worsened during dressing changes. In a multicenter cross-sectional study from Italy, it was seen that women with venous ulcers had more pain and worse quality of life than men. Venous ulcers had high mean values of visual analog score (VAS) during the day and night (44.4 and 44.9, respectively). A higher value was observed during dressing change (57.5). There was direct correlation between pain and quality of life, being worse for ulcers with longer duration and larger area [9]. Chronic leg ulcers also affect self-esteem and social life. In a study from the United Kingdom based on a questionnaire administered to 198 patients, it was observed that bad odor and excessive exudates from the wound had adverse psychological effects leading to feelings of disgust, self-loathing, and low self-esteem. The net result was social isolation and depression. 52 patients (27 %) scored as depressed, while 50 (26 %) scored as anxious on the hospital depression and anxiety (HADS) scale [10]. In another study, 38 patients

completed a health-related quality-of-life questionnaire, and the data obtained was used to evaluate the impact of ulceration. Older patients had worse health-related quality-of-life issues as did those with pain and non-healing ulcers. Pain, itching, altered appearance, loss of sleep, functional limitation, and disappointment with treatment were identified as the psychological effects of chronic ulceration [11]. It is thus important that wound management guidelines should also include recommendations for management of pain, lifestyle modifications, compliance and other quality-of-life issues. In another study from Brazil, the diminished quality of life observed in patients with chronic venous ulcers was attributed to both the physical aspects and functional ability [12]. Routine activities like climbing or moving down stairs or simply standing without support even for short periods become difficult. This physical limitation of mobility entails multiple restrictions which force people with chronic venous ulcers to restructure their daily activities and increase dependence upon others which also hamper social relationships. These patients feel socially isolated, depressed, and constrained due to the dressings. They also feel discriminated against by their family as well as the society. The presence of chronic leg ulcers also affects their mental health as evidenced by the low quality-of-life (QOL) scores in the domains of emotional aspects and mental health. Many studies have shown that persistent pain is a constant reminder of their ulcer and contributed to the feelings of sadness and loss of control. Pain was also related to loss of mobility and sleep disorders.

Health-related quality of life (HRQOL) is worse in diabetics with complications than in diabetics without complications. Foot ulcers increase the risk of death by 2.4-fold as compared to diabetic patients without ulcers. These ulcers are associated with reduced mobility and restriction of daily activities that adversely affect HRQOL. Both qualitative and quantitative studies have confirmed the huge negative psychological and social effect in diabetic foot ulcer patients including reduction in social activities, increased family tensions for patients and their caregivers, limited employment, and financial hardship [13]. A systematic literature review of HRQOL issues in diabetic foot ulcer patients reported that these posed a threat to physical functioning and a negative impact on psychological and also social functioning. The major factors were limited mobility, sleep disturbances, lack of energy, limitations in work and leisure activities, worries and frustration, and a lack of self-esteem [11].

Conclusion

Chronic leg ulcers have a profound economic, psychological, and social effect on the lives of the patients and their immediate families. The cost of caring for these patients also imposes a huge economic burden on healthcare facilities and providers. Manpower constraints and limited resources aggravate the problem. The immense economic and social impact of wounds call for allocation of more resources and funds not only to increase research funding for a better understanding of the complex biological mechanisms of wound healing but also to harness the technology for development of better wound care products which help in the early healing of chronic wounds thereby minimizing the cost of treatment and the socioeconomic burden.

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