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WOUND BURDEN IN A RESOURCE CONSTRAINED SETTING

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ABSTRACT

Background: Wounds pose a significant yet often underappreciated burden to an individual, the healthcare system and society. There is dearth of data on wound disease burden in many resources constrained countries which greatly impact management strategy.

Objective: To assess clinical presentation, wound characteristics and wound disease burden in Kenya.

Design: A multi-center cross-sectional study

Setting: Eight selected hospital each in one county per province in Kenya selected by convenient sampling and purposive sampling for respondents.

Subjects/Participants: Patient history and physical examination was recorded by pre-trained wound assessment health provider for those who presented with wounds and questionnaires for patients and healthcare professionals to assess cause, types, wound profile and age of patients.

Results: Trauma was the leading cause of wounds contributing to 55 % of wounds with post-surgical wound sepsis up to 10 %. The Mean age of presentation was 35 years. The most common site of wounds were the lower limbs. The majority of wounds presented with features of inflammation.

Conclusion: Trauma is a leading cause of wounds in our environment with the majority progressing to chronic wounds probably as a consequence of improper management. We recommend multi-sectorial interventions to reduce trauma injuries and to train wound care professionals.

Key Words: Wounds, epidemiology, Constrained, Chronic

INTRODUCTION

A wound is defined as a breach in the epithelium or integrity of tissue causing loss of the protective lining, thus predisposing to infection. Wounds pose a significant, yet underappreciated burden to an individual, healthcare system and the society at large. Knowledge on wound prevalence, common wounds and patient characteristics is vital in setting up strategies for management in healthcare systems.

Traditionally, wounds have been classified as acute or chronic. Acute wounds being either traumatic or surgical and can further be classified as either tidy or untidy or as lacerations, puncture wounds, abrasions, bruises or contusions (1). Surgical wounds on the other hand are those resulting from surgical intervention in

management of surgical conditions. They are further classified as clean, clean contaminated, contaminated and dirty (2, 3). Chronic wound defined as that has failed to proceed through an orderly and timely reparative process to produce anatomic and functional integrity within a period of three months or that has proceeded through the repair process without establishing a sustained, anatomic and functional result, a wound that has failed to reduce in size by 30 to 40% in a month is likely to be chronic (4, 5). The common types of chronic wounds traditionally include diabetic wounds, vascular ulcers, pressure ulcers as well as malignant wounds and sickle cell ulcers.

In the developed world, chronic wounds are mostly due to traditional causes and are mainly seen in

the elderly population. In the United States for example, 3% of the population over 65 years of age have chronic wounds and overall, 2% of the total population are estimated to be affected by chronic wounds (1). A 2016 report from Wales estimated a 6% prevalence of chronic wounds (1). There is no prevalence study in Kenya and still very few in the sub-Saharan Africa. Studies done in South Africa and Nigeria have shown wounds to constitute to up to 30-42% of hospital admissions every year (7, 8). Our preliminary literature search suggests no reliable estimates at present on the total prevalence and categories of in our setting. There is also a lack of knowledge on wound disease spectrum as well as management strategies.

Knowledge about prevalence and incidence of chronic wounds in relation to population characteristics is important for informing healthcare planning and resource allocation (9).

MATERIALS AND METHODS

Study Design: This was a descriptive cross-sectional multi-center study.

Study Setting: The research was conducted in a total of eight hospitals with at least one hospital in each of the former provinces of Kenya.

Sampling Procedure: In each hospital, purposive sampling was used and all patients with a wound, who gave consent were recruited.

Data Collection: Data on the number of patients with wounds visiting the hospital was taken over 24 hours to get the point prevalence. History and physical examination was conducted on each patient recruited and further information gathered from the health care providers. Information captured included wound aetiology, duration, anatomical location and clinical characteristics. Excluded from the study were patients in critical conditions.

Data Analysis: Data was coded and entered into SPSS (IBM version 21). Means, modes and medians were analyzed using Student T test.

Ethical Consideration

Ethical approval was received from Kenyatta National Hospital/ University of Nairobi ethics and review board.

RESULTS

The majority of patients were in an inpatient setting (68%), while 32% were reviewed in outpatients. 55.8% of the patients were male, 44% female and 0.2% preferred not to disclose their gender.

The age range was between 0 to 90 years with a mean of 35.0 years. Most patients, (72.1%) were between 19 to 60

years, those below the age of 5 years (8.5%), 6 to 18 years (9.3%) and above 60 years (10%).

About one third of patients had co-morbidities, hypertension (12.2%), diabetes mellitus (10.4%), HIV (3.3%) and cancer (6.1%) as the most common co-morbidities. Trauma was a major contributor to wound disease, responsible for 54.8%, of which 16.2% was due to burns trauma and 9.8% due to post-surgical wound sepsis.

The most affected sites were the lower limbs (63%), (Figure 1, 2). Other frequently reported wound sites included the upper limbs (12.3%), abdomen (9.1%), face (7.7%), chest (4.9%) and other parts.

Wounds dimensions assessed in terms of length, width, and depth showed great variation, with majority of the wounds on the lower limbs having a length of 1-10 cm (70.9%) and a width of 1-10 cm (87.4%) (Figure 1). In terms of depth, the most common category was 1-5 cm (59.6%), followed by depth of less than 1 cm (35.0%).

In our assessment of wounds, we also found 62.5% were clean, as per the CDC classification.

A sizable portion of 22.7% were categorized as dirty, indicating presence of debris or other contaminants, while a smaller percentage (7.1%) were found to be smelly, suggesting potential presence of infection.

Our analysis of tissue types found in the wound bed as well as type of exudate in the wounds, revealed results summarized in (Table 1)

Table 1: Tissue types.

Tissue Type	Proportion (%)
Granulation (red color)	42.1
Slough (Yellow-Green)	24.6
Epithelializing (pink color)	15.2
Necrotic (black)	9.6
Hyper granulation	5.3

Table 1-1: Common tissue types proportions, the most common tissue type represented was granulation tissue, 42% and the least was hype granulation, 5.3%

Table 2: Exudate types

Exudate Type	Proportion (%)
Non-exudative (Dry)	59.7
Purulent (green, brown or yellow)	38.9
Hemoserous (Red or straw color)	31.3
Serous (Straw colored)	23.1
Serosanguinous	6.7

Table 2: Showing exudate types, most wounds were non-exudating (59.7%), the rest had variable nature of exudate, most of which were purulent, 38.9%

ASSESSMENT FOR SIGNS OF INFLAMMATION

Analysis of wounds for signs of inflammation showed that 57% of all wounds had features of inflammation, (Table 2); tenderness being the most common feature, The remaining 43% of wounds did not show any sign of inflammation. A considerable number, 14.4% of wounds were identified as infected, indicated by the presence of microbial colonization, additionally, a subset of wounds was described as non-healing wounds (5.3%).

Table 3: Signs of Inflammation

Sign of inflammation	Proportion (%)
Tenderness	35.2
Edema	26.8
Purulent exudate	25.7
Foul smell	25.4
Erythema	18.3
Biofilm	14.8
Local warmth	12.0
Friable granulation tissue	10.2

Table 3: Distribution of features suggestive of inflammation, the common reported sign of inflammation was tenderness, 35.2%, Edema was seen in 26.8%, and the least reported sign of inflammation was friability of granulation tissue.

Assessment of wound edges and the peri-wound skin also revealed findings as seen in Table 3

Table 4: Wound edges and Peri Wound Skin:

WOUND EDGES	PROPORTION (%)
Contracted	40.4
Sloping	31.3
Everted	11.0
Punched out	7.5
Undermined	6.2
Rolled	3.7
PERI-WOUND CHARACTERISTICS	
Intact – healthy	47.3
Edematous	16.3
Erythematous	11.4
Dry/Scaly	11.0
Fragile	5.3
Macerated	5.3
Excoriated	2.9

DISCUSSION

Estimates from various sources demonstrate that the magnitude of wounds as a healthcare problem has considerably increased. The consequence of chronic wounds to the healthcare system due to increasing prevalence and cost implication is significant. In developed countries, common types of wounds include pressure ulcers, diabetic foot ulcers, venous leg ulcers, and ischemic wounds which are the traditional cause of chronic wounds. In the United States for example, it is estimated that 6.5 million people are managed with chronic wounds (10). In the United Kingdom it is estimated that about 700,000 patients present with chronic leg ulcers (11). The spectrum of wounds in many developing countries remains unknown. In Kenya, Nang'ole *et al* demonstrated pressure ulcer prevalence in patients admitted at KNH to be about 11% (12).

In this cross-sectional study, trauma stands the most common cause of wounds at 54.8%, a similar trend as that observed by Toppino *et al* (13) in Cote d'Ivoire, with mechanical trauma contributing 85.3% with burns 2.9%. The contribution of the traditional causes of chronic wounds to the wound burden in our setting is considerably low, with majority of chronic wounds seen in our setting being a consequence of progression of acute traumatic wounds to chronic wounds, likely as a sequel of poor intervention leading to wound infection.

This fact underscores the importance of appropriate management of acute wounds to avert the progression to chronic wounds, it further illuminates the deficiencies in wound care experience, practices and wound care materials experienced in most resource constrained settings.

We reviewed a large number of acute wounds, 62.5% of which fit the CDC classification as clean wounds. This finding would suggest easy progression of most of these wounds to healing, which is not necessarily the trend observed. A number of these clean wounds when poorly managed tend to run a chronic course.

The main stay of management of acute wounds is appropriate surgical toilet. When delayed or done inappropriately, persistence of necrotic tissue, could account for the high infection and inflammation rates encountered in our settings. Compounded with poor and limited options of dressing materials and wound care practices, this could explain why more than half; (57%) of the wounds exhibit features of inflammation, with purulent exudate. All these are pointers of local wound infection. Chronic inflammation plays a pivotal role in transition of acute wounds to chronic wounds, a common finding we encountered, and which underscores the benefits of

appropriate care of acute wounds to curtail transition to chronicity. One third of wounds reviewed had wound edge characteristics, unfavorable for healing and suggestive of infection.

In the same vein, our assessment of peri wound skin revealed some unfavorable changes including peri-wound edema, scaling, excoriation, maceration, erythema and fragility in more than half of the wounds.

Age stratification in most studies reported rather similar mean/median ages of patients with wounds (70–80 years), except for one study from Egypt on prevalence of diabetic foot ulcers that reported a mean age of 50 years (14). Our findings, on the contrary reveal that 72.1% of patients with wounds were younger, between 19 and 60 years of age with the mean age of 35 years, signifying a great age difference with the United states where Chronic wounds are the common type and mostly seen in elderly population with 3% of the population above 65 years having open wounds (3) the continued threat of diabetes and obesity worldwide, and the persistent problem of infection, it is expected that chronic wounds will continue to be a substantial clinical, social, and economic challenge. In 2020, the coronavirus disease (COVID.

CONCLUSION

With most wounds being attributed to trauma the significant incidence of chronic wounds in our setting, with relatively low contribution from traditional causes of chronic wounds (i.e. Diabetic foot ulcers, Vascular and pressure ulcers), suggests mostly progression of acute to chronic wounds in most resource constrained settings. This is a different spectrum from that observed in the developed world. We recommend specialized training in wound care to build competent wound care knowledge base and multi-sectorial intervention to reduce trauma related causes including burns. With common site of wounds being the lower limbs, this finding highlights the importance of targeted wound care and prevention strategies, particularly for lower limbs, to address specific challenges associated with wound management. We recommend further research to assess hindrances to early surgical wound coverage in resource constrained settings.

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