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Malignant Wounds in Hospitalized Oncology Patients: Prevalence, Characteristics, and Associated Factors

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Epidemiological and descriptive research on malignant wounds (MWs) is scarce. The objective of this study was to identify the prevalence of MWs and analyze the characteristics and associated factors of MWs in hospitalized patients at an oncological institution. An epidemiological, cross-sectional, and descriptive study, which was derived from a larger study that collected data on the prevalence of different types of wounds in 341 adults hospitalized in a large oncological hospital, was conducted. The present study comprehensively analyzed data related to MWs. Information was obtained through participant interviews, physical examination, and medical record review. The study was approved by the ethics committee of the institution where the study was conducted. Fourteen MWs were identified in 13 patients, who were primarily married (58%) and men (75%), with a mean age of 60.5 ± 15.1 years. Malignant wounds were predominantly located in the head and neck region (43%) and classified as 1N (50%) according to the Staging of Malignant Cutaneous Wounds instrument. Malignant wounds were characterized as painful (83.3%), with significant pain present during dressing changes (93%). The presence of MWs was associated with the use of antidepressants (odds ratio [OR] = 4.95; $p = .012$), upper-limb edema (OR = 8.39; $p = .003$), and infection (OR = 12.16; $p = .051$). The prevalence of MWs in hospitalized patients was 3.8%. Associated clinical variables were related to the degree of disease progression. This information provides evidence of the need for research identifying and investigating nursing interventions for patients with MW to assist with pain control during dressing changes.

Malignant wounds (MWs) are the result of primary malignant or metastatic cancer cells infiltrating the skin. Malignant wounds are classified as chronic wounds that evolve into a progressive and degenerative disease, depending upon the curability of the cancer (Seaman & Bates-Jensen, 2015). Approximately 15% of people affected by advanced cancer develop MWs (Jarvis, 2014).

Despite the significant negative impact of MWs on the quality of life of patients and their families, studies on

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MWs are scarce (Firmino et al., 2020). A review of the literature shows that the lack of evidence for controlling the signs and symptoms of MWs is a challenge for health professionals, particularly the nursing team (Tilley, Fu, & Lipson, 2019; Tsichlakidou et al., 2019).

In most cases, MWs metastasize from inoperable tumors and are seen in patients undergoing radiotherapy or chemotherapy and receiving palliative care (García-Vilariño et al., 2018). Malignant wounds have a low prevalence compared with other types of wounds (Grocott, Gethin, & Probst, 2013; Seaman & Bates-Jensen, 2015). However, medical advances in oncology are prolonging the survival time of people affected by incurable cancer, making patients more likely to develop MWs (Probst, Arber, & Faithfull, 2013).

Advanced tumors are usually large and challenging to resect while preserving body contour, function, and quality of life. However, current plastic surgery techniques have boosted the development of oncoplastic surgery, making it possible to operate on tumors previously considered unresectable, perform surgeries to control symptoms of MWs, facilitate nursing care, increase the ability of patients to care for themselves at home, decrease suffering, and improve quality of life (Chirappapha et al., 2016; Cohen & Miner, 2019; García-Vilariño et al., 2018).

Plastic surgery nurses caring for patients with MW should understand the characteristics of MWs, develop knowledge about how to care for these patients, educate the patient's family members or caregivers about MWs, predict complications associated with MWs, and have the ability to discuss options related to palliative surgery (García-Vilariño, 2018; Lucas & Trivialpiece, 2015). The aim of this study was to identify the prevalence of MWs and analyze the characteristics and factors associated with MWs in hospitalized patients at an oncological institution.

METHODS

This study was derived from a larger study whose objective was to identify the prevalence of different types of wounds in 341 adults hospitalized at a large oncological institution (Castro et al., 2020; González et al., in press).

Ethical Considerations

The study followed Resolution No. 466/12 of the Brazilian Ministry of Health and was approved by the Research Ethics Committee of the health institution (Protocol No. 2088/15, CAAE: 46697115.5.0000.5432).

Study Design

This epidemiological, descriptive, and analytical study comprehensively analyzed data from a primary cross-sectional study conducted at a large hospital that specializes in cancer treatment and offers both public and private care services in Sao Paulo, Brazil. The data were collected daily for 9 days, between November 23 and December 1, 2015, from each sector of the institution in which the study was conducted.

Population Sample and Inclusion and Exclusion Criteria

The database included 341 participants with cancer who were hospitalized in the institution during the data collection period (Figure 1). Individuals 18 years or older admitted to the intensive care units or wards were included in the study. Outpatients, surgical center patients, post-anesthesia care unit patients, and hematopoietic progenitor cell transplantation unit patients were excluded. Included participants signed an informed consent form after being provided with information about the study objectives and procedures. Patients who were unconscious or had difficulty expressing themselves verbally were included when authorized by an accompanying family member.

Study Protocol

Study data were collected by reviewing medical records, conducting interviews, and performing physical

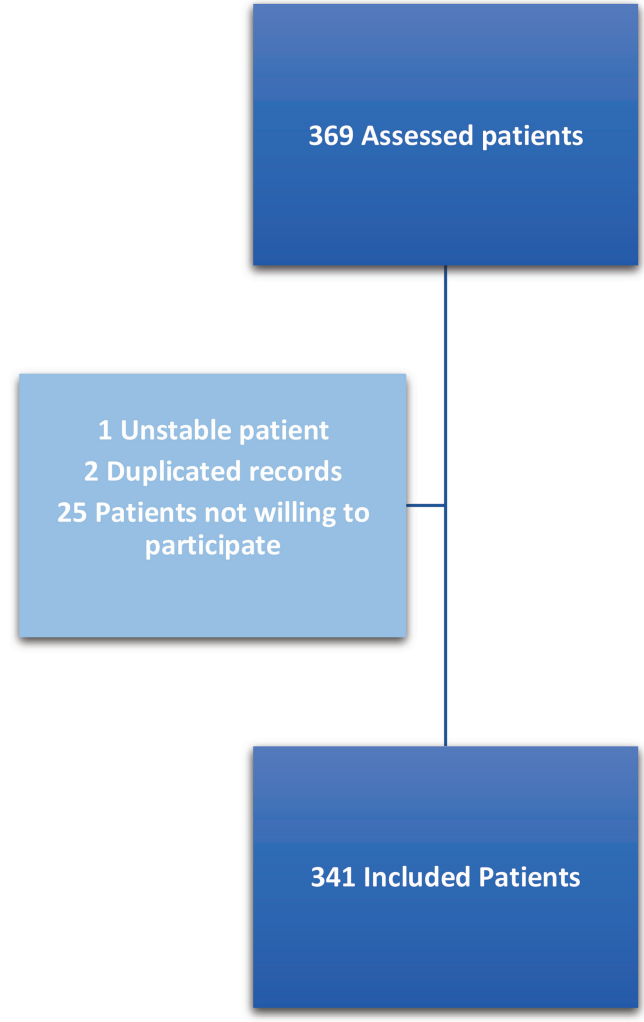

FIGURE 1. Patient flow chart. This figure is available in color online (www.psnjournalonline.com).

examinations that included inspecting and palpating the skin and evaluating each type of wound.

Malignant wounds were evaluated and classified using a tool developed by the National Cancer Institute in Brazil (Instituto Nacional de Câncer, 2009), which is based on the Hopkins Wound Assessment Tool (Haisfield-Wolfe & Baxendale-Cox, 1999) that includes the following five stages:

- *Stage 1*: Closed wound, whole skin, asymptomatic, reddish or pinkish tissue, and visible and delimited nodule;
- *1N*: Wound with a superficial opening through a drainage orifice with the possibility of occasional pain or pruritus;
- *Stage 2*: Open wound involving the epidermis and dermis, possibly friable, exudative, with odor and pain;
- *Stage 3*: Wound involving the subcutaneous tissue, possibly with adhering necrotic tissue, exudate, and foul odor; and
- *Stage 4*: Very deep wound with abundant exudate, foul odor, and pain.

Sociodemographic data collected included age, gender, and marital status. Data collection of clinical variables included the following:

- Use of corticosteroids, antihypertensives, analgesics, antidepressants, antihistamines, immunosuppressants, anti-inflammatory agents, anticoagulants, diuretics, and antibiotics;
- Presence of bruising, hematoma, dry and scaly skin, senile purpura, upper- or lower-limb edema, and infection; and
- Use of catheters, disposable diapers, supportive appliances, orthopedic footwear, drains, skin tape, and adhesives.

Additional variables related to MWs were also considered that included presence, location, classification, intensity, and pain as measured by the visual analog scale (VAS; Martinez, Grassi, & Marques, 2011). The VAS is an incremental numerical scale that ranges from 0 to 10 (Hjermstad et al., 2011). The individual is asked to report the number that best describes his or her pain and the circumstances during which the pain occurs (e.g., continuous, when the dressing is removed, while the dressing is applied, after the dressing is secured).

Data Analysis

The data were compiled and analyzed using SPSS Version 22.0 (IBM, Armonk, NY). Prevalence (i.e., the proportion of individuals who present with a clinical condition at a given point in time) was calculated using the following formula: Prevalence coefficient = [(Number of patients with WM)/(Total number of patients at risk for MW)] × 100 (Fletcher, Fletcher, & Fletcher, 2014).

Associations between the dependent variable (i.e., presence of MWs) and the independent variables were obtained by conducting Fisher's exact tests in univariate analysis with a confidence interval of 95%. Multivariate analysis was conducted using stepwise forward logistic regression, with $p < .2$ considered significant in the association tests to calculate the odds ratios (ORs) for each independent variable. For the other analyses, a $p < .05$ was considered significant. Receiver operating characteristic (ROC) curves were used to evaluate the quality of the logistic regression.

RESULTS

The prevalence of MWs was found to be 3.8% based on data from 13 patients who represented 14 MWs. One patient was excluded for further analysis due to missing data.

Demographics

The sample comprised 341 adult patients, the majority of whom were married (53.4%), white (46.9%), and men (58.1%), with an average age of 59.2 ± 15.1 years (range = 21–70 years). Patients with MW had a mean age of 60.5 ± 15.1 years (range = 21–91 years) and were younger than patients without MWs (64.7 ± 15 years; range = 28–85 years; $p = .25$). Of the patients with MW, nine were men (75%) and three were women (25%). Relative to marital status, seven were married (58%), three were single (25%), one was a widow (8%), and one was divorced (8%). This result is similar to patients without MW ($p = .44$).

Characteristics of MWs

The characteristics of MWs are presented in Table 1. The most common location of MWs was the head and neck region ($n = 7$; 43%). Half of the MWs were classified as 1N and four (28.6%) as Stage 2, meaning that the majority of MWs had superficial openings in the skin where communication between the tumor and the exterior was established with possible exudate drainage.

The majority of MWs were characterized as painful (83.3%), with significant pain present during dressing changes in 93%. A total of 10 patients (83.3%) reported mild, moderate, or severe pain. VAS scores ranging from 4 to 8 were reported by 60% of patients during the application of MW dressings even after receiving medications with analgesic properties.

Clinical and Epidemiological Data

The distribution of clinical variables according to the presence or absence of MWs is shown in Table 2. The use of antidepressants ($p = .012$), upper-limb edema ($p = .025$), and infection ($p = .027$) were significantly associated with

TABLE 1 Characteristics of Malignant Wounds According to Stage, Location, Time, and Intensity of Pain and Analgesic Medications

Stage	Location	Time of Pain	VAS Intensity	Analgesic Medications
1N	Head	Dressing application	5	Corticosteroids, analgesics
2	Head	Continuous	8	Analgesic, antidepressants
2	Head	Continuous	8	
4	Neck	Dressing application	7	Analgesics, antidepressants
1N	Neck	Dressing removal	5	Corticosteroids, analgesics, antidepressants
1N	Neck	Dressing removal	5	Analgesics, antidepressants
1	Anterior chest	Dressing application	4	Analgesics, antidepressants, anti-inflammatory agents
1N	Anterior chest	Continuous	6	Corticosteroids, antidepressants
2	Anterior chest	Dressing application	6	Analgesics
1	Abdomen	Dressing removal	5	Antidepressants
2	Abdomen	None	–	
1N	Abdomen	Continuous	8	Analgesics, antidepressants
1N	Genitals	Continuous	6	Corticosteroids, analgesics
1N	Lower limbs	None	–	Analgesics, antidepressants

Note. VAS = visual analog scale.

the presence of MWs. The regression had an ROC curve of .768, which indicates a very high degree of accuracy (Mossman, 2013).

Table 3 shows the variables significantly associated with MWs ($p < .2$). Patients with MW were less likely to use diapers but 5 times more likely to use antidepressants, 8 times more likely to have edema of the upper limbs, and 12 times more likely to have an infection.

DISCUSSION

This study was part of a larger study that investigated the prevalence and factors associated with various types of wounds that could be present in hospitalized patients with cancer, thus including a wide range of variables for five types of wounds. The present study deepens the analysis and discussion of MWs, one of the specific types of injuries in these patients.

In this study, a small number of patients with MW were identified in the sample of 341 patients, corresponding to a prevalence of 3.8%. This is lower than the 5%–15% prevalence reported in other studies (Grocott et al., 2013; Maida, Ennis, Kuziemsky, & Corban, 2009; Tilley et al., 2019). Notably, this was a point prevalence study that did not include ambulatory patients.

A study in Nigeria (Iyun, Ademola, Olawoye, Michael, & Oluwatosin, 2016) reported an MW point prevalence of 2.6%. However, this study was conducted in a tertiary university hospital with 800 beds and an occupancy rate of 80%, which was a reference center for the treatment of chronic wounds. As MWs are an injury of low prevalence, it is difficult to achieve large samples in a point prevalence study, even in specialized hospitals, which prevents narrower confidence intervals, as shown in Table 3.

American researchers (Grocott et al., 2013) suggested that the low prevalence of MWs may explain the lack of research and need for more assertive treatment guidelines. A postgraduate study (de Brito et al., 2013) conducted in Brazil between 2001 and 2010 investigated chronic wounds in dissertations and theses. The researchers assessed 43 studies, 20.9% ($n = 9$) of which were performed in Sao Paulo. The researchers identified MWs as "lesions of lesser interest" and included only one study (2%) in the study sample. They concluded that attention on healing chronic lesions should predominate attention to MWs. This may explain the lack of interest in MWs, which require symptom control and do not heal.

Despite their low prevalence, MWs are complex wounds that have a drastic negative impact on the quality of life of patients with cancer (Jarvis, 2014; Seaman & Bates-Jensen, 2015; Tilley, Lipson, & Ramos, 2016). Although the number of patients with MW is limited, providing evidence for the practical and subjective care that nursing can offer patients with MW and their families is a matter of clinical relevance.

In this study, 12 patients had 14 MWs, the majority of which were in the initial stage. A total of 10 patients (83.3%) reported pain and 60% of the patients reported having mild, moderate, or severe pain, with VAS scores ranging from 4 to 8 during the application of dressings on the MWs, even after receiving medications with analgesic properties.

A cross-sectional study conducted in the northeastern region of Brazil (Lisboa & Valença, 2016) that characterized

TABLE 2 Distribution of Clinical Variables According to the Presence or Absence of Malignant Wounds in Hospitalized Cancer Patients (*N* = 341)

	Malignant wounds				
	Absent		Present		
	n	%	*n*	%	*p*
Corticosteroids (*n* = 339)					
No	242	96.8	8	3.2	.338
Yes	84	94.4	5	5.6	
Antidepressants (*n* = 338)					
No	221	98.2	4	1.8	.012*
Yes	104	92	9	8.0	
Alcohol (*n* = 339)					
No	312	96.3	12	3.7	.451
Yes	14	93.3	1	6.7	
Ecchymosis					
No	222	97.4	6	2.6	.133
Yes	106	93.8	7	6.2	
Dry and scaly skin					
No	280	95.6	13	4.4	.228
Yes	48	100	0	0.0	
Edema of the upper limbs					
No	300	97.1	9	2.9	.025*
Yes	28	87.5	4	12.5	
Infection					
No	321	96.4	12	3.6	.027*
Yes	7	87.5	1	12.5	
Drain					
No	283	95.6	13	4.4	.231
Yes	45	100	0	0.0	
Use of disposable diapers					
No	242	95.3	12	4.7	.197
Yes	86	98.9	1	1.1	

Note. Fisher's exact test.
*$p < .05$.

TABLE 3 Variables Significantly Associated With Malignant Wounds in Hospitalized Patients With Cancer (*N* = 341)

			95% CI for OR	
Variable	*p*	OR	Minimum	Maximum
Antidepressants	.012*	4.952	1.41	17.34
Upper-limb edema	.003*	8.390	2.02	34.87
Infection	.051*	12.162	0.98	150.28
Diaper use	.035*	0.097	0.01	0.84

Note. CI = confidence interval; OR = odds ratio.
*$p < .2$.

51 MWs in a specialized hospital found a predominance of more advanced stages of MWs (i.e., Stage 3 and Stage 4; 68%) and pain (90.2%). In the present study, the presence of pain was significant in the participants with MW even in the early stages (i.e., Stage 1 and 1N). This finding is important because pain in MWs during dressing changes has been associated with MWs in more advanced stages. The pain related to MWs is predominantly neuropathic, characterized by the compression and destruction of nerve endings by the tumor and exacerbation of the inflammatory processes in the adjacent skin (Grocott et al., 2013; Seaman & Bates-Jensen, 2015).

In a Japanese study of the association between MWs and pain in 22 patients with breast cancer (Tamai, Mugita, Ikeda, & Sanda, 2016), the researchers identified factors associated with pain that included degradation of wound margins, granulation tissue, and the time interval between dressing changes. The researchers suggested that the involvement of peripheral nerve fibers at the wound surface or tumor infiltration at its margins might be responsible for the wound-related pain and that the granulation tissue was formed predominantly by the tumor tissue rather than the granulation tissue itself. They were unable to determine whether the relationship between pain and time interval of dressing change was due to the way the dressing change was performed or the frequency of the dressing changes.

The pathophysiology of MWs shows that granulation tissue in the tumor bed is present in the initial development of the wound (Haisfield-Wolfe & Baxendale-Cox, 1999; Tamai, Mugita, et al., 2016), which aligns with the findings of this study, where patients with MW in initial stages of development reported significant pain associated with the application of dressings. The results reported by Tamai, Mugita, et al. (2016) and the results of the present study suggest that the initial stages of MWs are as painful or more painful than MWs in advanced stages.

The strength of association between the presence of MWs and the use of antidepressants, the presence of upper-limb edema, and infection can be explained by the natural progression of the disease. These variables are clinical changes that may occur before or after the existence of MWs.

Antidepressants are used as adjuncts in the treatment of cancer pain. As the cancer progresses, the patient may experience increased pain and may require the use of a combination of antidepressants and analgesics for synergism in analgesia, which weakens the effectiveness of their use for depression associated with the disease or injury. In this respect, patients with MW are more likely to take antidepressants because their use presupposes more advanced disease, with increased pain and the need for complementary pain management (Fink, Gates, & Montgomery, 2015).

Edema is a clinical sign that can have several causes. Lymphedema is a pathological condition of unknown prevalence involving the accumulation of protein-containing fluids in the tissues due to an interruption of lymphatic flow owing to the absence or dysfunction of the lymph nodes (Fu & Lasinski, 2015). Lymphedema is a chronic condition affecting the upper extremities of 8%–56% of patients undergoing surgical treatment of breast cancer (Fromantin et al., 2013; Wanchai, Armer, Stewart, & Lasinski, 2016). It occurs in the upper extremities of patients with breast cancer, but it may also be present in patients with cancers of the head, neck, and lungs.

Although lymphedema occurs more frequently in women undergoing surgical breast cancer, MWs are often present in women with locally advanced breast cancer, where conservative treatment is the most common therapeutic intervention. In these women, lymphedema may occur as a consequence of radiotherapy or cancer progression. Even in patients who have undergone a partial or total mastectomy, relapse or tumor progression triggered by the progression of the disease may cause MWs (Fink et al., 2015).

Infection in patients with cancer may occur for reasons such as febrile neutropenia in patients undergoing chemotherapy. Infection can also be a symptom resulting from the degeneration of visceral tumors and of the MWs themselves (Fromantin et al., 2013). Patients with advanced cancer are more susceptible to infection due to a loss of immunological resistance with disease progression. In these advanced cases, MWs may be present and become a focus of local infection that may evolve to systemic infection (Fromantin et al., 2013; Grocott et al., 2013; Seaman & Bates-Jensen, 2015).

The association of the use of diapers with lower ORs in the present study suggests that the study participants with MW were less dependent (i.e., had more mobility, were in better clinical condition, had less advanced disease) than participants who used diapers but did not have MW. The authors of previous studies have suggested that the evolution of MWs reflects the evolution of the underlying cancer (Grocott et al., 2013; Seaman & Bates-Jensen, 2015; Tamai, Akase, et al., 2016). The patients in this study had early stages of MWs, as shown in Table 1. This association reinforces the hypothesis that the evolution of MWs reflects the evolution of the cancer.

Study Limitations

This study was limited because of missing data and missing variables (i.e., primary cancer, tumor staging, time of diagnosis, curative or palliative stage of treatment, site affected, presence of metastases), preventing further analysis of participant characteristics and associations.

CONCLUSION

The prevalence of MWs in hospitalized patients was 3.8%, characterized primarily by painful MWs in the initial stages. Associated factors included the use of antidepressants, upper-limb edema, and the presence of infection.

The associated factors are distinct from those of other types of wounds and more related to the progression of the disease, with infection being the most common factor. Multicentric studies are necessary to confirm and complement these findings.

Implications to Clinical Practice and Research

Malignant wounds are complex and require specific and sensitive nursing care; they cannot be ignored even if studies indicate a low prevalence. Identification of MW characteristics and their associated factors can guide the clinical management and the planning of educational programs for patients, family members, and health professionals, including plastic surgery nurses. The need for pain control during application of the dressing, even in the early stages of MWs, supports the implementation of evidence-based nursing interventions focusing on the patient. This study provides a rationale for the development of additional epidemiological studies and clinical trials investigating MWs.

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