Wounds in advanced illness: a prevalence and incidence study based on a prospective case series

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Maida V, Corbo M, Dolzhykov M, Ennis M, Irani S, Trozzolo L. Wounds in advanced illness: a prevalence and incidence study based on a prospective case series. Int Wound J 2008;5:305–314.

ABSTRACT

A prospective observational sequential case series was studied in order to ascertain an accurate inventory of the various wound types, their point prevalence and incidence rates and their anatomic locations in patients with advanced illness. Five hundred and ninety-three patients were serially assessed until their deaths. Forty-three individual wound types were identified and grouped into nine distinct classes. Data were stratified between patients suffering from malignant and non malignant disorders. One thousand and thirty-six individual wounds (average 1·8 wounds per patient) were identified at baseline. Eight hundred and ninety-one individual wounds (average 1·5 wounds per patient) were identified between baseline and their date of death. Pressure ulcers constituted the most commonly occurring wound class affecting more than 50% of all patients. Malignant wounds were observed only in cancer patients. Baseline point prevalence for pressure ulcers, traumatic wounds, venous ulcers and arterial ulcers in non cancer patients exceeded that in cancer patients. At baseline, iatrogenic wounds were more prevalent in cancer patients than in non cancer patients. Incidence rates for pressure ulcers, traumatic wounds, diabetic ulcers, arterial ulcers and ostomies in non cancer patients exceeded those in cancer patients. The broad range of wounds along with high rates of prevalence and incidence, identified in this study, reflects that wounds represent a significant management issue for patients with advanced illness. Therefore, there exists a need for advancement in modalities and measures aimed at risk assessment, prevention and appropriate goal-oriented management.

Key words: Advanced illness • Incidence rate • Point prevalence • Prospective • Supportive care • Wounds

INTRODUCTION

The integument system comprises the body's largest organ (1). It is subject to failure and pathology similar to other organ systems (2). Patients suffering from advanced illnesses are in transition from curative care to supportive and palliative care (3). The term advanced illness may include patients in a number of clinical settings such as acute medicine, intensive care, nursing home, palliative care and hospice care. Patients with advanced illnesses comprise a substantial proportion of all patients admitted to hospitals worldwide. Such patients have been deemed to be suffering from disease(s) that is incurable and are generally thought to be at risk of dying within 6 months by their treating physicians (4). In this clinical context, wounds may be acute or chronic (5). There exist varied

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Key Points

- patients with advanced illnesses have been deemed to be suffering from disease(s) that is incurable and are generally thought to be at risk of dying within 6 months by their treating physicians
- in this clinical context, wounds may be acute or chronic

Key Points

- patients with advanced illness are particularly predisposed to wounds as a result of their advanced age, decreased mobility, anorexia-cachexia, metabolic disorders, immunosuppression, medical comorbidities and associated treatments
- wounds constitute a leading cause of pain and disfigurement, they also contribute to decreased functional status and quality of life and may also be associated with reduced life expectancy
- wounds are also a cause for concern from a health care economic perspective as their management is becoming a major factor in escalating health care
- a literature search was conducted on Medline, Pubmed, Cochrane, CINAHL and Healthstar databases between 1997 and May 2007 to identify relevant and related studies
- six hundred and sixty-four sequential patients were eligible for the study
- five hundred and ninety three (88·5%) patients were followed until their deaths; sixty-one (9·1 %) patients were discharged from the programme and thus lost to follow-up. As of 30 April 2007, ten (1·5%) patients remained alive and continued to be monitored

goals and objectives of care depending on their perceived potential for healing (6). This includes wound healing as well as wound palliation – the management of pain and other symptomatic issues such as exudate management and odour control (7–9). Patients with advanced illness are particularly predisposed to wounds as a result of their advanced age, decreased mobility, anorexia–cachexia, metabolic disorders, immunosuppression, medical comorbidities and associated treatments (10). Wounds constitute a leading cause of pain and disfigurement (11). Cherney *et al.* reported that 21% of patients attending an oncology and palliative day hospital were directly symptomatic from integumentary disorders (12). In addition, they also contribute to decreased functional status and quality of life (10,12). They may also be associated with reduced life expectancy (13). There exists significant controversy regarding wounds, especially related to pressure ulcers; one position is that they are totally preventable and thus their occurrence reflects negligence and neglect, while the other position asserts that they are largely inevitable and represent part of the natural history of advanced illness. Wounds are also a cause for concern from a health care economic perspective as their management is becoming a major factor in escalating health care costs (14).

A literature search was conducted on Medline, Pubmed, Cochrane, CINAHL (Cumulative Index to Nursing and Allied Health Literature) and Healthstar databases between 1997 and May 2007 to identify relevant and related studies. Keywords used were advanced illness, wounds, prospective, point prevalence and incidence rate. There were no studies that fulfilled all of the listed search criteria. Tippett in 2005 reported on the results of a two-part retrospective data in the hospice and end-of-life setting (15). Eleven wound categories were cited: pressure, stasis, arterial, trauma, skin tears, surgical, neuropathic, gangrene, tumour, terminal and other. In part 'A', there are no data on whether the wounds were present on admission or developed after admission to the hospice. Therefore, the results that quote prevalence may actually be reflecting incidence. Such prevalence rates were reported in the absence of information relating to performance status, comorbid illness and philosophy of care. Reifsnyder and Magee in 2005 reported on the results of multi-site combined retrospective and prospective study in the hospice setting (16). Only pressure ulcers were considered. Performance status was assessed using the Palliative Performance Scale (PPSv2) and risk for pressure ulcer development was measured using the Braden Scale. They defined 'incidence' as all new cases of an index problem for the period of interest, while prevalence was defined as all occurrences of a problem for a period of interest, including both pre-existing and new cases (16).

METHODS

Six hundred and sixty-four sequential patients were eligible for the study. They represented all patients referred to a consultative integrated and combined community- and hospital-based palliative medicine programme for consideration of supportive and palliative care. Referrals were received from community primary care physicians, community hospital oncologists, surgeons, internists and tertiary care oncologists. The palliative programme comprises a community consultative service with linkage to a palliative care inpatient unit and associated hospital-based palliative consultative service. Collectively, the combined community- and hospital-based components serve an estimated population of 750 000 within the northwest quadrant of Metropolitan Toronto, Canada. Recruitment for this study was commenced with new referrals on 1 May 2005 and ended on 30 June 2006. All patients or their substitute decision makers provided consent to have their clinical data registered in a research database. Five hundred and ninety-three (88·5%) patients were followed until their deaths. Sixty-one (9·1%) patients were discharged from the programme and thus lost to follow-up. As of 30 April 2007, ten (1·5%) patients remained alive and continued to be monitored. All patients were examined within 24 hours of the initial referral. Data collected were entered on a customised and anonymous Microsoft Access database by all research collaborators on an accrual basis. Patients were followed by serial clinical assessments, occurring every 24–48 hours, throughout their palliative trajectory, culminating in their death either in the community or in the hospital. Performance status was measured at baseline and weekly until death using the PPSv2 (17). Risk for the development of pressure ulcers was measured using the Braden Scale (18). The

total study and observational period spanned a total of 24 months. All wounds were managed by a specialist wound management team consisting of a specialist wound physician and advanced practice nurse. Pressure ulcers were classified according to the system developed by the National Pressure Ulcer Advisory Panel (NPUAP) (19). According to the NPUAP, stage I is defined as intact skin with non blanching erythema; stage II is partial thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough, and it may also present as an intact or open/ruptured serum-filled blister; stage III represents full-thickness tissue loss, and subcutaneous fat may be visible but bone, tendon or muscle is not exposed; stage IV reflects full-thickness tissue loss with exposed tendons, muscles, joints, and bone and 'unstageable' refers to full-thickness tissue loss in which the base of the ulcer is covered by slough and/or eschar. Diabetic foot ulcers were classified according to the system developed by Wagner (20). According to the Wagner classification, grade 0 is defined by erythema, grade 1 is a superficial ulcer, grade 2 is a deeper ulcer, grade 3 represents a deep abscess and osteomyelitis, grade 4 reflects forefoot gangrene and grade 5 is defined as gangrene of the entire foot. All wounds were managed in accordance with current practice guidelines (6,7,9). The study protocol was approved by the research ethics board of the William Osler Health Centre in Toronto, Canada.

STATISTICAL ANALYSIS

Patient-related data were exported from the Microsoft Access database into S-Plus 6.2 for Windows for statistical analysis. Only data from the 593 patients who were followed until death were considered for data analysis. In this fashion, the analysis would yield both point prevalence and incidence rates. Means and standard deviations were calculated for age, performance status and the number of comorbidities by cancer status, and the means were compared using student *t*-test analysis. Gender and race were compared using Pearson chi-squared test with continuity correction. Survival data were compared using the log-rank test. Point prevalence of wound types was calculated as the proportion of patients who had one or more wounds of the given type at referral. Confidence intervals for the prevalence proportions were calculated by the exact binomial method. Although known to be conservative, these confidence intervals have the advantage of not giving lower limits below 0 in cases where the prevalence is low (21). Pearson chi-squared test with continuity correction was used to test if the prevalence proportions differed between cancer and non cancer patients. The prevalence of wound locations was treated in the same way as prevalence of wound types. The incidence rate is defined as the rate at which new cases of wounds develop in a population during a specific time period (22,23). Incidence rates in this study were calculated as the number of patients who developed at least one new wound per month of being at risk for a wound type per 100 patients (24,25). Consideration was restricted to the first new wound of each type that developed between referral and death per patient so that inference via simple Poisson distributions is valid (26). It was assumed that having a wound of a certain type at baseline did not exclude a patient from being at risk for developing another wound of the same type during follow-up. Thus, a patient's time at risk for developing a first new wound was taken as the number of months from referral to the development of the first new wound of the type under consideration. If no event occurred, the time at risk was the full survival time. Confidence intervals for the incidence rates were calculated using the Poisson distribution (27). Incidence rates were compared using the W3 statistic recommended by Ng and Tsang (28).

RESULTS

Six hundred and sixty-four sequential patients were eligible for the study. Of these, 593 (88·5%) were followed until their deaths. Cancer was identified as the main diagnosis in 415 (70%) patients and was stratified into eight subgroups: gastrointestinal, lung, genitourinary, breast, head and neck, gynaecological, haematolymphatic and other. Non cancer accounted for 178 (30%) patients and was stratified into eight subgroups: cerebrovascular, neurodegenerative, cardiovascular, sepsis, gastrointestinal, respiratory, renal and immunological (Table 1). Significant differences between the cancer and the non cancer patients

Key Points

- cancer was identified as the main diagnosis in 415 (70%) patients
- non cancer accounted for 178 (30%) patients

Key Points

- during the 24-month study period, 43 different wound types were identified; these were categorised into nine distinct wound classes: malignant, pressure ulcers, iatrogenic, traumatic, diabetic foot ulcers, venous leg ulcers, arterial ulcers/gangrene, infections/inflammatory lesions and ostomies
- one thousand and thirty-six wounds were observed at baseline (average 1·8 wounds per patient)
- during the 24-month follow-up period, 891 new wounds developed (average 1·5 wounds per patient)
- malignant wounds were only seen in patients with cancer
- pressure ulcers accounted for 60·6% of all wounds identified throughout the study
- the most common anatomic site for wounds in the study was the sacrum/coccyx area

Table 1 Diagnoses of patients completing the study ($n = 593$)

Main diagnosis – cancer ($n = 415$)	n (%)	Main diagnosis – non cancer ($n = 178$)	n (%)
Gastrointestinal*	129 (31.1)	Cerebrovascular‡‡	55 (30·8)
Lung†	99 (23·8)	Neurodegenerative§§	47 (26·4)
Genitourinary‡	36 (8·7)	Cardiovascular¶¶	32 (17·9)
Breast	30 (7·2)	Sepsis***	16 (8·9)
Head and Neck§	30 (7·2)	Gastrointestinal†††	13 (7·3)
Gynecological¶	27 (6·5)	Respiratory‡‡‡	10 (5·6)
Haematolymphatic**	24 (5·9)	Renal§§§	3 (1·7)
Other††	40 (9·6)	Immunological¶¶¶	2 (1·4)

*Gastric, oesophageal, small intestine, colorectal, biliary, pancreatic and liver.
†Non-small cell lung cancer (NSCLC), Small cell lung cancer (SCLC) and mesothelioma.
‡Renal, bladder, ureter and prostate.
§Oral, laryngeal, salivary gland and primary brain tumours.
¶Cervix, ovarian and uterine.
**All leukaemias, lymphoma and myeloma.
††Sarcoma, skin and carcinoid.
‡‡Brain haemorrhage and thromboembolic stroke.
§§Dementia, Parkinson's, Multiple Sclerosis (MS) and Amyotrophic Lateral Sclerosis (ALS.)
¶¶Myocardial Infarction (MI), Congestive Heart Failure (CHF) and aneurysms.
***Peritonitis and human immunodeficiency virus-acquired immunodeficiency syndrome.
†††Cirrhosis and ischaemic bowel disease.
‡‡‡Chronic Obstructive Pulmonary Disease (COPD), pneumonia, asthma and fibrosis.
§§§Polycystic and diabetic.
¶¶¶Amyloidosis and transplant rejection.

were noted and indicated the need for these groups to be compared and contrasted (Table 2). At baseline, the non cancer patients were older, carried a female predominance, had a greater proportion of non Caucasians, measured significantly lower on their PPSv2 and Braden scores, possessed more medical comorbidities, demonstrated a lower survival and were less likely to have been initially assessed in their homes and to have ultimately died in their homes (Table 2).

During the 24-month study period, 43 different wound types were identified. These were categorised into nine distinct wound classes: malignant, pressure ulcers, iatrogenic, traumatic, diabetic foot ulcers, venous leg ulcers, arterial ulcers/gangrene, infections/inflammatory lesions and ostomies (Table 3). One thousand and thirty-six wounds were observed at baseline (average 1·8 wounds per patient). During the 24-month follow-up period, 891 new wounds developed (average 1·5 wounds per patient). Malignant wounds were only seen in patients with cancer. Pressure ulcers accounted for 60·6% of all wounds identified throughout the study.

A range of wound frequency was observed throughout the study period (Table 4). One hundred and ninety-five (47%) cancer patients developed no wounds contrasted to 33 (18·5%) non cancer patients with no wounds. Eleven (2·7%) cancer patients had more than six wounds, while 22 (12·4%) non cancer patients had more than six wounds. The maximum number of wounds, observed in two non cancer patients, was 15.

The most common anatomic site for wounds in the study was the sacrum/coccyx area (Table 5). Among the cancer patients with wounds at referral, 39·1% had wounds in the sacrum/coccyx area, in contrast to 76·6% of non cancer patients with wounds in the same area at referral. The prevalence of wound sites was greater in non cancer patients than in cancer patients for the following areas: sacrum/coccyx, upper extremity, lower extremity, heel, feet and pelvis/hip. Cancer patients had a higher prevalence of wounds in the chest/breast, abdomen, head/neck, upper/lower back and perineum/genitalia compared with the non cancer patients, although statistical significance only applied to the chest/breast area.

Non cancer patients experienced a higher prevalence of pressure ulcers (total and all stages), traumatic wounds, diabetic foot ulcers, venous leg ulcers and arterial/gangrene wounds at referral compared with

Table 2 Baseline characteristics of cancer versus non cancer patients

Baseline characteristics	Cancer ($n = 415$)	Non cancer ($n = 178$)	P value
Mean age (years)	72·4 ± 13·2	80·5 + 11·1	<0·001*
Gender, *n* (%)			0·0152†
Male	224 (54)	76 (42·7)	
Female	191 (46)	102 (57·3)	
Race, *n* (%)			0·0045†
Caucasian	358 (86 3)	145 (81·5)	
Negroid	22 (5·3)	5 (2·8)	
Oriental	14 (3·4)	2 (1·1)	
Hispanic	3 (0·7)	4 (2·2)	
South Asian	18 (4·3)	22 (12·4)	
Mean PPSv2	50·8 ± 16·4	25·2 ± 11·1	<0·001*
Mean Braden Score	15·8 ± 3·8	10·1 ± 2·9	<0·001*
Comorbidities (mean number)	8·3 ± 3·3	9·1 ± 3·1	0·0102*
Survival			<0·0001‡
Mean (days)	70·7	29·2	
Median (days)	33	9	
Proportion that survived >6 months (%)	9·60	2·20	
Initial consult at home, *n* (%)	226 (54·5)	18 (10·1)	<0·0001†
Home death, *n* (%)	103 (24·8)	19 (10·7)	0·0001†

PPSv2, Palliative Performance Scale.
*Independent samples *t*-test.
†Pearson chi-squared test with continuity adjustment.
‡Log-rank test.

Key Points

- the results of the study are reflective of patients in a specific domain of care, namely those with advanced illness referred for supportive and palliative care and whose life expectancy was thought to be less than 6 months
- the results clearly define point prevalence and incidence rates as they relate to the patient population identified
- the status of the patient in terms of performance status and Braden Scale was described
- it is not possible to make comparisons, as other prospective studies do not exist that consider the range of wound types and classes documented in the current study
- statistically significant differences that emerged during statistical analysis mandated stratification of the study results between patients with a main diagnosis of cancer and those with a non cancer main diagnosis

cancer patients (Table 6). Conversely, cancer patients had a higher point prevalence of malignant wounds and iatrogenic wounds. Although cancer patients demonstrated higher point prevalence of infection/inflammatory and ostomies, this was not statistically significant.

Incidence rates during the follow-up period were greater in non cancer patients for pressure ulcers (total and all stages), traumatic wounds, diabetic foot ulcers, arterial/gangrene wounds and ostomies (Table 7). Although non cancer patients had higher incidence rates of venous leg ulcers, this was not statistically significant. The incidence rate of malignant wounds in non cancer patients was zero. Cancer patients demonstrated higher incidence rates of iatrogenic and infection/inflammatory wounds, but this was not statistically significant.

DISCUSSION

The results of the study are reflective of patients in a specific domain of care, namely those with advanced illness referred for supportive and palliative care and whose life expectancy was thought to be less than 6 months. The results clearly define point prevalence and incidence rates as they relate to the patient population identified. In addition, the status of the patient in terms of performance status and Braden Scale was described. It is not possible to make comparisons, as other prospective studies do not exist that consider the range of wound types and classes documented in the current study. Statistically significant differences that emerged during statistical analysis mandated stratification of the study results between patients with a main diagnosis of cancer and those with a non cancer main diagnosis.

Regarding malignant wounds, Hatsfield-Wolfe and Rund reported the prevalence of fungating malignant wounds at 5–10% (29). Unlike these findings, the study under discussion had a point prevalence of 14·5% at referral. One possible explanation for this discrepancy may be the inclusion of other types of malignant wounds such as nodules, induration, malignant ulcers, zosteriform lesions and mixed patterns.

Table 3 Types of wounds identified during the study period

Wound class	Wound type	No. of wounds present at baseline ($n = 593$)	No. of wounds developed between baseline and death ($n = 593$)
Malignant	Nodules and induration	30	10
	Fungating	50	35
	Malignant ulcer	9	4
	Other (zosteriform and mixed)	2	1
Pressure ulcers	NPUAP stage I	220	269
	NPUAP stage II	252	270
	NPUAP stage III	26	10
	NPUAP stage IV	31	7
	NPUAP unstageable	56	26
Iatrogenic	Radiotherapy burns	7	1
	Surgical wound dehiscence	9	1
	Surgical wound infection	12	6
	Chemotherapy-induced skin necrosis	8	6
	Foley catheter-induced hypospadias	1	1
Traumatic	Abrasions	39	58
	Lacerations	13	26
	Haematoma and/or severe ecchymosis	60	44
	Thermal burns	7	1
Diabetic foot ulcers	Wagner grade 0	4	1
	Wagner grade 1	10	12
	Wagner grade 2	12	3
	Wagner grade 3	5	3
	Wagner grade 4	3	2
	Wagner grade 5	1	1
Venous	Venous leg ulcers	38	21
Arterial	Arterial leg ulcers	1	1
	Gangrene (non diabetic)	12	5
Infection/inflammatory	Abscesses	5	4
	Bacterial (cellulitis)	4	11
	Viral (zoster)	1	9
	Pemphigus (bullous)	2	1
	Vasculitis	2	1
	Pyoderma gangrenosum	1	1
	Pilonidal sinus	2	1
Ostomies	Colostomies	15	3
	Ileostomies	5	1
	Nephrostomies	13	4
	Ileal conduit	12	1
	Percutaneous gastrostomies (feeding + venting)	29	12
	Percutaneous biliary drains	1	4
	Drainage catheters (chest + abdomen)	14	10
	Suprapubic catheter	1	1
	Tracheostomies	11	2
Totals	43	1036	891

NPUAP, National Pressure Ulcer Advisory Panel.

Regarding pressure ulcer prevalences, the NPUAP reported stage I–IV pressure ulcer prevalences of 14–28% in the 'end-of-life' scenario. Reifsnyder found a 14·9% prevalence in the retrospective phase of a home hospice study and 26·9% prevalence in the prospective phase (16). Tippett found a 17·5% prevalence in end-of-life patients (15). One of the reasons for

Table 4 Frequency of wounds in cancer and non cancer patients

No. of wounds	Cancer, *n* (%)	Non cancer, *n* (%)
0	195 (47·0)	33 (18·5)
1	93 (22·4)	20 (11·2)
2	55 (13·3)	30 (16·9)
3	33 (8)	27 (15·2)
4	17 (4·1)	29 (16·3)
5	11 (2·7)	17 (9·6)
>6	11 (2·7)	22 (12·4)

$P < 0{\cdot}0001$ (Pearson chi-squared test with continuity adjustment).

the higher point prevalence and incidence rates is because of the high numbers of stage I pressure ulcers occurring in a population that was predominantly Caucasian. It has been previously reported that stage I ulcers tend to be underdetected in non Caucasians (30). The current study found pressure ulcers comprised 60·6% of all wounds documented. This compares to 50% quoted by Tippett as the proportion of all wounds assessed retrospectively in patients at end of life (15).

The sacrum/coccyx was the most common anatomic site for wound development, as reflected by the presence of more than half of all wounds (55·3%) at this site. This compares with the finding of 40% by Tippett (15).

A review of the data demonstrated a relatively high prevalence of diabetic foot ulcers, yet diabetes mellitus affected 212 (51·1%) of the cancer patients and 118 (66·3%) of the non cancer patients. When expressed as number of diabetic patients with foot ulcers divided by the total number of diabetic patients, the point prevalence at referral equates to 10·6%. Studies involving diabetic patients have revealed a prevalence ranging from 3% to 7·2% (31). The higher prevalence of diabetic foot ulcers is likely because of the greater degree of systemic debilitation present in the study population.

The most important differentiating aspect of this study from other wound research was all wound and integument issues were considered, catalogued and documented. In addition, the study involved a large sequential case series with a long follow-up period that spanned 24 months. Another aspect was the completely prospective nature of this study. The study also provided detailed information regarding diagnoses, performance status (PPSv2) and Braden Scale. This will allow for more direct comparisons and correlation with future research studies. In addition, there was a consistent standard of care delivered to all patients because they were all managed by the same team of health care professionals. The study identified significant differences between cancer patients and non cancer patients that previous research did not document. In addition, the methods for the calculation of point prevalence and incidence rates were clearly defined.

A possible limitation of the study was that the recruitment of patients was derived from a single health care organisation in a single

Key Points

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Table 5 Anatomic sites and prevalence of wounds at referral

Wound site	No. of cancer patients with wound site at referral	Prevalence of wound site in cancer patients, % (95% CI)	No. of non cancer patients with wound site at referral	Prevalence of wound site in non cancer patients, % (95% CI)	*P* value*
Sacrum/coccyx	86	20·7 (16·9–24·9)	111	62·4 (54·8–69·5)	<0·0001
Abdomen	70	16·9 (13·4–20·8)	23	12·9 (8·4–18·8)	0·2766
Chest/breast	54	13 (9·9–16·6)	4	2·2 (0·6–5·7)	0·0001
Head/neck	34	8·2 (5·7–11·3)	12	6·7 (3·5–11·5)	0·6614
Upper/lower back	26	6·3 (4·1–9·0)	9	5·1 (2·3–9·4)	0·7021
Upper extremity	39	9·4 (6·8–12·6)	36	20·2 (14·6–26·9)	0·0005
Lower extremity	25	6·0 (3·9–8·8)	35	19·7 (14·1–26·3)	<0·0001
Heel	22	5·3 (3·4–7·9)	69	38·8 (31·6–46·3)	<0·0001
Feet	12	2·9 (1·5–5·0)	30	16·9 (11·7–23·2)	<0·0001
Pelvis/hip	6	1·4 (0·5–3·1)	23	12·9 (8·4–18·8)	<0·0001
Perineum/genitalia	10	2·4 (1·2–4·4)	4	2·2 (0·6–5·7)	0·8606

*Pearson chi-squared test with continuity correction.

Key Points

- the possible limitation of the study was that the recruitment of patients was derived from a single health care organization in a single country
- given the large patient sample and large number of overall wounds, the unstageable wounds are unlikely to have significantly altered the prevalence and incidence rates observed

Table 6 Point prevalence of wounds at referral

Wound type	No. of cancer patients with wound type at referral	Prevalence at referral, % (95% CI)	No. of non cancer patients with wound type at referral	Prevalence at referral, % (95% CI)	*P* value*
Malignant	60	14·5 (11·2–18·2)	0	0	
Pressure ulcer (total)	93	22·4 (18·5–26·7)	127	71·3 (64·1–77·9)	<0·0001
NPUAP stage I	66	15·9 (12·5–19·8)	84	47·2 (39·7–54·8)	<0·0001
NPUAP stage II	56	13·5 (10·4–17·2)	97	54·5 (46·9–62·0)	<0·0001
NPUAP stage III	4	1·0 (0·3–2·4)	13	7·3 (3·9–12·2)	0·0001
NPUAP stage IV	3	0·7 (0·1–2·1)	18	10·1 (6·1–15·5)	<0·0001
NPUAP unstageable	6	1·4 (0·5–3·1)	29	16·3 (11·2–22·6)	<0·0001
Iatrogenic	34	8·2 (5·7–11·3)	6	3·4 (1·2–7·2)	0·0492
Traumatic	41	9·9 (7·2–13·2)	46	25·8 (19·6–32·9)	<0·0001
Diabetic foot ulcers	5	1·2 (0·4–2·8)	7	3·9 (1·6–7·9)	0·0452
Venous leg ulcers	10	2·4 (1·2–4·4)	17	9·6 (5·7–14·9)	0·0003
Arterial/gangrene	3	0·7 (0·1–2·1)	8	4·5 (2·0–8·7)	0·0053
Infections/inflammatory	16	3·9 (2·2–6·2)	3	1·7 (0·3–4·8)	0·2623
Ostomies	61	14·7 (11·4–18·5)	21	11·8 (7·5–17·5)	0·4191

NPUAP, National Pressure Ulcer Advisory Panel.
*Pearson chi-squared test with continuity correction.

country. Although the absolute values for point prevalence and incidence rates determined in this study cannot be generalised to other programmes, the ratios between cancer and non cancer patients should still apply. Another possible limitation is that reassessments occurred at intervals ranging from 24 to 48 hours. As a result, there may be some degree of error in assessing the onset date of particular wounds. Finally, 7% of the pressure ulcers were 'unstageable' according to the NPUAP criteria. Fifty six at the baseline referral date and with 26 noted during the follow-up period. Given the large patient sample and large number of overall wounds, the unstageable wounds are unlikely to have significantly altered the prevalence and incidence rates observed.

Table 7 Incidence rates of wounds during study period

Wound type	No. of cancer patients with at least one new wound	Incidence rate per month per 100 cancer patients (95% CI)	No. of non cancer patients with at least one new wound	Incidence rate per month per 100 non cancer patients (95% CI)	*P* value*
Malignant	36	3·9 (2·8–5·5)	0	0	
Pressure ulcer (total)	182	22·4 (19·3–25·9)	60	50·8 (38·8–65·4)	<0·0001
NPUAP stage I	138	16·1 (13·5–19·0)	38	26·4 (18·7–36·2)	0·0066
NPUAP stage II	128	14·8 (12·4–17·6)	45	33·7 (24·6–45·1)	<0·0001
NPUAP stage III	4	0·4 (0·1–1·1)	5	3·0 (1·0–6·9)	0·0033
NPUAP stage IV	4	0·4 (0·1–1·1)	3	1·8 (0·4–5·3)	0·0546
NPUAP unstageable	12	1·3 (0·6–2·2)	11	6·6 (3·3–11·8)	0·0001
Iatrogenic	23	2·5 (1·6–3·8)	4	2·4 (0·7–6·1)	0·9079
Traumatic	60	6·5 (4·9–8·3)	22	14·3 (8·9–21·6)	0·0014
Diabetic foot ulcers	4	0·4 (0·1–1·1)	4	2·4 (0·7–6·2)	0·0135
Venous leg ulcers	10	1·0 (0·5–1·9)	4	2·6 (0·7–6·5)	0·1315
Arterial/gangrene	3	0·3 (0·1–0·9)	3	1·8 (0·4–5·2)	0·0336
Infections/inflammatory	17	1·8 (1·0–2·9)	1	0·6 (0–3·3)	0·2860
Ostomies	12	1·3 (0·7–2·3)	12	7·9 (4·1–13·8)	<0·0001

NPUAP, National Pressure Ulcer Advisory Panel.
*Pearson chi-squared test with continuity correction.

CONCLUSIONS

This prospective observational study, based on a sequential case series of 593 patients with advanced illness referred for supportive and palliative care, demonstrates that wounds represent a major domain of care within the overall medical and nursing management of these patients. The first challenge in attempting to manage a problem of this magnitude is to define its scope and degree through accurately computing prevalence and incidence rates. The study results show that non cancer patients were older and were referred at a much later stage of their illness trajectory relative to cancer patients and they presented with a significantly greater burden of wounds along with more medical comorbidities. Indeed, wounds in non cancer patients are representative and reflective of global systematic and organ failure. Forty-three distinct wound types grouped into nine classes were identified. With the exception of malignant wounds and iatrogenic wounds, non cancer patients develop more wound-related issues relative to cancer patients. In addition, the predilection for the development wounds in certain anatomic sites was computed. In view of our ageing world demographics, greater attention needs to be directed to the wound care needs of patients. The wide range of wounds identified along with the high prevalence and incidence rates reported in this prospective study indicates a need to increase educational and research efforts directed at more effective prevention and management. The study findings reinforce the need for wound care to evolve as a major tenet of supportive and palliative care.

ACKNOWLEDGEMENTS

Literature search was conducted by Darren Hamilton and Anna Mann.

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Key Points

- the study results show that non cancer patients were older and were referred at a much later stage of their illness trajectory relative to cancer patients and they presented with a significantly greater burden of wounds along with more medical comorbidities
- wounds in non cancer patients are representative and reflective of global systematic and organ failure
- with the exception of malignant wounds and iatrogenic wounds, non cancer patients develop more wound-related issues relative to cancer patients
- in view of our ageing world demographics, greater attention needs to be directed to the wound care needs of patients
- the wide range of wounds identified along with the high prevalence and incidence rates reported in this prospective study indicates a need to increase educational and research efforts directed at more effective prevention and management
- the study findings reinforce the need for wound care to evolve as a major tenet of supportive and palliative care

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