

Clinical Science

High cost of stage IV pressure ulcers

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KEYWORDS:

Pressure ulcer;
Cost;
Stage IV

Abstract

BACKGROUND: The aim of this study was to calculate and analyze the cost of treatment for stage IV pressure ulcers.

METHODS: A retrospective chart analysis of patients with stage IV pressure ulcers was conducted. Hospital records and treatment outcomes of these patients were followed up for a maximum of 29 months and analyzed. Costs directly related to the treatment of pressure ulcers and their associated complications were calculated.

RESULTS: Nineteen patients with stage IV pressure ulcers (11 hospital-acquired and 8 community-acquired) were identified and their charts were reviewed. The average hospital treatment cost associated with stage IV pressure ulcers and related complications was \$129,248 for hospital-acquired ulcers during 1 admission, and \$124,327 for community-acquired ulcers over an average of 4 admissions.

CONCLUSIONS: The costs incurred from stage IV pressure ulcers are much greater than previously estimated. Halting the progression of early stage pressure ulcers has the potential to eradicate enormous pain and suffering, save thousands of lives, and reduce health care expenditures by millions of dollars. © 2010 Elsevier Inc. All rights reserved.

A pressure ulcer is a localized injury to the skin and/or underlying tissue, usually over a bony prominence, because of pressure or pressure in combination with shear and/or friction.¹

Pressure ulcers are chronic wounds with physiologically impaired healing.^{2,3} An estimated 15% of acute-care patients have pressure ulcers,⁴ and pressure ulcer incidence has increased by 63% in recent years.⁵ Pressure ulcers are an epidemic among bed-bound populations, with a reported prevalence as high as 26% among hospitalized patients,⁶ 43%

among those in nursing homes,⁶ and 39% among patients with spinal cord injuries.⁷ These estimates likely underestimate the true scope of the pressure ulcer pandemic because many cases are underreported owing to concern that a pressure ulcer may be interpreted as negligent care.⁸ Every year, billions of dollars are spent on the treatment of pressure ulcers and associated morbidities, representing a significant portion of health care resources. This figure will continue to increase over the next decade. In addition, the financial burden to hospitals also will increase because the Center for Medicaid and Medicare Services recently classified hospital-acquired stage III and IV pressure ulcers as a “never event” and that care for these ulcers will no longer be reimbursed.^{9,10} Appropriate cost-effective treatment modalities are therefore of the utmost importance.

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Manuscript received June 3, 2009; revised manuscript December 9, 2009

Table 1 Morbidities associated with pressure ulcers^{11,16-18,29-31}

Pain
Depression
Local infection
Osteomyelitis
Anemia
Sepsis
Gas gangrene
Necrotizing fasciitis (rare)
Death

Emphasis must be placed not on decreasing incidence, but on early treatment of pressure ulcers to minimize comorbidities and ensuing costs.

The morbidities associated with pressure ulcers represent a considerable health care problem, particularly when healing does not occur (Table 1).¹¹ Approximately 50 percent of stage II¹² and 95% of stage III and IV pressure ulcers do not heal within 8 weeks.¹³ Patients with pressure ulcers usually show significantly impaired physical and social function, self-care, and mobility.¹⁴ Common associated morbidities include pain, depression, local infection, anemia, osteomyelitis, and sepsis.^{11,15-18} In addition, patients with pressure ulcers often require either long-term hospitalization or frequent hospital admissions. The presence or development of a pressure ulcer can increase the length of a patient’s hospital stay by an average of 10.8 days.¹⁹ These extended hospitalizations are associated with higher costs and increased incidence of nosocomial infection and/or other complications.²⁰

The average hospital charge per pressure ulcer patient was reported to be \$48,000 in 2006.⁵ This represents a minimum annual outlay of 11 billion dollars to the US health care system,²¹ excluding nursing home and home health care costs. Table 2 illustrates the cost components generally attributed to pressure ulcers. Besides being outdated, there is a great deal of variability among cost estimates. Moreover, hospital costs calculated in previous studies greatly underestimate the true cost of stage IV pressure ulcers because costs incurred from secondary complications were not accounted for. Pressure ulcers do not have a separate Diagnostic Related Group category; charges and reimbursements therefore often are fragmented into different diagnostic categories. Only by focusing on pressure ulcers as a separate disease entity and including all directly related complications can the financial and clinical costs of stage IV pressure ulcers be understood. The purpose of this study was to identify and report additional morbidities that are related directly to pressure ulcers, and to calculate and analyze the costs of treatment of stage IV pressure ulcers and associated complications. Although only the financial costs of hospitalizations owing to pressure ulcers were presented in this study, it is important to emphasize the burden of pain, suffering, and decreased quality of life experienced by patients and their families affected by this disease.

Methods

A retrospective chart review of patients with stage IV pressure ulcers in a university-based, tertiary-care hospital was conducted. The true costs related to the pressure ulcers, which included costs of ensuing morbidities, were calculated and analyzed. The inclusion criteria for the study were as follows.

First, patients admitted with stage IV pressure ulcers (community-acquired) or acquired stage IV pressure ulcers during the hospital stay (hospital-acquired) were included. Patients with hospital-acquired pressure ulcers (HAPUs) were admitted to the hospital for a separate medical condition (eg, pneumonia requiring mechanical ventilator support, complication of major surgery), and acquired a stage IV pressure ulcer in the hospital. Their hospital stays therefore were prolonged even after the presenting medical condition had been stabilized or resolved. The wound healing team was consulted after the stage IV ulcer was observed. Patients with community-acquired pressure ulcers (CAPUs) were admitted to the hospital for stage IV pressure ulcers or a related complication. The ulcers were acquired at home or in a long-term care facility.

Second, the stage IV pressure ulcer or resulting morbidity was the sole reason for a portion (HAPU), or the entire hospital stay (CAPU), as determined by consensus from the health care team.

Table 2 Costs previously associated with treatment of pressure ulcers^{25,27,32-36}

Component	Costs/fee
Nursing care	\$152-\$996/ulcer*
Medications	\$350/y to \$4,898/hospital stay/patient
Dressings	\$93-\$7,021/ulcer*
Laboratory tests	\$733-\$1,455/patient
Radiology	\$109-\$235/patient
Alternating pressure overlays, mattresses	\$.86-\$3.57/d [‡]
Debridement and surgical Procedures	\$29.33-\$344.26/debridement [†]
Chronic-care bed in hospital	\$280-\$600/d
Home health care supplies	\$75-\$150/wk
Home health care nurse visit	\$105/visit*
Office visit	\$339-\$520/y*
Malpractice lawsuits	\$279,000/monetary settlement

Fees were as follows: \$11,040 (debridement; skin, partial thickness) and \$11,044 (debridement; skin, subcutaneous tissue, muscle, and bone) (no published costs available).

*Over a 12-week treatment period.

†2007 Medicare repayment values for Manhattan, NY, Medicare payment facilities CPT codes.

‡Converted from pounds Sterling based on 2002 exchange rate (2-year product life).

Third, all stage IV pressure ulcers were treated in accordance with standard published treatment guidelines.^{22,23} The wound healing team consisted of a surgeon, medical physicians, physician assistants, nurses, a physical therapist, and a nutritionist. The director of the Medical Intensive Care Unit and the nursing director of the Respiratory Care Unit also were part of the team. The wound care team ensured continuity of care for these patients. All ulcers were documented with the Wound Electronic Medical Record (WEMR), a Microsoft Access (Redmond, WA)–based relational database that documents the following: a digital photograph of the wound; a real-time graph of the wound healing rate (length, width, depth, and area over time); wound location; presence of drainage, cellulitis and/or pain; fever; ambulation status; degree of undermining; a summary of the patient's medical history; hematology and chemistry laboratory data; radiology and pathology reports; deep wound culture reports; and wound treatment regimens.²⁴

The hospital records for these patients were analyzed retrospectively for a maximum of 29 months to consolidate and tabulate all related costs in the following manner.

First, all charges related to the treatment of stage IV pressure ulcers and ulcer-related complications were included in the calculation. For patients with HAPUs, charges were included starting when the pressure ulcer became the primary reason for continued hospital stay. This was determined through agreement by all members of the health care team. All charges were incurred during 1 hospital stay for HAPUs. For CAPUs, charges were calculated for all hospital stays directly resulting from the pressure ulcer or resulting complication, as determined by the wound healing team at admission.

Second, inpatient ledger statements were checked, and a total bill of charges for the defined period was compiled for each patient. Physician charges were excluded.

Third, hospital costs per patient were calculated as follows. The amount charged by each department for services related to the pressure ulcer was obtained for each patient. These charges then were converted to the actual hospital cost for the service using department-specific conversion factors obtained from the hospital billing office. This conversion was performed for each specific charge in all categories.

Fourth, only costs directly related to the stage IV pressure ulcer during the patient's hospital stay were calculated. These included the complications of renal failure, sepsis, respiratory failure, and other medical conditions directly resulting from the ulcer as determined by the wound healing team. This research was approved by the local Institutional Review Board.

Results

Nineteen patients with stage IV pressure ulcers (11 hospital-acquired, 9 community-acquired) were identified, and

Table 3 Breakdown of average costs associated with stage IV pressure ulcers

Cost component	Average cost
Accommodations	
Hospital accommodations	\$94,915.85
Laboratory	
Chemistry	\$829.71
Microbiology	\$1082.67
Hematology	\$246.23
Immediate laboratory	\$360.94
Radiology	
General radiology	\$2607.50
Nuclear medicine	\$1088.92
Computerized axial tomography scan	\$609.61
Magnetic resonance imaging	\$223.46
Operating room services	
Operating room	\$4441.66
Blood bank	\$1783.00
Recovery room	\$592.38
Anesthesia	\$363.16
Pathology	
Pathology	\$769.52
Clinical microscopy	\$1057.30
Ancillary services	
Respiratory therapy	\$4522.01
Central sterile supply	\$125.53
Electrocardiography	\$40.86
Pharmacy	\$6903.49
Consultation services	
Rehabilitation	\$801.06
Core cardiology	\$425.23
Endocrinology	\$145.98
Emergency room	\$619.00
Miscellaneous	
Other	\$700.50
Total	\$127,185

their charts were reviewed retrospectively. The hospital cost averaged \$127,185 over a maximum of 29 months. The cost for a hospital-acquired pressure ulcer patient averaged \$129,248 during 1 hospital stay, whereas the cost for a community-acquired pressure ulcer patient averaged \$124,327. Pressure ulcer-related morbidities previously omitted are included in the calculation. Necrotizing fasciitis, renal failure, cardiovascular events, other serious complications that were not previously recognized as being associated with pressure ulcers, as well as other commonly associated morbidities (Table 1), were observed in patients with HAPUs and CAPUs. Table 3 shows the average costs for HAPUs and CAPUs, broken down by types of service performed.

Comments

The costs of stage IV pressure ulcers and related complications are extremely high. In this study, we emphasize that in calculating costs, the amount spent on treating associated medical complications of pressure ulcers also must be

included. Our cost estimate in this study represents only a fraction of the total economic burden of pressure ulcers. There are also expenses of long-term care, such as nursing home and home health care, outpatient visits, social services, and patient transportation, all of which are not accounted for. Other indirect costs include time lost from work, forced early retirement, patient pain and suffering, impact on the patients' families, and expenses associated with morbidity and mortality. In addition, malpractice suits associated with the development of pressure ulcers, averaging \$250,000 per settlement and reportedly accounting for a total of \$65 million, were not included in our calculations.²⁵

It is widely accepted that prevention of pressure ulcers decreases associated morbidity, mortality, and health care costs. One study showed that the implementation of a comprehensive prevention program decreased the incidence of all pressure ulcers by 87%.²⁶ At a monthly cost of \$519.73 per patient, preventing pressure ulcers would be significantly less expensive than treating stage IV pressure ulcers and associated morbidities, as exemplified in this study.

Although initially more expensive, providing the best quality care from the onset of treatment reduces healing time and is by far the most economical approach.²⁷ Despite appropriate care, pressure ulcers may not be preventable in certain patients.²⁸ An alternative approach to reducing morbidity and mortality from pressure ulcers is early detection and treatment to halt progression to stage IV ulcers. Our clinical experience in treating patients with pressure ulcers has shown that although prevention may not be feasible in all cases, halting progression is a feasible goal for all pressure ulcers, except in patients receiving palliative care. A comprehensive program of early recognition and treatment should be implemented to prevent these high costs as well as to reduce morbidity and mortality. The WEMR is an essential tool to synthesize the complex clinical information required to manage patients with pressure ulcers because it captures all the critical clinical information on 1 page, so that appropriate medical decisions can be made.²⁴ Furthermore, the WEMR allows all clinicians to view the wound, the variables that affect wound healing, and the wound area, thus facilitating change in real time.

The design of this study differs from previous studies by including the costs of treating associated complications in the analysis of pressure ulcer treatment costs. This is a possible limitation because some of the included costs may have resulted from underlying morbidity independent of pressure ulcers. To minimize this error, costs were included only when the entire health care team agreed that the incurred costs resulted from the pressure ulcer or its complication. By including the costs of all pressure ulcer-related complications, the cost analysis in this study is more representative of the actual cost of stage IV pressure ulcers. A second limitation may be that the costs of a metropolitan hospital are higher relative to other hospitals in the country. It is nevertheless likely that the costs of treating stage IV pressure ulcers significantly are underestimated in this

study. Higher-stage pressure ulcers rarely heal fully in a tertiary care setting, and the excluded costs associated with outpatient care only would underestimate the overall cost of treatment. Future studies are needed to determine the substantial costs associated with stage IV pressure ulcers that fall beyond the scope of this study.

Again, we believe that many of these costs can be eliminated by an early treatment protocol.

Conclusions

Although not meant to be a definitive cost analysis, this study illustrates the high costs associated with stage IV pressure ulcers. The magnitude of these costs has not been fully appreciated because costs usually are attributed in a fragmented manner. Costs resulting from ulcer progression and its associated medical complications may be prevented by early recognition and treatment of pressure ulcers and monitoring for complications. The exorbitant morbidity, mortality, and costs attributable to stage IV pressure ulcers demand a better understanding of the molecular basis of physiologic impairment, which will lead to new pharmacologic therapies. Moreover, future studies are warranted to evaluate the efficacy of prevention and treatment modalities as they are developed.

Acknowledgments

The authors would like to thank Dr Anna Flattau for her critical revisions of intellectual and written content.

This work was supported by the United Spinal Association and the National Institutes of Health (grant RO1LM008443).

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