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An Economic Evaluation of the Impact, Cost, and Medicare Policy Implications of Chronic Nonhealing Wounds

Samuel R. Nussbaum, MD¹, Marissa J. Carter, PhD, MA², Caroline E. Fife, MD^{3,4,5},
Joan DaVanzo, PhD, MSW⁶, Randall Haught⁶, Marcia Nussgart, RPh^{7,*}, Donna Cartwright, MPA⁸

¹Schaeffer Center for Health Policy and Economics, University of Southern California, Los Angeles, CA, USA; ²Strategic Solutions, Inc., Cody, WY, USA; ³Baylor College of Medicine, Houston, TX, USA; ⁴CHI St. Lukes Hospital, The Woodlands, TX, USA; ⁵The US Wound Registry, The Woodlands, TX, USA; ⁶Dobson/DaVanzo & Associates LLC, Vienna, VA, USA; ⁷Alliance of Wound Care Stakeholders, Bethesda, MD, USA; ⁸Integra Lifesciences, Plainsboro, NJ, USA

ABSTRACT

Objective: The aim of this study was to determine the cost of chronic wound care for Medicare beneficiaries in aggregate, by wound type and by setting. **Methods:** This retrospective analysis of the Medicare 5% Limited Data Set for calendar year 2014 included beneficiaries who experienced episodes of care for one or more of the following: arterial ulcers, chronic ulcers, diabetic foot ulcers, diabetic infections, pressure ulcers, skin disorders, skin infections, surgical wounds, surgical infections, traumatic wounds, venous ulcers, or venous infections. The main outcomes were the prevalence of each wound type, Medicare expenditure for each wound type and aggregate, and expenditure by type of service. **Results:** Nearly 15% of Medicare beneficiaries (8.2 million) had at least one type of wound or infection (not pneumonia). Surgical infections were the largest prevalence category (4.0%), followed by diabetic infections (3.4%). Total Medicare spending estimates for all wound types ranged from \$28.1 to \$96.8 billion. Including infection costs, the most

expensive estimates were for surgical wounds (\$11.7, \$13.1, and \$38.3 billion), followed by diabetic foot ulcers (\$6.2, \$6.9, and \$18.7 billion). The highest cost estimates in regard to site of service were for hospital outpatients (\$9.9–\$35.8 billion), followed by hospital inpatients (\$5.0–\$24.3 billion). **Conclusions:** Medicare expenditures related to wound care are far greater than previously recognized, with care occurring largely in outpatient settings. The data could be used to develop more appropriate quality measures and reimbursement models, which are needed for better health outcomes and smarter spending for this growing population.

Keywords: Medicare 5% Limited Data Set, Medicare spending, prevalence of wounds, wound care.

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The true cost of wound care, including chronic wounds, such as venous leg ulcers, diabetic foot ulcers, and pressure ulcers, remains unknown for the national population of the United States [1]. This is also true for subgroups, such as Medicare beneficiaries.

A rough prevalence rate for chronic nonhealing wounds in developed countries is 1% to 2% of the general population [2,3], similar to the prevalence rate for heart failure [4]. Unlike heart failure, the morbidity and associated costs of chronic wounds, including amputation and death, have been largely ignored from a public policy standpoint in the United States, perhaps because no specific medical specialty is clearly responsible. Nonhealing wounds are not so much a disease as a symptom. Patients with nonhealing wounds are likely to be older adults, nonambulatory or paralyzed, unable to provide self-care, and/or suffering from dementia. Their ulcers may occur as a result of unique medical conditions (e.g., sickle cell anemia, vasculitis) [5,6]; in association with immunosuppression (e.g., steroid use) [7,8], renal impairment (e.g., calciphylaxis) [9], autoimmune diseases (e.g., systemic

lupus erythematosus), dermatologic diseases (e.g., epidermolysis bullosa), and age-related debility or paralysis (which can lead to pressure ulcers) [10,11]; result from peripheral neuropathy (e.g., diabetes); and occur in patients with peripheral arterial and venous disease (e.g., arterial and venous ulcers). From an International Classification of Diseases 9 (ICD-9) coding perspective, these cutaneous lesions are divided into “ulcers”—related to an underlying chronic disease—and “wounds” resulting from physical trauma or surgical intervention. We use the term “wound” to encompass both meanings.

Traditionally, wound care procedures were done in the hospital setting, but like many chronic, complex conditions, nonhealing wounds have been usually treated in the outpatient setting since 2000, when the Centers for Medicare and Medicaid Services (CMS) created the hospital-based outpatient payment system with the goal of providing care in complex cases where patients did not require hospitalization. Approximately 1500 specialized hospital-based outpatient “wound centers” across the United States provide standard wound care treatment, as

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* Address correspondence to: Marcia Nussgart, 5225 Pooks Hill Road, Suite 627 south, Bethesda, MD 20814, USA.

E-mail: marcia@woundcarestakeholders.org

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well as numerous therapeutic treatments. Additionally, wound care is provided in patients' homes by home health services and in skilled nursing facilities (SNFs). We postulated that CMS's current methods for allocating resource use fails to identify the financial burden of chronic wounds because the majority of their costs accrue from outpatient services rather than sentinel inpatient events. As a result, the prevalence and the financial burden of chronic nonhealing wounds are not fully appreciated by Medicare policy leaders. Therefore, the goal of this study was to determine the cost of chronic wound care for Medicare beneficiaries in aggregate, by wound type and by setting.

Materials and Methods

Database

The database used for this analysis was the Medicare 5% Limited Data Set for calendar year 2014, and all costs were evaluated for that 1-year timeframe and calculated in 2014 US dollars. Medicare beneficiaries included in the analysis were those enrolled in Medicare Part A or B any time during the year and not enrolled in a managed care plan.

To ensure that we captured the entirety of diagnostic, procedural, and evaluation and management (E/M) codes used in outpatient wound care services, we harnessed the US Wound Registry (USWR). The USWR is a Qualified Clinical Data Registry that collects clinical data from approximately 2,000 wound care clinicians to satisfy the requirements of programs such as the Physician Quality Reporting System, Meaningful Use, and now the Merit Based Incentive Payment System. Participating in the USWR are 129 hospital-based outpatient wound centers in 32 states using an EHR specifically designed for wound care. This EHR internally audits the structured language within the chart to ensure accurate billing of both physician and hospital outpatient charges and transmits data to the USWR for benchmarking. Using this repository, a detailed list of all ICD-9 Clinical Modification (CM) codes with their long descriptors was created, as well as all Common Procedural Terminology codes, and all E/M codes used in the delivery of outpatient wound care. The master list was

reviewed by two authors (Author 3, Author 7) to remove any nonvalid codes, leaving a total of 1814 ICD-9-CM codes and 196 Common Procedural Terminology codes. The diagnosis codes were organized into 12 broad wound categories ([Supplemental Table 1](#)): arterial ulcers, chronic ulcers, diabetic foot ulcers, diabetic infections, pressure ulcers, skin disorders, skin infections, surgical wounds, surgical infections, traumatic wounds, venous ulcers, and venous infections. This list of codes was then applied to the Medicare Limited Data Set.

Determining the Prevalence of Wounds in the Medicare Population

To determine the number of beneficiaries with each type of wound, we searched the primary and up to 24 secondary diagnosis codes (ICD-9) on all Medicare claims data for inpatient and outpatient hospital, SNF, home health agency (HHA), and hospice services. For Medicare Part B Carrier and durable medical equipment claims, we used the specific line level diagnosis codes to identify specific services for wound care.

For each beneficiary, we compiled claims across all the types of services to determine the presence of each wound type. Because beneficiaries could have multiple wounds during the year, we created an overall category that counts the number of beneficiaries with any wound type, and we did not double count beneficiaries with multiple wound types. Prevalence rates were computed as the number of beneficiaries receiving wound care during the year divided by the total number of beneficiaries in the sample. Prevalence rates were calculated by age group (< 65, 65–74, and ≥ 75 years), gender, and type of wound.

Determining Medicare Spending Associated with Wound Care

In most sites of care, Medicare reimburses providers for an episode of care (e.g., an entire hospital stay) during which time multiple diagnoses are identified for a beneficiary. However, it is difficult to determine what portion of the payment is attributable to each of the patient's conditions. Therefore, a methodology must be developed which allows payment to be apportioned among the diagnoses. Previous cost-of-illness studies attribute the total cost of a service to the principal diagnosis only [12], or a

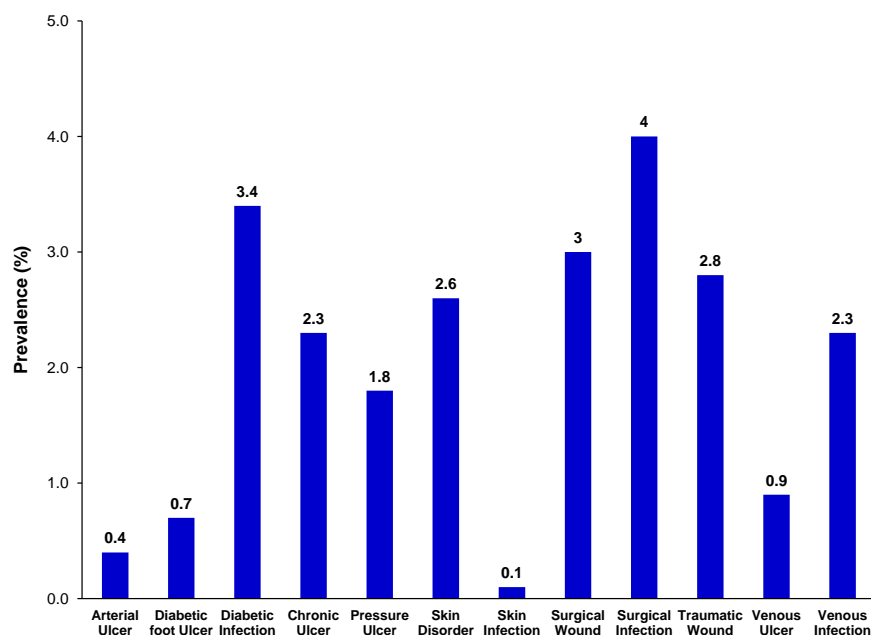


Fig. 1 – Prevalence of wound types in the Medicare population based on 2014 claims data.

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