



Pressure Ulcer Trends in the US 2012-2017

Phoebe B. McAuliffe, BA¹; Eric D. Winter, BS;¹ Ankoor A. Talwar, MBA¹; Abhishek A. Desai, MD¹; Robyn B. Broach, PhD¹; John P. Fischer, MD MPH¹

¹Division of Plastic Surgery, University of Pennsylvania



Introduction

Decubitus ulcers are a morbid, prevalent, and costly condition faced by healthcare systems and patients across the country. They are associated with significant pain and mortality, labor-intensive care, and high recurrence rates.¹ The treatment of pressure ulcers costs \$9.1-11.6 billion per year in the US.^{2,3} Despite the efficacy of preventative measures, pressure ulcers remain prevalent and frequently require complex treatment including reconstructive plastic surgery.⁴ The incidence of decubitus ulcers has been established as a healthcare facility quality indicator, drawing increased attention to this issue. However, there is limited understanding of national trends in pressure ulcer prevalence, and patient characteristics. We examine current patterns and characteristics in the US using the Nationwide Inpatient Sample (NIS) data.

Objectives

- 1) Examine trends in decubitus ulcer prevalence in the US
- 2) Elucidate characteristics of decubitus ulcer patients and how they are changing over time

Methods

- Data was extracted from the Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS) from January 2012 to December 2017
- Patients hospitalized with an ICD-9/ICD-10-defined diagnosis of pressure ulcer were identified
- Clinical, demographic and cost data were collected and analyzed
- Statistical analysis was performed to account for the complex survey design of the NIS database. Population estimates were created by incorporating patient-specific discharge weights.
- Univariate and multivariate logistic regression models were created to assess changes in patient characteristics over time
- All multivariate analysis controlled for hospital teaching status, geographical region, hospital bed-size and hospital ownership

Results

Overall Cohort:

- 3,683,219 discharges with a diagnosis of pressure ulcer were identified from 2012-2017
 - 192.1/100K US population
 - Average annual growth rate was 3.6% per year (**Figure 1**)
- Mean total charges were \$89,082 per discharge
- Mortality rate was 8.2% and average length of stay (LOS) was 10.03 days
- Severity III and IV ulcers accounted for 33.8% of discharges
- 14.3% of patients had a diagnosis of paralysis
- Ulcer locations were:
 - 63.4% sacral area
 - 18.9% multiple
 - 8.7% lower extremity
 - 9.0% other (elbow, head, unknown)

Change over time analysis:

- The proportion of all hospital discharges with a diagnosis of pressure ulcer increased slightly over the study period, from 1.68% to 1.72% (p = 0.016)
- On univariate analysis, over time the proportion of pressure ulcer patients who were male increased. The age of the cohort also decreased (p<0.001) and total charges increased (p<0.001). The percentage of patients identified as each race (white, black, Hispanic, Asian/Pacific islander, Native American, Other) did not change.
- When controlled for age, race and hospital characteristics, there was no change in the proportion of patients insured by Medicare, but proportion insured by Medicaid increased (p<0.001) and private insurance decreased (p=0.002).
- When controlled for payer, race and hospital characteristics, length of stay did not change over time (**Table 1**)

	2012	2013	2014	2015	2016	2017	β, (95% CI)	p-value
Age (years)	70.3 (±17.2)	70.1 (±17.3)	69.8 (±17.2)	69.8 (±17.2)	69.4 (±17.2)	69.4 (±17.1)	-0.072 (-0.091 to -0.053)	< 0.001
Length of Stay (days)	9.8 (±13.5)	9.8 (±13.3)	10.0 (±13.9)	10.1 (±13.8)	10.1 (±13.8)	10.0 (±13.9)	-0.001 (-0.020 to 0.017)	0.893
Total Charges (\$)	74,994 (±139,997)	79,546 (±146,892)	84,041 (±153,969)	87,437 (±158,731)	93,257 (±177,772)	96,983 (±183,001)	3763 (3613 to 3914)	< 0.001

Table 1: Multivariate logistic regression was used to assess changes in the patient cohort over time, controlled for demographic variables and hospital characteristics

Conclusions

- Despite preventative efforts and mitigation incentives by healthcare systems, pressure ulcers are growing in prevalence.
- The most common pressure ulcer location is sacral area, followed by multiple locations and lower extremity
- Over time the decubitus ulcer populations is becoming younger and more male with no change in race distribution
- When controlled for demographic and hospital factors, length of stay remains constant while total charges are increasing

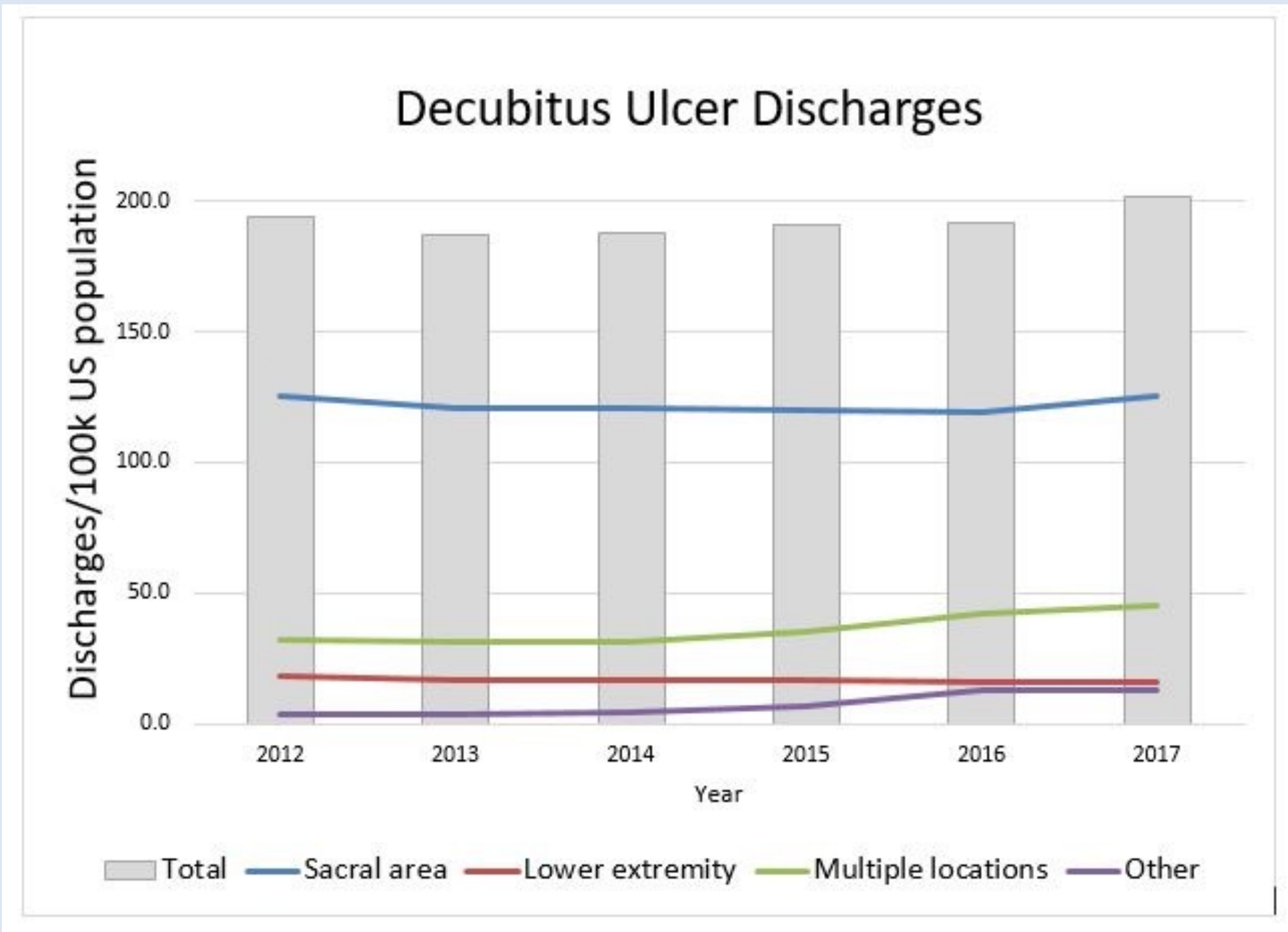


Fig. 1: Annual discharges with a pressure ulcer diagnosis per 100k US population, by location

References

1. Sameem M, Au M, Wood T, Farrokhhyar F, Mahoney J. A systematic review of complication and recurrence rates of musculocutaneous, fasciocutaneous, and perforator-based flaps for treatment of pressure sores. *Plast Reconstr Surg.* 2012;130(1). doi:10.1097/PRS.0b013e318254b19f
2. Brem H, Maggi J, Niernan D, et al. High cost of stage IV pressure ulcers. *Am J Surg.* 2010;200(4):473-477. doi:10.1016/j.amjsurg.2009.12.021
3. Sen CK, Gordillo GM, Roy S, et al. Human skin wounds: A major and snowballing threat to public health and the economy: PERSPECTIVE ARTICLE. *Wound Repair Regen.* 2009;17(6):763-771. doi:10.1111/j.1524-475X.2009.00543.x
4. Veith JP, Collier W, Kim J, Agarwal J, Kwok A. A national analysis of readmissions for wound healing complications following the repair of lower back, hip, and buttock pressure ulcers using the Nationwide Readmissions Database. *Am J Surg.* 2019;217(4):658-663. doi:10.1016/j.amjsurg.2018.12.013