Average Costs of Pressure Injuries for Decision Support

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Introduction

When making financial decisions about the cost / benefit of adverse event prevention or treatment approaches, it is important to have reliable cost figures. Good summary cost information can be very helpful to guide care strategies and focus resources on specific kinds of patients and units where the financial return justifies the cost of the prevention and/or treatment measures being taken.

One very significant category of adverse event that stems from the compromised sacral region blood flow of high acuity patients is Pressure Injuries (PIs). Broadly speaking, PIs can be grouped into two categories: *Full-thickness* and *Partial-thickness*. Full-thickness PIs: a) lead to more care complications, b) are more expensive to treat, c) can cause additional conditions, d) are state reportable and e) sometimes trigger CMS financial reimbursement penalties. For these reasons, full-thickness PIs are worth tracking as a separate category even though their prevalence is significantly lower than partial thickness PIs (8% of the total PIs observed in one 37,000 patient systematic review and meta-analysis of the PI literature were full-thickness[1]).

For the purpose of this cost analysis, full-thickness PIs consist of Stage 3, Stage 4 and Unstageable Pressure Injuries. Partial-thickness PIs consist of Stage 1 and Stage 2 Injuries. Because Deep Tissue Injuries (DTIs) can resolve to different outcomes (including both full-thickness PIs and full healing) and because the treatment of DTIs, although usually more extensive and expensive than the treatments for stage 1 and stage 2 injuries, is closer in cost to stage 1 and stage 2 treatment than to the cost of treating full-thickness PIs, we include DTIs in the partial-thickness PI cost grouping.

The most common type of PIs are sacral region PIs (injuries of the Sacrum, Buttocks and Trochanter amount to 63% of the total observed[1]) and likewise the majority of full-thickness PIs take place in the sacral region.

Full Thickness Pressure Injury Costs

According to Medicare data taken from FY 2007 published in the *CMS Proposes Additions to list of Hospital Acquired Conditions for Fiscal Year 2009* [2]*,* the average cost billed by hospitals for 257,412 reported stage 3 and stage 4 PIs was $43,180. In 2022 dollars that cost is $57,861 per PI (134% higher to adjust for inflation). Per the paper *The High Costs of Stage IV Pressure Ulcers by Harold Brem MD et a*l[3], Acute Care PI costs from FY 2007 Medicare data include the items listed in the table below:

Table II

Costs Previously Associated with Treatment of Pressure Ulcers [25, 27, 32–36]

Component	Costs/Fee
Nursing care	$152–$996/ulcer*
Medications	$350/year to $4,898/hospital stay/patient
Dressings	$93–$7021/ulcer*
Laboratory tests	$733–$1,455/patient
Radiology	$109–$235/patient
Alternating pressure overlays, mattresses	$0.86–$3.57/day‡
Debridement & surgical procedures	$29.33–$344.26/debridement†
Chronic-care bed in Hospital	$280–$600/day

The paper points out that including just these cost factors results in cost totals that are low for Stage 4 Injuries because the costs of treating associated medical conditions are not factored in. According to Dr. Brem's 2010 analysis, these associated conditions add at least $84,005 to the cost of each stage 4 injury ($127,185 observed total cost per stage 4 PI minus the $43,180 direct treatment average cost per stage 3 and stage 4 pressure injury).

Table I

Morbidities Associated with Pressure Ulcers [11, 16–18, 29–31]

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

If you assume that the bulk of the associated medical conditions happen with Stage 4 not Stage 3 PIs, it is possible to use an approximate estimate of the split between stage 3 and stage 4 pressure injuries using historically observed prevalence ratios to calculate an updated average cost that factors in the additional cost of associated medical conditions for stage 4 pressure injuries.

The ratio of the prevalence of stage 4 to stage 3 pressure injuries in the literature is approximately even[1]. Using this to calculate the number of stage 4 pressure injures in the 2007 data gives an estimate of 128,706 out of the 257,412 reported total full-thickness injuries being stage 4 PIs.

Adding in the incremental cost of associated medical conditions for each stage 4 injury and recalculating the total average cost per full thickness pressure injury gives $110,989 in 2022 dollars. This confirms that the commonly quoted cost figure of $70,000 per full-thickness PI prevalent in the pressure injury literature[4] is a conservative estimate of the average cost of a full thickness pressure injury in 2022.

The suggested average cost to use for full-thickness PIs is between $57,861 direct treatment cost per PI and $110,989 for total treatment cost per PI in 2022 dollars.

Partial Thickness Pressure Injury Costs

In a 2006 survey of 90% of all discharges in the US[5], an analysis was done of the relative costs of patients with a) PIs as the primary diagnosis, b) PIs as the secondary diagnosis, and c) patients with no PIs reported. The difference in mean cost per hospitalization between patients with PIs as a secondary diagnosis ($20,400) and those who had no PIs ($9,900) of $10,500 in 2006 dollars ($14,490 in 2022 dollars) is a good estimate of the incremental cost to treat patients with PIs when compared to those who did not have PIs.

In a 2019 paper by William Padua and Benjo Delarmente, *The national cost of hospital-acquired pressure injuries in the United States*[6], it is estimated that 59% of the total cost of PI care is attributable to full-thickness PIs. If you subtract this percentage from the total mean cost of treating patients with PIs, you get an average cost of treating patients with partial thickness PIs of $5,940 per PI in 2022 dollars.

Another report sponsored by the Society of Actuaries' Health Section entitled *The Economic Measurement of Medical Errors*[7] puts the average cost of a Pressure Injury at $10,288 in 2008 dollars. This study matched patient types based on a) procedures performed in the same year, b) similar chronic conditions, and c) same age group and gender between control and injury groups to align the outcomes and make the cost estimates more accurate. The reported average cost of 10,288 per PI in 2008 dollars is the equivalent of $13,271 in 2022 dollars. Using again the 59% estimate for the part of the average cost attributable to full-thickness PIs, the cost per non-full thickness PI is calculated to be $5,441 in 2022 dollars.

As such, a suggested average cost to use for partial-thickness PIs (including DTIs) is between $5,441 and $5,940 per PI.

Other PI costs

In addition to the costs of PIs covered above, there are other costs that are harder to quantify or not captured in this analysis. The short and long-term pain and suffering that PIs cause patients can impact patient and family satisfaction ratings and can negatively impact potential future revenue and the brand and reputation of the hospital where they happen. Also, hospitals are named in lawsuits related to Pressure Injuries in 61.7% of the cases[10]. The odds of a hospital winning a PI related lawsuit is 37.2% and judgements against hospitals for PIs averaged $1,596,705 ± $2,481,178[10]. High HAPI rates can trigger CMS reimbursement rate reductions of 1% if they put a hospital into the worst performing quartile of HAC scores[11].

Source of the majority of full-thickness PIs in high acuity Hospitals

The most common source of full-thickness Hospital Acquired PIs (HAPIs) in high acuity hospitals is typically ICUs[8]. At TurnCare we have seen that in facilities that handle shock patients and unstable patients, up to two thirds of full-thickness facility acquired PIs can originate in the ICUs. In the 2015 paper by Jill Cox, *Vasopressors and Development of Pressure Ulcers in Adult Critical Care Patients*, it is observed that mechanically ventilated patients who are on ventilation longer than 72 hours are 23 times more likely than similar patients not on ventilation or not on ventilation for as long to develop a HAPI[9]. Many of the HAPIs developed by these patients are DTIs or full-thickness HAPIs. Typically, ICUs constitute 10 to 15% of the beds in a larger facility and ventilated unstable patients occupy a significant percentage of those beds.

For these reasons if HAPI prevention efforts are focused on the unstable ventilated patients in ICUs, facilities typically get a very high return on investment by saving significant amounts of cost by focusing on a relatively small group of patients who are most likely to develop the most expensive HAPIs.

Conclusion

It is recommended that facilities use a value of $110,989 per full-thickness PI and $5,940 per partial-thickness PI for average cost calculations based on findings in the literature and adjustments for inflation (2022 dollars). Additionally, it is recommended that facilities focus their HAPI prevention efforts on the ventilated patient populations of their hospitals who represent a small number of patients relative to the total number of beds but who consume a large amount of staff time for care and who are the most likely patients to develop partial and full-thickness pressure injuries. Focusing effective HAPI prevention strategies on these patients will result in large cost savings for facilities and reduce the care burden on critical care staff.

References

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