EPUAP, Dublin, 9 – 11 September 2026

The economics of hospital-wide pressure injury prevention

How to build a business case for a pressure injury prevention programme

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Two decision-making audiences

The economic case for pressure injury prevention (PIP) has to be made twice, to two different audiences that speak two different languages.

UPWARD

Executives, finance, operations

Speak in the currency of constrained capacity.

They are not persuaded by cost per case.

- bed days released: capacity rather than cash
- patient flow and delayed discharge
- litigation exposure
- hospital-acquired complication reporting
- severity concentration – a few cases drive most of the cost

YOU The tissue viability team sits between the two and must speak both languages.

DOWNWARD

Ward nurses, clinical teams

Speak in the currency of predictable work.

Prevention increases nursing workload in the short term.

- prevention changes the character of the work
- planned, protocolised, delegable
- fewer crisis episodes on a short shift
- planned care replaces reactive treatment
- prevention can run on a schedule but treatment can't

The trouble with big numbers

Studies on the national economic burden of pressure injuries always produce dramatic, widely-cited statistics. But are they helpful for hospital-based decision makers?

€ 250 m

per year, all care settings

Gethin et al 2005 

£ 1.4 – 2.1 bn

per year, ~4% of NHS spend

Bennett et al 2004 

$ 26.8 bn

per year, 59% stage 3–4

Padula & Delarmente, 2019 

$ 9.11 bn

per year, public hospitals

Nghiem et al 2022 

National estimates of economic burden do not easily translate into hospital costs

Internal business cases require institution-level estimates. The sequence that follows constructs just such an estimate, parameter by parameter. Each input is drawn from published evidence and conservative values are applied throughout.

1. Model the population

Let's imagine a 300-bed general hospital. This approximates the size of the average European hospital.

STEP 1: POPULATION

Institutional denominators

Bed capacity and annual admissions data are held by every institution and are not subject to dispute

These values determine the scale of all subsequent parameters and convert incidence rates into absolute case counts.

Key to data sources:

- Local data you already hold
- Literature-derived
- From your finance department

Parameter	Value	Result
Beds	300	
Annual admissions	15,000	
HAPI incidence		
Category 3–4 share		
Excess LOS · cat 1–2		
Excess LOS · cat 3–4		
Cost per bed day		

Running total —

2. Incidence

Institutional pressure injury incidence data are frequently subject to under-reporting

STEP 2: INCIDENCE

Case definition and ascertainment

Three distinctions determine this parameter – prevalence versus incidence, hospital-acquired versus present-on-admission, and completeness of category 1 recording.

Reported hospital prevalence ranges from approximately 7% to 23% across Europe and North America. Incidence of new hospital-acquired injury is lower. A conservative value of 4% is applied here.

A low reported rate may indicate under-reporting rather than low incidence.

Parameter	Value	Result
Beds	300	
Annual admissions	15,000	
HAPI incidence	4%	600 cases
Category 3–4 share		
Excess LOS · cat 1–2		
Excess LOS · cat 3–4		
Cost per bed day		

Cases per year	600

3. Severity

The literature consistently shows that a small number of pressure injuries incur most of the costs.

STEP 3: SEVERITY

Distribution of cost by category

Padula and Delarmente attributed 59% of US hospital-acquired cost to stage 3 and 4 injuries. Nguyen et al reported that severe cases constituted 12% of Australian cases and 30% of total cost.

Two health systems and two methodologies yield a consistent finding: cost concentrates by severity.

This supports an intervention objective of arresting progression rather than preventing all incident injury.

Parameter	Value	Result
Beds	300	
Annual admissions	15,000	
HAPI incidence	4%	600 cases
Category 3–4 share	10%	60 cases
Excess LOS · cat 1–2		
Excess LOS · cat 3–4		
Cost per bed day		

Of which category 3–4	60

4. Excess length of stay

Category-specific values are applied in preference to a single aggregate estimate.

STEP 4: EXCESS LENGTH OF STAY

Attributable excess bed days

Graves et al identified a significant independent contribution of pressure injuries to excess length of stay in 2,000 Australian inpatients, while noting that earlier estimates may overstate cost. Dealey et al reported 5–8 additional days for the UK.

A single aggregate value inflates the total. Values of 4 days for categories 1–2 and 10 days for categories 3–4 are therefore applied. This stratification is not provided by the source literature and is stated as an assumption.

Parameter	Value	Result
Beds	300	
Annual admissions	15,000	
HAPI incidence	4%	600 cases
Category 3–4 share	10%	60 cases
Excess LOS · cat 1–2	4 days	2,160 days
Excess LOS · cat 3–4	10 days	600 days
Cost per bed day		
Excess bed days per year		2,760

2,760 excess bed days

Using the excess bed day estimate we can make two very important capacity calculations

CAPACITY

7.6 beds

continuously occupied throughout the year

2,760 / 365. This represents continuous rather than peak occupancy, equivalent to a single eight-bed ward in most hospitals.

FLOW

445 admissions

not accommodated

At a mean length of stay of six days, the excess bed days correspond to 445 admissions that could not happen within existing capacity.

Both metrics express burden in capacity terms rather than monetary terms.

5. Monetary valuation

Distinguish cash-releasing from capacity-releasing savings

STEP 5: COST

Classification of savings

Bed-day cost should be obtained from hospital finance data in preference to published estimates, both for accuracy and to get the finance department involved in your business case.

In publicly funded systems the resulting saving is predominantly capacity-releasing rather than cash-releasing – no budget line is reduced.

Explicit statement of this distinction reduces the headline figure but establishes the credibility of the analysis.

Parameter	Value	Result
Beds	300	
Annual admissions	15,000	
HAPI incidence	4%	600 cases
Category 3–4 share	10%	60 cases
Excess LOS · cat 1–2	4 days	2,160 days
Excess LOS · cat 3–4	10 days	600 days
Cost per bed day	€ 600	€ 1.66m
Annual cost of hospital-acquired injury		**€ 1.66m**

6. Prevention costs and net position

Pressure injury prevention costs applied against a conservatively discounted estimate of avoided burden

STEP 6: THE OFFSET

Discounting of avoided burden

Demarré et al costed pressure injury prevention at €7.88 per at-risk hospitalised patient per day in Flanders, using a bottom-up method inclusive of nursing time.

Assuming 30% of admissions were at risk with a mean six-day stay, hospital-wide pressure injury prevention costs approximately € 213,000 per year.

Chaboyer et al reported a pooled risk ratio of 0.55 for pressure injury prevalence following implementation of prevention care bundles. A relative risk reduction of 45% is applied.

Parameter	Working	Result
At-risk admissions	30% of 15,000	4,500
At-risk patient days	× 6 days	27,000
Prevention cost	× € 7.88	€ 212,760
Burden if 45% averted	45% of € 1.66m	€ 745,200

Avoided burden against prevention spend

€ 745,200 : € 212,760 ≅ 3.5 : 1

7. Sensitivity analysis

Three parameters determine the result so we must vary them across their published or plausible ranges.

Excess Length of Stay

Derived from published literature

2 / 6 days	€ 864,000
4 / 10 days	€ 1.66m
8 / 10 days	€ 2.95m

The conclusion is unchanged when both values are halved.

Incidence

Measurable at institutional level

2%	€ 828,000
4%	€ 1.66m
8%	€ 3.31m

Substitution of institutional incidence data is recommended.

Prevention Effectiveness

Published estimates, ratio of benefit to cost

RR 0.31	5.4 : 1
RR 0.55	3.5 : 1
RR 0.64	2.8 : 1
RR ≥ 1.00	No benefit

0.31 and 0.55 are pooled bundle estimates; 0.64 is an adjuvant dressing trial.

How to build the business case for your own hospital

You need five inputs, three conversations and one number.

1	Your incidence	Institutional data	Confirm whether prevalence or incidence is reported, and whether present-on-admission cases are separated.
2	Your severity split	Institutional data	A category 3–4 proportion below 10% may indicate inconsistent staging rather than low severity.
3	Excess bed days	Published literature	Graves et al and Dealey et al provide the evidence base. Category-specific stratification of 4 and 10 days is an assumption.
4	Cost per bed day	Finance department	Institutional values should be used in preference to published estimates.
5	Prevention cost	Literature, then institutional	€ 7.88 per at-risk patient per day may be applied pending institutional costing.

An institution-specific estimate of excess bed days provides the basis for an internal business case.

Limitations of the evidence base

Each limitation is stated with the direction of its likely effect on the estimate.

SCOPE OF COSTING

The model values excess bed days only. Treatment costs — dressings, debridement, theatre time and extended nursing input — are excluded, and scale more steeply with category than length of stay does.

Underestimates burden

EFFECTIVENESS EVIDENCE

The pooled risk ratio of 0.55 is from five non-randomised studies at high risk of bias, certainty graded very low, with a prediction interval of 0.05–5.64. Randomised evidence at programme level is non-significant.

Uncertain in both directions

ENDPOINT ALIGNMENT

The effectiveness estimate is measured on pressure injury prevalence. It is applied here to incident cases across all categories, including category 1, which the source studies did not isolate.

Uncertain

STATED ASSUMPTIONS

Bed capacity, admissions, bed-day cost and the stratification of 4 and 10 excess days by category are assumptions of this analysis rather than published values. Each is varied in sensitivity analysis.

Conservative where tested

No hospital-perspective budget impact analysis of a complete pressure injury prevention programme has been published to ISPOR standards in a European setting. The gap is in the published literature, not in the method.

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