



An Australian Government Initiative

The cost of hospital-acquired complications for older people with and without dementia

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Translating dementia research into practice



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Nursing costs

1/3rd hospital budget (Watts 2000)

Patients over age 65 take up

1/3rd - 1/2 of hospital bed days (Garling, 2008, AIHW 2011)



Table 3 Evidence of association between the four key complications and nursing work environments

Study	Sample	Location and data time frame	Characteristics of nursing work environments (independent variable)	Patient complication (dependent variable)
Cimiotti ²²	161 hospitals 1 571 068 patients 7076 nurses	USA 2006	Lower levels of burnt out (a) nurses	Lower rates of urinary tract infection
Needleman <i>et al</i> ¹⁸	799 hospitals 6 million+ patients	USA 1997	Higher levels of total nurse staffing	Lower rates of urinary tract infection
Cho <i>et al</i> ²³	232 hospitals 124 204 patients	USA 1997	Higher proportions of RNs (b)	Lower rates of pneumonia
Kovner <i>et al</i> ²⁴	187 hospitals	USA 1990–1996	Higher RN hours per patient day	Lower rates of pneumonia
Pappas <i>et al</i> ²⁵	2 hospitals 3200 patients	USA 2007	Higher RN hours per patient day	Lower rates of pneumonia
Kane <i>et al</i> ¹¹	Systematic review 96 studies	USA 2006	Higher proportions of RN per patient day	Decreased OR of hospital-acquired pneumonia
Twigg <i>et al</i> ²⁶	3 hospitals 236 454 patients 150 925 nurses	Australia 2000–2004	Refined staffing model (c)	Lower rates of pneumonia Lower rates of delirium
Schubert <i>et al</i> ²⁷	8 hospitals 779 patients 1338 nurses	Switzerland 2003–2004	Implicit care rationing (d)	Predicted higher levels of pressure ulcers
Horn <i>et al</i> ²⁸	82 RACF 1376 residents	USA 1996–1997	Higher RN direct time per resident per day	Lower rates of pressure ulcers
Pekkarinen <i>et al</i> ²⁹	66 RACF 724 nurses	Finland 2002	Increased time unit pressure (e)	Higher rates of pressure ulcers
Hickey <i>et al</i> ³⁰	35 RACF Patient assessment files Staffing data	USA 1998–1999	Lower skill mix (less RNs)	Higher rates of pressure ulcers



Research questions

- **What are the rates of nurse-sensitive, hospital-acquired complications for older patients?**
- **Is there a difference between dementia and non-dementia patients?**
- **What is the cost?**



Method

- **NSW public hospital overnight discharge data 2006/07**
- **Ages 50+**
- **Patient level, complication specific risk-adjustment**
- **12 potentially preventable, nurse-sensitive complications**



UTI					
ICD-10 Secondary Diagnosis Inclusions	N390		T835		
ICD-10 Principal Diagnosis Exclusions	N390		T835	>=A40 AND < A42	A499
PRESSURE ULCER					
ICD-10 Secondary Diagnosis Inclusions	L89				
ICD-10 Principal Diagnosis Exclusions	L89				
PNEUMONIA					
ICD-10 Secondary Diagnosis Inclusions	J690	J959	J958	J182	>=J14 AND < =J156
ICD-10 Principal Diagnosis Exclusions	>=J12 and <=J129	J13	>=J14 AND < =J156	J158	J159
DVT					
ICD-10 Secondary Diagnosis Inclusions	I802	I268	I269		I828
ICD-10 Principal Diagnosis Exclusions	I802	I268	I269		I828
ULCER/GASTRITIS/UGI BLEEDING					
ICD-10 Secondary Diagnosis Inclusions	>=K25 AND <=K253	K259	>=K26 AND <=K263	K269	>=K27 AND <=K273
ICD-10 Principal Diagnosis Exclusions	>=K25 AND <=K253	K259	>=K26 AND <=K263	K269	>=K27 AND <=K273
SEPSIS					
ICD-10 Secondary Diagnosis Inclusions	>=A40 AND <42	A499			
ICD-10 Principal Diagnosis Exclusions	>=A40 AND <42	A499	>=D80 AND <=D89.9	M359	>=B20 AND <= B24
SHOCK/CARDIAC ARREST					
ICD-10 Secondary Diagnosis Inclusions	I460	I461	I469	R579	R570
ICD-10 Principal Diagnosis Exclusions	I460	I461	I469	R579	R570
CNS COMPLICATIONS					
ICD-10 Secondary Diagnosis Inclusions	R402	R401	F059		F4488
ICD-10 Principal Diagnosis Exclusions	R402	R401	F059		F4488
SURGICAL WOUND INFECTIONS					
ICD-10 Secondary Diagnosis Inclusions	T793		T814		
ICD-10 Principal Diagnosis Exclusions	T793		T814		
PULMONARY FAILURE					
ICD-10 Secondary Diagnosis Inclusions	J182	J81	J951	J952	J960
ICD-10 Principal Diagnosis Exclusions	J182	J81	J951	J952	J960
PHYSIOLOGIC/ METABOLIC DERANGEMENT					
ICD-10 Secondary Diagnosis Inclusions					
ICD-10 Principal Diagnosis Exclusions	E1110	E1111	E1010	E1011	E15

Needleman Approach

ICD10 codes for patient adverse outcomes that are potentially sensitive to nursing

(International Classification of Disease 2010)

Table presented with thanks to Barbara McCloskey 2010

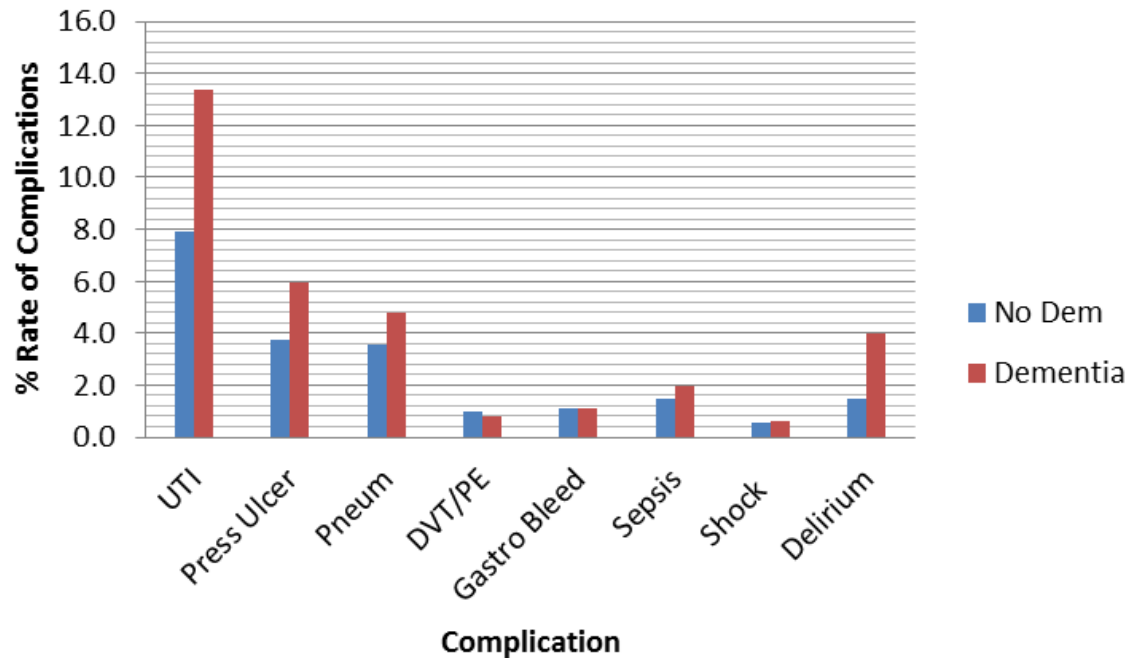


Complication	Inclusion criteria Any secondary diagnosis of	Exclusion criteria Any primary diagnosis or major diagnostic category (MDC) of
<i>Urinary tract infection</i>	Urinary tract infection, non-specified site Infection and inflammatory reaction due to implant, prosthesis and graft in urinary system	Urinary tract infection, non-specified site Infection and inflammatory reaction due to implant, prosthesis and graft in urinary system Streptococcal sepsis, other sepsis Bacterial infection, unspecified Kidney and urinary tract (MDC) Female reproductive system (MDC) Pregnancy, childbirth and puerperium (MDC) Newborn and other neonates (perinatal period; MDC)
<i>Pressure ulcer</i>	Decubitus ulcer and pressure area	<i>Any primary or secondary diagnosis of:</i> Pregnancy Abortion Decubitus ulcer and pressure area Skin, subcutaneous tissue and breast (MDC)
<i>Pneumonia</i>	Pneumonitis due to solids and liquids Post procedure respiratory disorder, unspecified Other post procedural respiratory disorders Hypostatic pneumonia, unspecified Pneumonia, haemophilus influenza and bacterial	<i>Any primary or secondary diagnosis of:</i> Hemi/quadruplegia Viral pneumonia, not elsewhere classified Pneumonia due to <i>Streptococcus pneumoniae</i> Bacterial pneumonia due to flu Other bacterial pneumonia Bacterial pneumonia, unspecified



Demographics

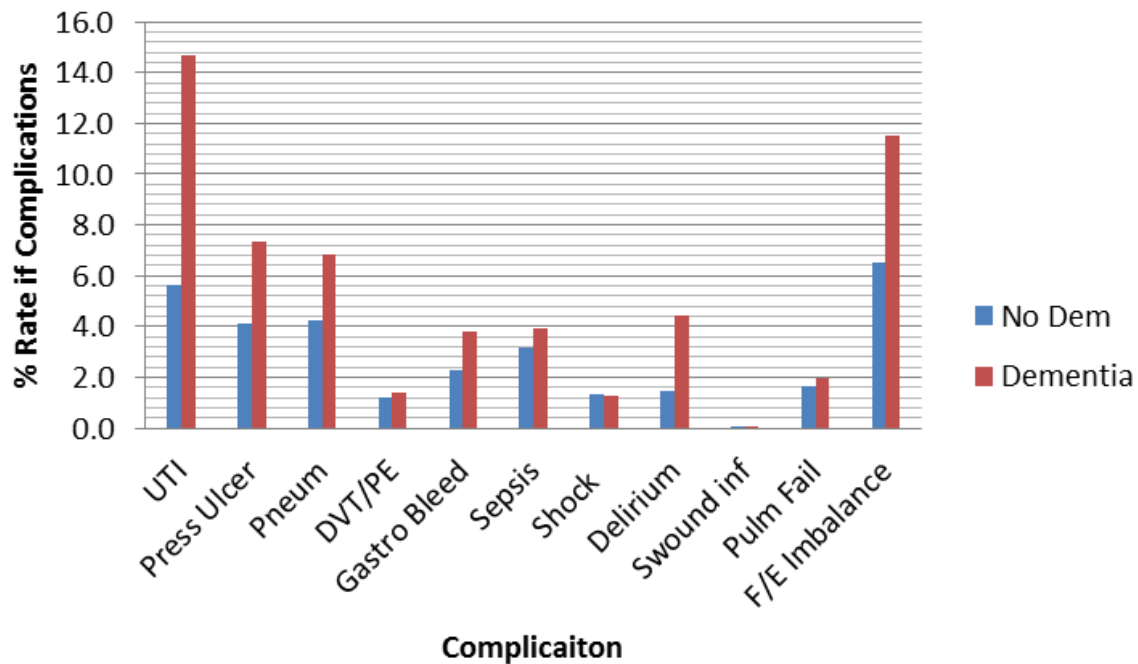
	Dementia	No dementia
Mean age	82	70
Mean LOS	10.9	7.1
Mean Charlson Index	0.9	1.0
Complication rate	21.9%	8.8%
Population	44,488	381,788



Surgical Patients




Medical Patients





Calculating costs

- **Using Patient Length of Stay**
- **Comparing to state average for the DRG**
- **Examining 4 complications with highest RR for dementia patients**





Table 1 Calculations to estimate cost[^]

Patient DRG	Data source	Fractured Neck of Femur, +c/c
Fixed costs (estimated)	State data	\$670
Variable costs (estimated)	State data	\$6,570
Average length of stay for the DRG	State data	8 days
Daily variable cost	State data	$\$6,570 / 8 = \820
Actual length of stay	Study data	11 days
Actual estimated cost	Study data * State data	$11 * \$820 + \$6700 = \$9690$
<i>If patient length of stay is above the average for the DRG:</i>		
Extra length of stay	Study data – State data	$11 - 8 = 3 \text{ days}$
Extra cost	Study data * State data	$3 * \$820 = \2460

[^]Example uses Fractured Neck of Femur with complication and/or comorbidity (+c/c) (DRG I78A), figures rounded to reflect estimation status.

DRG = Diagnostic Related Group.

State data = all ages overnight NSW public hospital episodes.

Study data = 50+ overnight NSW public hospital episodes.

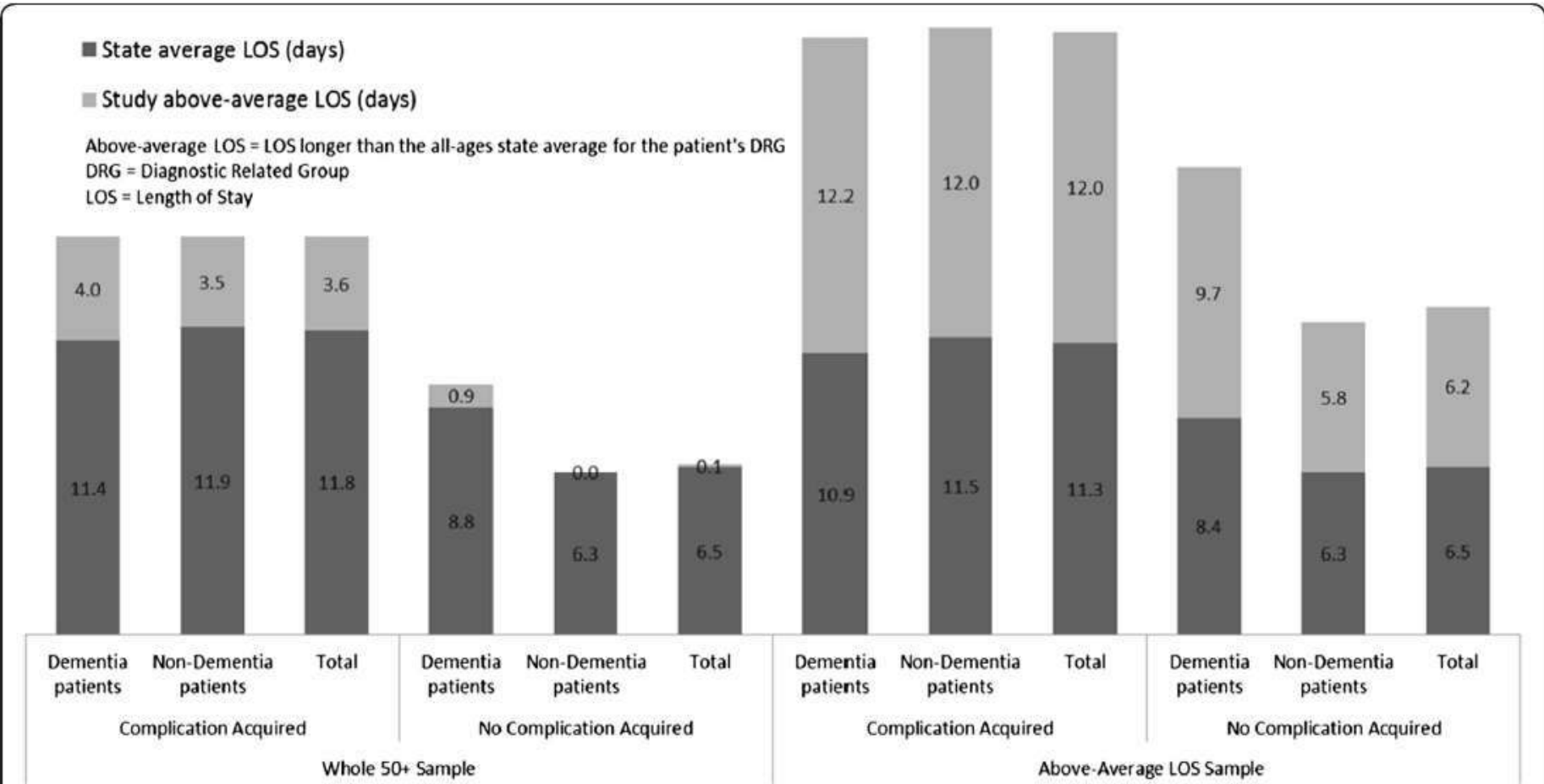
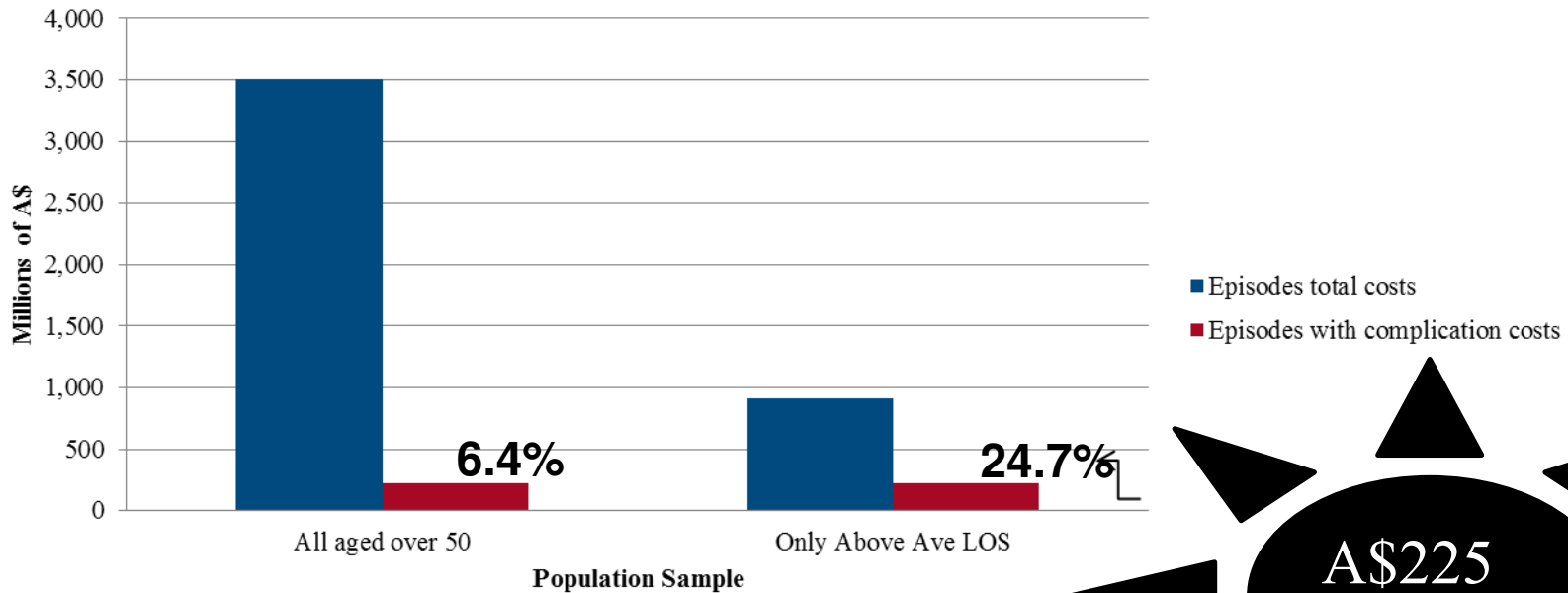


Figure 2 Comparison of samples, comparing dementia and complication status.



Cost of complications

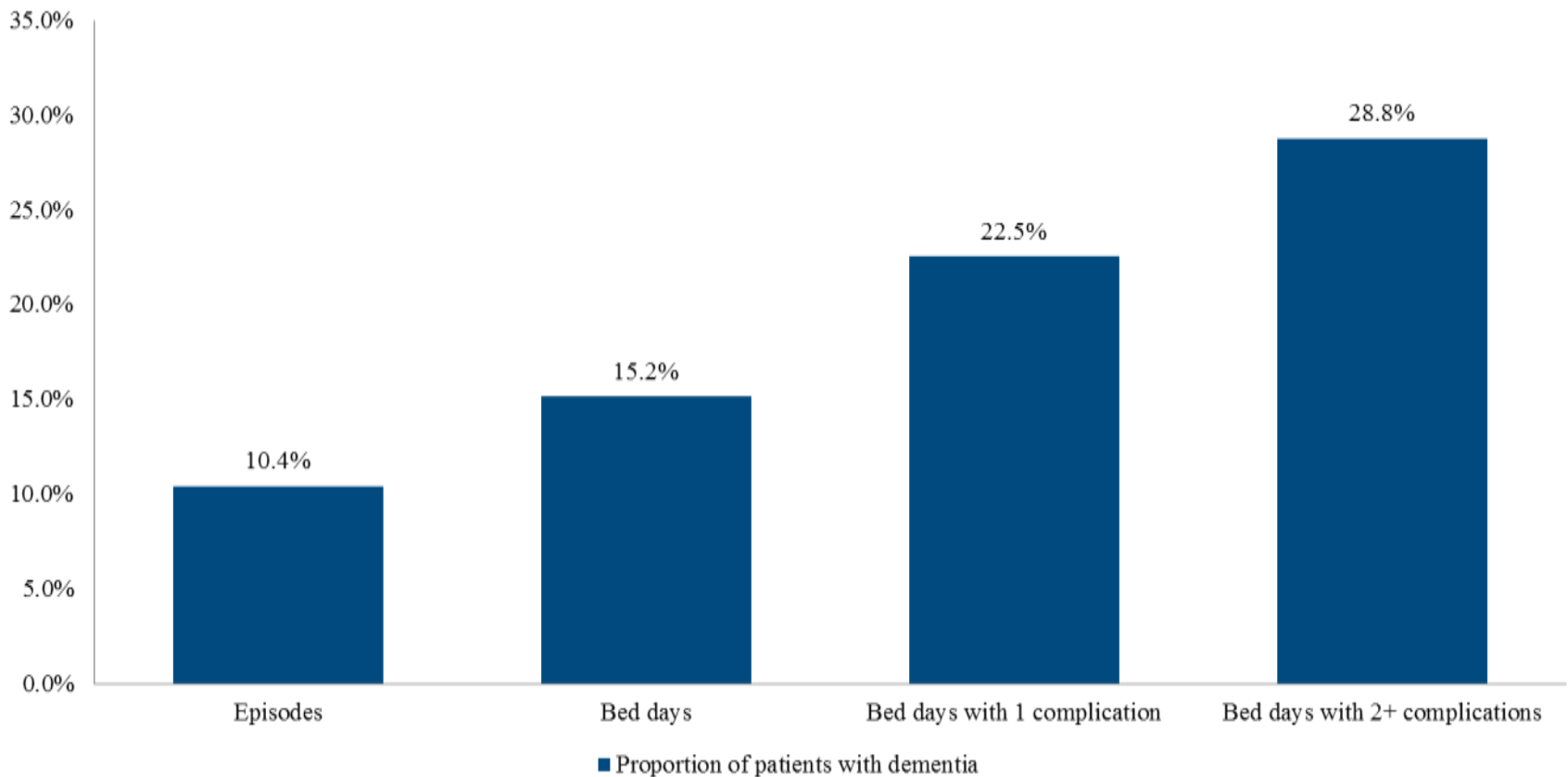
Proportion of total cost



A\$225 Million



Dementia and complications





In conclusion:

- **These are potentially preventable complications**
- **They are associated with 1/4 extra LOS costs**
- **May be associated with:**
 - **Nurse staffing, skill mix**
 - **Multidisciplinary models**



Future considerations:

- **Consider dementia when considering complications, and vice versa**
- **Accept higher risk means need for higher prophylaxis**
- **Consider nursing as an intervention, rather than labour**



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Research



Potentially preventable complications of urinary tract infections, pressure areas, pneumonia, and delirium in hospitalised dementia patients: retrospective cohort study

Kasia Bail,¹ Helen Berry,² Laurie Grealish,¹ Brian Draper,³ Rosemary Karmel,⁴ Diane Gibson,¹ Ann Peut⁵



RESEARCH ARTICLE

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The cost of hospital-acquired complications for older people with and without dementia; a retrospective cohort study

Kasia Bail^{1*}, John Goss¹, Brian Draper², Helen Berry¹, Rosemary Karmel³ and Diane Gibson¹