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1 **Associations between cognitive function, hospital admissions and costs in**  
2 **nursing homes: a cross-sectional study**

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30 Running Title: Cognitive function, hospital admissions and costs

31

32 **Associations between cognitive function, hospitalizations and costs in nursing homes: a**  
33 **cross-sectional study**

34 **ABSTRACT**

35 In an Australian nursing home population, associations between cognitive function  
36 and 12-month hospitalizations and costs were examined. Participants with dementia had 57%  
37 fewer hospitalizations compared to those without dementia, with 41% lower mean  
38 hospitalization costs; poorer cognition scores were also associated with fewer  
39 hospitalizations. The cost per admission for those with dementia was 33% greater, due to  
40 longer hospital stays (5.5 days versus 3.1 days for no dementia,  $P=0.05$ ). People with  
41 dementia were most frequently hospitalized for fractures. These findings have policy  
42 implications for increasing investment in accurate and timely diagnosis of dementia and fall  
43 and fracture prevention strategies to further reduce associated hospitalization costs.

44 **Keywords**

45 Dementia, cognitive impairment, hospitalizations, costs, nursing homes

46

## Introduction

47           People living with dementia have significant healthcare needs which impact their  
48 healthcare utilization and associated costs (Bynum et al., 2004; Phelan, Borson, Grothaus,  
49 Balch, & Larson, 2012; Prince, Comas-Herrera, Knapp, Guerchet, & Karagiannidou, 2016).  
50 The estimated worldwide cost of dementia US\$818 billion in 2015, reaching two trillion by  
51 2030(Wimo et al., 2017). In Australia the most recent per capita direct expenditure estimate  
52 was US\$67,000 per year for individuals living in nursing homes(Gnanamanickam et al.,  
53 2018).

54           In high income countries, an estimated 34% of individuals living with dementia live  
55 permanently in nursing homes or residential care(Gnanamanickam, et al., 2018). Between 85-  
56 100% of all direct costs for people living with dementia in nursing homes are attributed to  
57 their cost of care; the remainder is health care utilization(Schaller, Mauskopf, Kriza,  
58 Wahlster, & Kolominsky-Rabas, 2015). The largest contributor to direct healthcare costs is  
59 hospitalizations (Brown, Hansnata, & La, 2017; Gnanamanickam, et al., 2018). For people  
60 living with dementia in Australia, this is estimated to be AUD\$4.8(US\$3.7) billion and these  
61 figures are predicted to rise (Brown, et al., 2017).

62           People living with dementia and those living in nursing homes are at a high risk of  
63 hospitalization (Arendts and Howard, 2010; Gimm and Kitsantas, 2016). Hospitalization for  
64 those living with dementia is often associated with worse outcomes including increased  
65 length of stay, delayed discharge and functional decline during hospitalization (Mukadam and  
66 Sampson, 2011), an increased risk of other complications including urinary tract infections,  
67 pressure ulcers, pneumonia and delirium (Bail et al., 2015) and an increased risk of mortality  
68 (Fong et al., 2012). A complete understanding of patterns of hospitalizations among this  
69 population with dementia or cognitive impairment living in nursing homes is valuable for  
70 policy and program development to optimize resource use, potentially reducing associated

71 costs and improving health outcomes including quality of life. Previous work to address this  
72 gap in knowledge has mainly been conducted in North American populations and few studies  
73 have focussed on the nursing home population (Burton et al., 2001; Daras, Feng, Wiener, &  
74 Kaganova, 2017; Fillenbaum, Heyman, Peterson, Pieper, & Weiman, 2001; Wiener, Feng,  
75 Coots, & Johnson, 2014).

76 In Australia, nursing home care is primarily funded by the Australian Government  
77 through subsidies to approved providers with means tested individual contributions (Grove,  
78 2016). Entry into nursing homes is upon a comprehensive assessment and approval for care  
79 by an Aged Care Assessment Team (ACAT), with universal coverage for care. Providers are  
80 funded to provide care by the government based on assessment of residents with the Aged  
81 Care Funding Instrument (ACFI). While individuals are free to choose their nursing home the  
82 ability to self-select is restricted by availability and unmet need in terms of demand and  
83 supply of spaces in nursing homes (Access Economics, 2011). Similarly admitted hospital  
84 services are also primarily funded by the government through public hospitals and universally  
85 covered through Medicare with options to receive private care in private or public hospitals  
86 (Biggs, 2013).

87 Within the context of predominantly publicly funded nursing home and  
88 hospitalization services, the aim of this analysis was to determine the association between  
89 dementia and cognitive impairment and hospitalizations and costs in a nursing homes  
90 population. We also present the most common diagnostic reasons for hospitalizations in this  
91 population.

92

## Materials and methods

### 93 Study and participants

94 The current study is a secondary analysis of data from participants in the INSPIRED  
95 (INvestigating Services Provided In the Residential care Environment for Dementia) study, a  
96 cross-sectional study of people living in nursing homes in Australia (Dyer et al., 2018).

97 Participants were individuals permanently resident (for 12 months or longer) in 17 not-for-  
98 profit care facilities across 4 states in Australia at a single time point between January 2015  
99 and February 2016. The majority (14 of 17) of the facilities provided specialized dementia  
100 care either as an entire facility or through a specialized unit.

101 The INSPIRED study collected a large range of data including cognitive status,  
102 quality of life, quality of care, functional status, activities of daily living, neuro-psychiatric  
103 symptoms, hospitalization, medical diagnosis etc. The burden on the individual participants  
104 was minimised by collecting data from the facility records and from proxy respondents and  
105 care givers as appropriate. In a total of 1323 potential participants, 903 were eligible to  
106 participate and 541 participated. Reasons for non-participation included busyness of  
107 participant/family member, lack of interest, family members not feeling qualified to respond  
108 on behalf of participant, and lack of return of consent form and questionnaire.

### 109 Variables

110 The outcomes of interest were number of hospitalizations and associated costs.  
111 Hospitalizations were measured retrospectively as the number of hospital separations  
112 (including day separations) during the 12-month period immediately prior to the participant  
113 data collection.

114 Cost of hospitalizations was estimated based on the Australian Refined Diagnosis  
115 Related Groups (AR-DRGs), a clinical classification system developed and used in Australia

116 to reflect clinical practice and hospital resource use (Australian Consortium for Classification  
117 Development, 2016). Each hospital separation was assigned to a specific AR-DRG and  
118 costed using the 2013-14 (Round 18) cost weights produced by the National Hospital Cost  
119 Data Collection (Independent Hospital Pricing Authority, 2016). All costs were reported in  
120 Australian dollars (AU\$) after adjusting to 2016 prices using the implicit price deflator for  
121 the health sector (AIHW, 2016).

122 The main covariates of interest were cognitive impairment and dementia. Cognitive  
123 impairment was measured using the Psychogeriatric Assessment Scales - Cognitive  
124 Impairment Scale (PAS-Cog)(Jorm et al., 1995). The PAS-Cog measures cognitive  
125 impairment on a scale from 0 to 21 with higher scores indicating severe cognitive  
126 impairment. Dementia was defined as having a diagnosis of dementia in the medical records  
127 or a PAS-Cog score of  $\geq 5$  indicating likely dementia (hereafter referred to as dementia).  
128 Formal diagnosis of dementia is low in this setting, so this approach also captures residents  
129 likely to have undiagnosed dementia and better represents the entire population with  
130 dementia in this setting (Lang et al., 2017).

131 The relationships between dementia/cognitive impairment and hospitalizations and  
132 costs were adjusted for age, sex and comorbidities. Comorbidities were measured using the  
133 Cohen-Mansfield index, a count of number of diagnostic disease groups (excluding dementia)  
134 (Cohen-Mansfield, Marx, Regier, & Dakheel-Ali, 2009).

## 135 **Analysis**

136 Descriptive characteristics of the sample are presented as means or proportions.  
137 Proportions of individuals who had at least one hospitalization along with mean costs in the  
138 full sample and the sample who had at least one hospitalization are presented by cognitive  
139 function status.



140 The relationships between dementia or cognitive impairment and hospitalizations and  
141 hospitalization costs were examined using marginalized two-part models. These models  
142 estimate the effects of covariates on the overall marginal mean in highly skewed distributions  
143 while accounting for the probability of zero hospitalizations or costs (Preisser, Das, Long, &  
144 Divaris, 2016; Smith, Preisser, Neelon, & Maciejewski, 2014; Teusner, Smith,  
145 Gnanamanickam, & Brennan, 2017). They provide the opportunity to determine the average  
146 effect of dementia/cognitive status on both the distributions represented by the hospitalization  
147 counts, namely the structural zeroes and the negative binomial counts. This approach was  
148 used in preference to Zero-inflated negative binomial (ZINB) regression models as the model  
149 fit was better (Akaike information criterion (AIC) smaller) than the traditional ZINB or other  
150 two-part models and required no post-processing computations.

151 Odds ratios were generated by logistic regression models (first part). Incidence rate  
152 ratios were calculated using a marginalized zero-inflated negative binomial (second part)  
153 regression. The ratio of mean costs was calculated using log normal regression models.  
154 Statistical significance was based on 95% confidence intervals and, or P-value <0.05.

155 Mean cost and length of hospital stay per hospitalization and a listing of the most  
156 common diagnostic reasons for the hospitalizations are presented as proportions of total  
157 hospitalizations. All statistical analyses were performed using SAS 9.4 (SAS Institute, Cary,  
158 NC, USA).

## 159 **Results**

### 160 **Study participants**

161 A total of 541 individuals with a mean age of 86 years participated in this study  
162 (Table 1). Approximately 75% were female. With respect to cognitive function, 84% had  
163 likely dementia, and almost half the sample had a PAS-Cog score  $\geq 18$  indicating severe

164 cognitive impairment (Jorm, et al., 1995). Mean number of comorbidities excluding dementia  
165 were 3.7. One participant did not provide valid consent to link hospital data and hence  
166 excluded from the analysis. Overall, the mean number of hospitalizations per participant was  
167 0.5 with a mean cost of AUD \$3156.

## 168 **Hospitalizations**

169 Overall, 24% of the study participants (n=131) had at least one hospitalization during  
170 the 12-month study period (Table 2). A significantly lower proportion of those with dementia  
171 had a hospitalization (21%) compared to those without dementia (39%). A higher proportion  
172 of those with no or minimal cognitive impairment (PAS-Cog<4) had a hospitalization (37%)  
173 compared to those with severe cognitive impairment (PAS-Cog>15, 18%). The proportion of  
174 individuals who had a hospitalization did not differ significantly by age, sex, or current  
175 marital status (Not tabulated).

176 Participants with dementia had lower odds of hospitalization than those without (adjusted  
177 OR: 0.43, 95% CI 0.27, 0.71; Table 3). Those with worse cognitive impairment as indicated  
178 by the PAS-Cog score also had reduced odds of hospitalization (adjusted OR: 0.96, 95% CI  
179 0.94, 0.99).

180 Participants with dementia had 57% fewer hospitalizations compared to those without  
181 dementia (adjusted incidence rate ratio: 0.43, 95% CI 0.27, 0.69) (Table 3). Similarly, for  
182 each unit increase in the PAS-Cog score (indicating worse cognitive function), participants  
183 had 5% fewer hospitalizations (adjusted incidence rate ratio: 0.95, 95% CI 0.93, 0.97).

184 The rate of hospitalizations among individuals with no dementia (91/100 person-years  
185 vs 54/100) and no or minimal cognitive impairment (92/100 person-years vs <65/100) was  
186 higher (Figure 1). The mean length of stay per hospitalizations for those with dementia, was  
187 higher (5.5 days dementia versus 3.1 without dementia (P=0.05); 4.3-7.9 cognitive

188 impairment versus 3.4 (95% CI 2.4-4.4) no cognitive impairment; Figure 1). The mean length  
189 of stay though highest for individuals with mild cognitive impairment was not significantly  
190 higher compared to any of the other groups.

## 191 **Costs**

192 The unadjusted mean of total hospitalization cost per individual was approximately  
193 \$3200 in the total sample. Among those hospitalized at least once, the mean cost per  
194 individual was approximately \$13100 (Table 2). As there were fewer hospitalizations for  
195 those with dementia, the costs of hospitalizations per resident on average over 12 months  
196 were higher for those without dementia (\$4849, 95% CI 2748-6951 versus \$2830, 95% CI  
197 1976-3684 for those with dementia) and for those with no or minimal cognitive impairment  
198 (\$4519, 95% CI 2585-6453 versus \$2369, 95% CI 1439 - 3298 severe cognitive impairment)  
199 (Table 2). The mean costs per unit hospital admissions were significantly higher for those  
200 with dementia (\$15,783 versus \$10,478 without dementia, P=0.005; Figure 1), and moderate  
201 to severe cognitive impairment (\$15,153 versus \$10,018 no cognitive impairment).

202 Considering the overall costs incurred per participant, those with dementia had 41%  
203 lower mean costs compared to those without (adjusted ratio of mean costs: 0.59, 95%CI 0.36,  
204 0.98; Table 3) due to the fewer hospitalizations in this group. Adjusted hospitalization costs,  
205 though 3% lower for each unit increase in PAS-Cog score (indicating worse cognitive  
206 function), were not statistically significantly lower per single unit change in score.

207 The most common primary reasons for hospitalizations in the dementia group were  
208 for musculoskeletal system and connective tissue disorders (19%, Figure 2). These were  
209 predominantly fractures (14%) with 9.1% of hospitalizations likely to be hip fractures  
210 (fractures of the femur). Among those without dementia, the most common reasons for

211 hospitalization were digestive system disorders (17%). These were predominantly attention to  
212 artificial openings, accounting for 10% of hospitalizations.

## 213 **Discussion**

214 In an Australian nursing home population, there were fewer hospitalizations in  
215 individuals with dementia. Consistent with this, there were lower hospitalizations for those  
216 with worse cognitive function. This study confirms previous findings that hospitalizations for  
217 those living with dementia are reduced, even in a country with universal healthcare coverage.  
218 In addition, for individuals with dementia the mean cost per hospitalization was more than  
219 50% higher than for those without dementia. The higher costs per hospitalization were  
220 reflected in the longer length of hospital stay among individuals with dementia and cognitive  
221 impairment, specifically the group with mild cognitive impairment.

222 This study builds upon and strengthens previous findings in populations living in  
223 nursing homes or residential care. Two US studies have demonstrated lower rates of  
224 hospitalization for high care residents with dementia and residents with cognitive impairment  
225 in different care settings (Burton, et al., 2001; Wiener, et al., 2014). A third study that  
226 examined hospital use across dementia severity found a lower probability of hospitalization  
227 amongst those with advanced dementia living in ‘institutions’ (Fillenbaum, et al., 2001). This  
228 study also reported lower hospitalization costs for those with more severe dementia  
229 (Fillenbaum, et al., 2001). Length of stay was similar between those with and without  
230 dementia in one study (Burton, et al., 2001) but decreased with worsening stages of dementia  
231 in another (Fillenbaum, et al., 2001). Our study confirms the previous findings with a  
232 definition of dementia that includes recent cognitive assessment, to capture individuals with  
233 likely dementia, to address the under diagnosis of dementia in this setting (Dyer,  
234 Gnanamanickam, Liu, Whitehead, & Crotty, 2018; Lang, et al., 2017). Sensitivity analysis

235 defining dementia only based on recorded diagnosis and defining dementia based on  
236 dementia diagnosis and or severe cognitive impairment ( $\text{Pas-Cog} \geq 16$ ) showed similar  
237 results (Supplementary Tables 1 and 2). The findings of this study also confirms previous  
238 reports of lower hospitalizations for people living with dementia in a non-US industrialized  
239 country with universal coverage for health care.

## 240 **Policy Implications**

241 The reasons for the lower rate of hospitalizations in those with cognitive impairment  
242 or dementia are varied, all with significant policy implications. It is possible that those living  
243 in nursing homes have a different profile of non-cognitive conditions associated with an  
244 increased chance of hospitalization. Our analysis adjusts for the number of other  
245 comorbidities, but does not take into consideration the relative severity of different disease  
246 profiles nor their relative contribution to the likelihood of hospitalization. The primary  
247 diagnostic reasons for hospitalization for those with dementia is consistent with findings from  
248 previous studies i.e., the most frequent reasons for hospitalizations were fractures, including  
249 hip fracture, most likely due to falls and other dementia related conditions such as  
250 convulsions (Toot, Devine, Akporobaro, & Orrell, 2013). Fractures are a major cause of  
251 morbidity and mortality in this population, thus implementing policies to reduce fractures in  
252 this population can both improve resident outcomes and further reduce costs (Dyer et al.,  
253 2016). There has recently been a global call to action to improve care and management of  
254 fragility fractures and this is particularly relevant in this population (Dreinhöfer et al., 2018).

255 A recorded diagnosis of dementia may result in better quality of care and primary  
256 healthcare leading to better management of symptoms and comorbidities, reducing the need  
257 for hospitalization. Furthermore, individuals with dementia may be prescribed less intense  
258 treatments and fewer interventions, which might reduce hospitalizations (Liu et al., 2017;

259 Rao, Suliman, Vuik, Aylin, & Darzi, 2016). Both of these can be achieved through adequate  
260 policy measures.

261 A number of the people living with dementia in this study resided in homes providing  
262 specialized dementia care. Well managed specialized care for people with dementia has the  
263 potential to provide savings in reduced hospitalizations (McCormick et al., 2001). Those with  
264 dementia or worse cognition are also more likely to have advanced care directives which  
265 request reduced transfers to hospital (Martin, Hayes, Gregorevic, & Lim, 2016; Street,  
266 Ottmann, Johnstone, Considine, & Livingston, 2015).

267 In Australia, potentially preventable hospitalizations (i.e. those that can be prevented  
268 with better primary care) defined by the AIHW include 22 chronic, acute or vaccine  
269 preventable conditions (Australian Institute of Health and Welfare, 2016. Overall in this  
270 study, the rate of potentially preventable hospitalizations was 7% ), below the national  
271 benchmark of 8.5% (Gnanamanickam, et al., 2018). Local and national policies that provide  
272 funding to increase access to specialized dementia care units are required in order to benefit  
273 from the reduced hospitalizations and costs observed in this study.

274 Understanding the patterns of hospitalization can enable better planning for  
275 interventions and services by government and providers to reduce and better manage  
276 hospitalizations in nursing home populations. Residents living with dementia have lower  
277 hospitalization rates and hence lower costs on average, however costs per unit admissions are  
278 higher for those with impaired cognition, due to the longer duration of hospital stay in this  
279 group. As the predominant reasons for hospitalization in this population are fractures, this  
280 study provides support that investment in policies to reduce falls and fractures in this  
281 population can both improve resident outcomes and further reduce costs (Dyer, et al., 2016).

282

## 283 **Strengths and Limitations**

284           The study spans several Australian states enrolling a large proportion of individuals  
285 with dementia. Whilst these individuals include only a small proportion people living in  
286 nursing homes in Australia, it is the second largest study in terms of participating facilities in  
287 Australia and the sample is generally similar to the wider population of individuals living in  
288 nursing homes in Australia (Gnanamanickam, et al., 2018). However, the study population is  
289 only representative of people living in facilities for 12 months or more and that are not under  
290 immediate palliative care. Thus, these data do not capture mortality or the costs associated  
291 with end-of-life care.

292           Our study included several organizations that have expertise in the care of residents  
293 with dementia. While other studies have examined the associations between cognitive  
294 function and hospitalizations, this study examined the independent association of both  
295 cognitive impairment and likely dementia in the same population. Likewise, we have  
296 examined both hospitalization rates and costs per individual and costs per hospitalization.  
297 While reporting hospitalizations provides an understanding of overall hospital service use,  
298 reporting of costs provides an understanding of the financial impact of hospital use in this  
299 population. Reporting costs per hospitalization has highlighted the inverse differences in the  
300 unit cost of care between the two groups.

301           The hospital utilization data in this study was obtained through linkage of individuals  
302 to administrative data. While these data have been used routinely to measure hospital use in  
303 health services research there may be under reporting due to less than 100% participation by  
304 private hospitals in the hospital data collections. As the study is cross-sectional the possibility  
305 that unmeasured factors could have a confounding effect on the observed associations  
306 remains.

307 This analysis has used marginalized two-part regression models to study adjusted  
308 relationships for both hospitalizations and their costs. These models accommodate highly  
309 skewed hospitalization and cost data thus giving a population level perspective of hospital  
310 use capturing both users and non-users of hospital services unlike previous studies. This is  
311 important for drawing policy conclusions on the entire population of individuals living long-  
312 term in nursing homes and enables the use of these rates and costs in healthcare expenditure  
313 modelling. However, these are not hierarchical models and hence the effects of facility level  
314 characteristics were not assessed.

### 315 **Conclusion**

316 This study demonstrates that in a country with a universal healthcare, there were  
317 fewer hospitalizations among those with worse cognitive function including those with likely  
318 undiagnosed dementia. However, the cost per hospitalization was higher. The most common  
319 reason for hospitalization for those with dementia was fractures. Given the high prevalence of  
320 people with dementia or cognitive impairment in nursing homes, interventions to reduce  
321 fractures in this population are warranted to further reduce the associated hospitalizations and  
322 costs.

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329 INSPIRED study.



330 **Declaration of interest**

331 The Authors declare that there is no conflict of interest.

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339 **Statement of Ethics**

340 Human research ethics approval was obtained from the Flinders University Social and  
341 Behavioural ethics committee (references, 6594, 6732, 6753) and by federal and state  
342 custodians of hospital data: the Department of Veterans' Affairs Human Research Ethics  
343 Committee (reference, E015/014), the SA Department for Health and Ageing Human  
344 Research Ethics Committee (reference, SSA/16/SAH/29), the Department of Health WA  
345 Human Research Ethics Committee (reference, 2015/59), the Queensland Department of  
346 Health (reference, RD006096), and the NSW Population and Health Services Research Ethics  
347 Committee (reference, HREC/15/CIHS/35). Self-consent by patients to participation was  
348 obtained when possible; for participants with more severe cognitive impairment, proxy  
349 consent for participation was provided (usually by a close family member).

350 **Author Contributions**

351 ESG was responsible for the preparation of data, analysis of data and drafting of the  
352 manuscript, SMD contributed substantially to drafting of the manuscript, SLH and EL  
353 contributed to analysis and drafting of the manuscript, CW was responsible for intellectual

354 input to the manuscript and MC is the lead investigator of the INSPIRED Study and  
355 contributed to the design of the study and was also responsible for intellectual input of the  
356 manuscript. All authors read, edited and approved the final manuscript.

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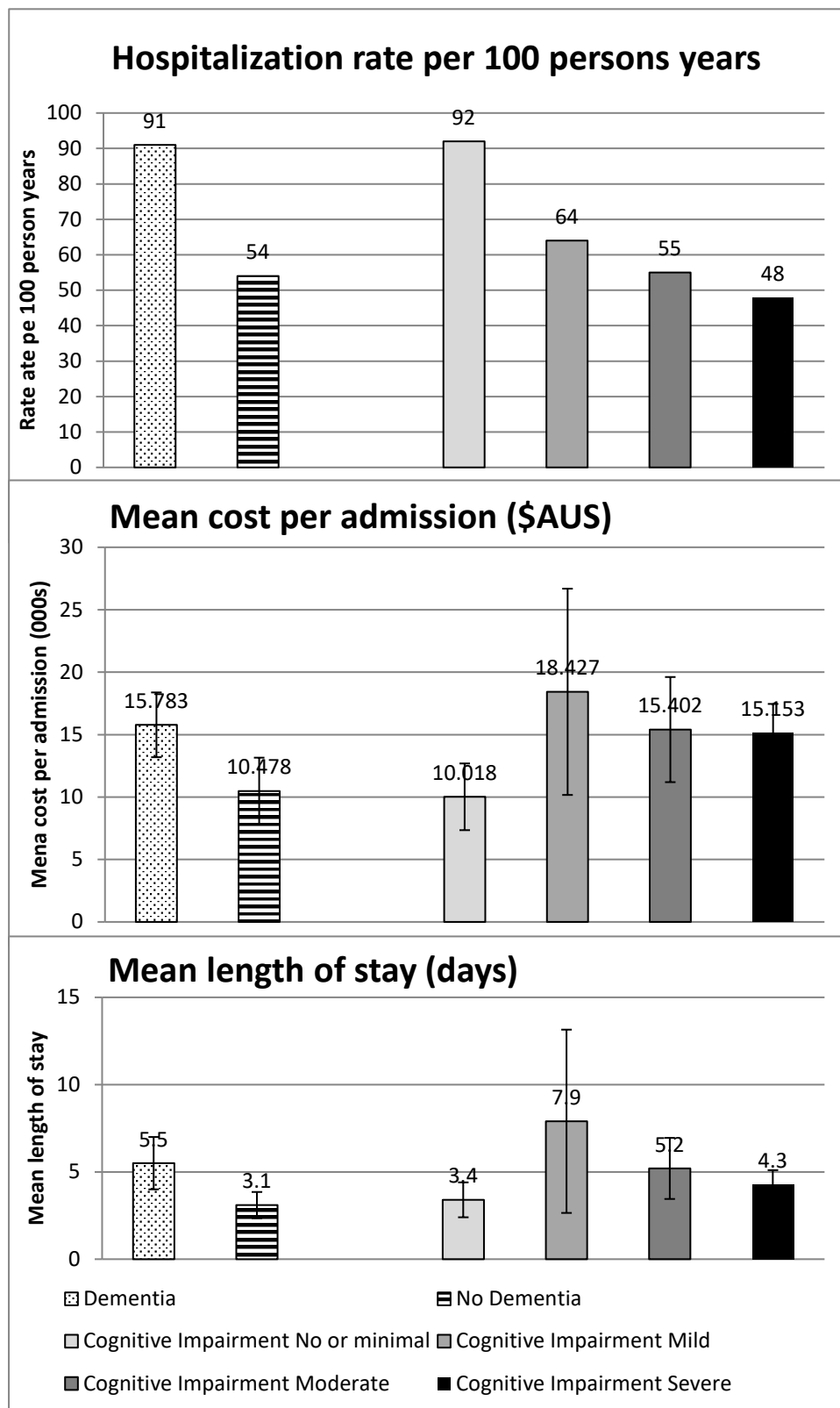
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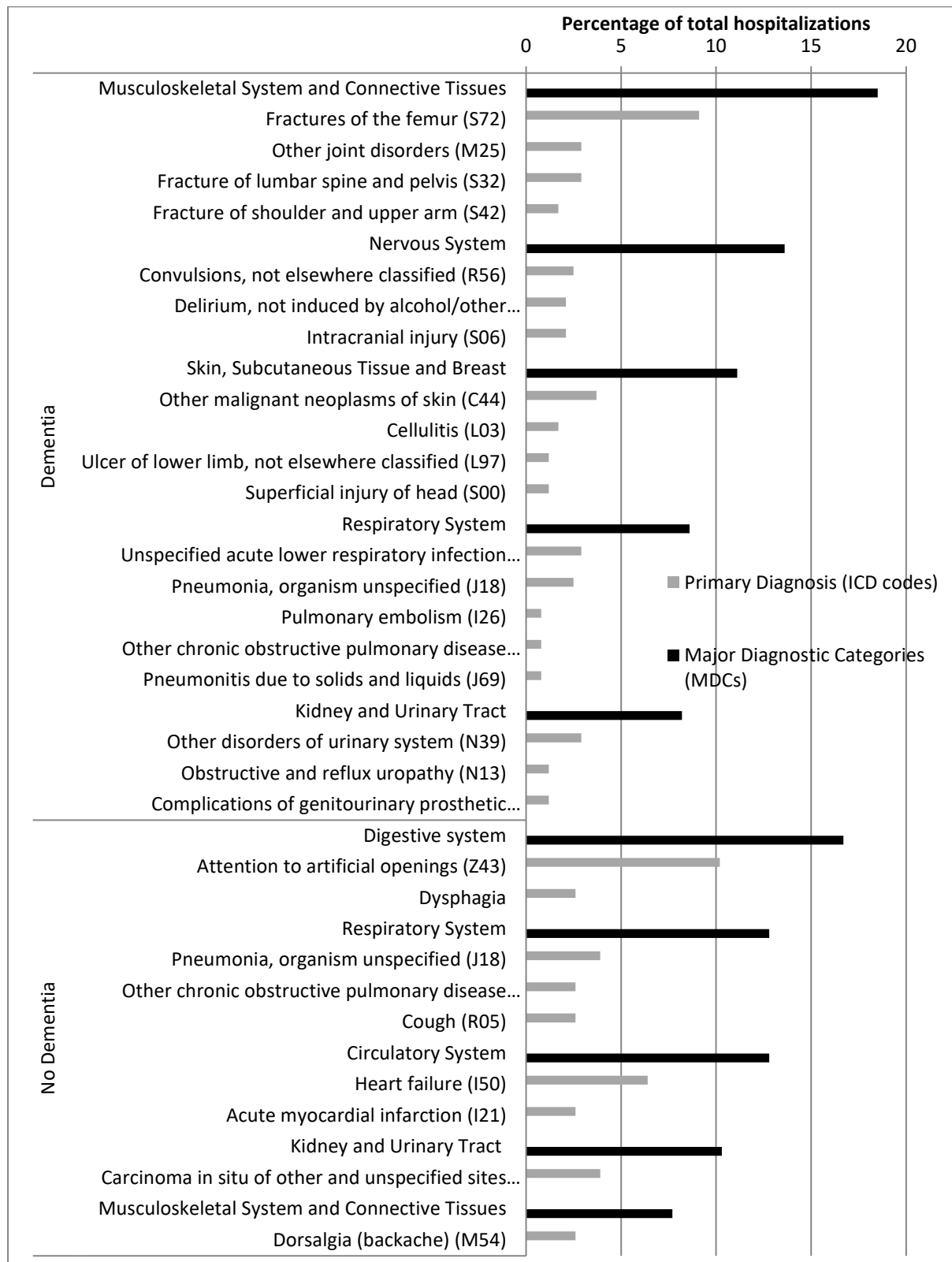
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**Associations between cognitive function, hospitalizations and costs in nursing homes: a cross-sectional study**

**Figure 1 – Admission rate, cost and length of hospital stay (in days) by dementia and cognitive status**



**Figure 2 - Most frequent diagnostic reasons (MDCs and respective primary diagnoses) for hospitalizations by dementia status**



**Associations between Cognitive Function, Hospitalizations and Costs in Nursing Homes: A Cross-sectional Study**

Emmanuel Sumithran Gnanamanickam PhD, Suzanne Marie Dyer PhD, Stephanie Lucy Harrison PhD, Enwu Liu PhD, Craig Whitehead FRACP and Maria Crotty PhD

**Supplementary table 1 – Unadjusted and adjusted association between dementia diagnosis and number and costs of hospitalizations**

	<b>Unadjusted Ratios</b>	<b>P Value</b>	<b>Adjusted Ratios<sup>^</sup></b>	<b>P Value</b>
<b>Predictor variables (reference group)</b>				
<b>Probability of any hospitalizations<sup>a</sup></b>	<b>Odds Ratios</b>		<b>Odds Ratios</b>	
Dementia (No Dementia)	0.52 (0.34, 0.78)	0.0017	0.55 (0.36, 0.84)	0.0058
<b>Probability of fewer hospitalizations<sup>b</sup></b>	<b>Incidence Rate Ratios</b>		<b>Incidence Rate Ratios</b>	
Dementia (No Dementia)	0.52 (0.34, 0.78)	0.0018	0.54 (0.36, 0.81)	0.003
<b>Probability of lower hospitalization costs<sup>c</sup></b>	<b>Ratio of Mean Costs</b>		<b>Ratio of Mean Costs</b>	
Dementia (No Dementia)	0.57 (0.35, 0.93)	0.0238	0.65 (0.41, 1.04)	0.0727



**Supplementary table 2 – Unadjusted and adjusted association between likely dementia (defined as dementia diagnosis and/or severe cognitive impairment (pas-cog $\geq$ 16)) and number and costs of hospitalizations**

	<b>Unadjusted Ratios</b>	<b>P Value</b>	<b>Adjusted Ratios<sup>^</sup></b>	<b>P Value</b>
<b>Predictor variables (reference group)</b>				
<b>Probability of any hospitalizations<sup>a</sup></b>	<b>Odds Ratios</b>		<b>Odds Ratios</b>	
Dementia (No Dementia)	0.53 (0.35, 0.80)	0.0024	0.59 (0.39, 91)	0.0169
<b>Probability of fewer hospitalizations<sup>b</sup></b>	<b>Incidence Rate Ratios</b>		<b>Incidence Rate Ratios</b>	
Dementia (No Dementia)	0.52 (0.34, 0.78)	0.0017	0.53 (0.35, 0.80)	0.0025
<b>Probability of lower hospitalization costs<sup>c</sup></b>	<b>Ratio of Mean Costs</b>		<b>Ratio of Mean Costs</b>	
Dementia (No Dementia)	0.68 (0.42, 1.11)	0.1272	0.75 (0.47, 1.19)	0.2192