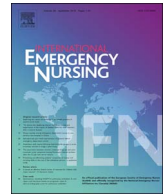




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Planning for the future: Emergency department presentation patterns in Tasmania, Australia

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ABSTRACT

Background: Emergency department crowding and associated adverse outcomes are major issues in health care systems worldwide. The Australian government has highlighted the need to analyse emergency presentations to inform system redesign.

Objective: To describe the profile of emergency department presentations by Tasmanian residents to emergency departments over four years, and examine regional variations.

Method: A retrospective analysis of emergency department data for Tasmania's public hospitals over four financial years, 2010–11 to 2013–14, was undertaken. Descriptive statistics were used to identify patterns in Tasmanian state-wide emergency presentations, as well as disparities between Tasmania's three regions (South, North and North-West). Regression analysis was undertaken to test if changes were significant.

Results: State-wide presentations increased by 3.4% (139,352–144,130) over the four years. Regional variations included an increase in presentations of 16% in the South, 5.1% in the North and a decrease of 3.9% in the North-West. Per capita presentations were consistently lowest in the South and highest in the North-West. The South recorded a significant increase in per capita presentations of those aged 75 and over ($p = 0.001$), increasing at a rate of 12.5 per 1000 residents per annum (95% CI 5.8–19.2).

Conclusion: There is regional variation in emergency demand and utilisation in Tasmania. The results indicate that recent increases are predominantly occurring in the South, including in the elderly, and the reasons for this warrant further investigation.

1. Introduction

Increased presentations to Emergency Departments (EDs) contributing to crowding, and its associated adverse outcomes, are major issues in Australia and around the world [1,2]. Unfavourable outcomes of ED crowding include prolonged length of stay in ED for both high and low acuity presentations [3], and increased in-patient mortality [4–6]. Australia experienced a 21% increase in demand for care at public hospital EDs over the five financial years to 2013–14 [7]. The increase in ED presentations is not simply explained by the national population growth rate and aging of the population [8].

Research investigating the probability of an individual's attendance at an ED has highlighted particular groups whom are more likely to attend. In Australia, those living in outer regional, remote and very remote areas, as well as those living in lower socio-economic areas, are more likely to visit an ED than those living in major cities and areas of

higher socio-economic advantage [9]. Older Australians have also been highlighted as being over represented in EDs [9].

These drivers of ED utilisation are particularly relevant in Tasmania where all of the state is classified as either regional or remote [10]. In 2013–14, 34% of Tasmanians were classified as residing in either outer regional, remote or very remote areas, compared to 11% for Australia as a whole [10]. In addition, 32.9% of Tasmanians live in the most disadvantaged quartile of the Socio-Economic Indexes for Areas (SEIFA) index [11]. Of all Australian states and territories, Tasmania has the highest proportion of people aged over 65 years, accounting for 16.8% of the state's population in 2014 [11]. In Australia, both the Commonwealth and Tasmanian governments have highlighted the importance of identifying and analysing sources of ED presentations as a major priority [7,12].

The aim of this study was to describe the profile of presentations to Tasmanian EDs, including regional variations, over four financial years,

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2010–11 to 2013–14. The data would provide information regarding demographics of ED users, acuity and time of presentations, mode of arrival, and discharge destination.

2. Methods

2.1. Study setting

Tasmania is Australia's most Southerly and only Island state with a population of 514,800 (2014) [10]. Between July 2012 and July 2015 Tasmania's acute healthcare system operated as three separate Tasmanian Healthcare Organisations (THOs). These THOs were serviced by four public hospital EDs; Launceston General Hospital (LGH) in THO North, North West Regional Hospital (NWRH) and Mersey Community Hospital (MCH) in THO North-West and Royal Hobart Hospital (RHH) in THO South. Each hospital offers 24 h a day ED services.

2.2. Study design

A retrospective analysis of ED presentations to Tasmania's public hospitals over four financial years (2010–11 to 2013–14) was undertaken. The study was approved by the Tasmania Human Research Ethics Committee (application number H13948).

Data for all patients attending the four public hospital EDs in Tasmania were provided by the Tasmanian State Department of Health and Human Services (DHHS). The DHHS data contains de-identified demographic, administrative and clinical information pertaining to all ED presentations.

In Australia the Statistical Area-level 2 (SA2) code is the base spatial unit used to collect statistics. Collectively the SA2s cover the whole of Australia without gaps or overlaps (average population 10,000) [13]. Patients' places of residence were assigned to one of Tasmania's three regions, South, North or North-West (NW) using SA2 codes. This excluded presentations to Tasmanian EDs by non-Tasmanians, indicating only patterns of ED usage by Tasmanians. Similarly, in sub-group analyses of presentations in a particular region, only residents of that region were counted.

All patients who present to an ED in Australia are assigned one of five possible categories of the Australian Triage Scale (ATS) [14]. ATS 1 represents the most urgent or highest acuity group with ATS 5 representing the least urgent or lowest acuity group. For ease of comparison in this study, triage categories were grouped into ATS 4 and 5 (low acuity presentations (LAPs)) and ATS 1–3 (high acuity presentations).

Data were coded to identify patients who attended the ED in the out-of-hours period. Using a definition applied by Primary Health Tasmania (PHT) [15], out-of-hours included before 8am and after 6 pm on Monday to Friday, before 8am and after 12 pm on Saturday, and all day on Sunday and public holidays.

2.3. Data analysis

Data were obtained for four financial years, July 1st 2011 to June 30th 2014 inclusive. Descriptive statistics were used to compare changes in mode of arrival to the ED, urgency of presentation, in-hours versus out-of-hours attendance and discharge destination. Linear interpolation was applied to annual population estimates obtained from the Australian Bureau of Statistics (ABS) [16] to estimate quarterly populations. These figures were used to calculate per capita presentations for the state as a whole and for each of the three regions by five-year age bands. Linear regression analyses were undertaken to test whether changes in per capita presentations were statistically significant ($p < 0.05$). Data were analysed using R version 3.1.2 and Microsoft Office Excel 2013.

3. Results

3.1. Absolute numbers of presentations to Tasmanian EDs by Tasmanians

The data set initially comprised 580,456 presentations. After excluding presentations by non-Tasmanians, the final data set number was 563,649 (2.9% excluded). Presentations to Tasmanian EDs increased from 139,352 to 144,130 (3.4%) from the first year of the study period (2010–11) to the last (2013–14). Over this time the number of patients presenting to the ED who were subsequently admitted to hospital increased by 23% (29,887–36,807), while ambulance arrivals increased by 11.5% (34,689–38,672). In the four years, high acuity presentations increased by 6.8% (57,558–61,490) while LAPs increased by 1% (81,403–82,242). Presentations in the out-of-hours period remained relatively stable, with 54% of all presentations occurring during this time in the both the first and last years of the study (data not shown).

3.2. Regional patterns

When the data were disaggregated into regions, different patterns emerged (Table 1). Presentations in the South increased each year of the study and recorded a 16% increase over the four-year period, with increases observed across all five-year age bands. Presentations in the North decreased in the second year (2011–12) but recorded an overall increase of 5.1% between the first and final years. Changes in the North-West varied over the study period, and the region recorded an overall decrease in presentations of 3.9%.

The South recorded increases across all levels of acuity with the greatest increase (25%) for LAPs. The North recorded increases of 5% across both high and LAPs, and the North-West recorded an increase in high-acuity presentations (14%) and a comparative decrease in LAPs (–14%). Whilst all regions recorded an increase in ambulance presentations, particularly in the South (20%), the proportion of ED patients arriving by ambulance varied greatly between regions: 35% in the South, 25% in the North and 20% in the North-West in 2013–14.

Thirty-three per cent of all presenters in the South in 2013–14 were subsequently admitted, an increase of 24% over the study period. The proportion of presentations resulting in admission in the North and the North-West equated to approximately one-fifth of all attenders, with increases over the period of 26% and 28%, respectively (Table 1).

3.3. Per capita presentations

When examining per capita presentations, different patterns emerged for each region (Fig. 1). Although absolute numbers of presentations in the North-West fell over the time period, this region consistently saw greater per capita presentations across all age groups than the other two regions. Residents in the North consistently presented at a greater rate than residents in the South.

3.4. Acuity of presentations

When comparing per capita presentations by level of acuity (Figs. 2 and 3) there was further evidence of regional variation. LAPs in the South increased across all age groups (Fig. 2a), with significant increases seen in all age-bands under 60 years ($p < 0.005$). LAPs in those aged under 60 years in the South increased at a rate of 9.9 per 1000 residents per annum (95% confidence interval 7.1–12.7). Conversely, there was a statistically significant decrease in LAPs across the majority of age bands in the North-West (Fig. 2c). High-urgency presentations in the North-West increased at a significant rate in almost all age groups between ages 10–54 years (Fig. 3c). The South recorded increases in high-urgency presentations in some of the older age bands (Fig. 3a). The North recorded increases of 5.4% and 5% in high (Fig. 2b) and low (Fig. 3b) acuity presentations respectively.

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