



## ORIGINAL ARTICLE

## What Are the Main Reasons for Hospital Admissions in Nursing Home Patients?

Warren Connolly<sup>1\*</sup>, Sinead Healy-Evans<sup>1</sup>, Christine Mc Carthy<sup>1</sup>, Hina Butt<sup>1</sup>, Tom Benicio<sup>1</sup>, Tracey Keating<sup>2</sup>, Dermot Power<sup>1</sup>, Joseph Duggan<sup>1</sup> and Chie Wei Fan<sup>1,2</sup>

<sup>1</sup>Mater Misericordiae University Hospital, Dublin, Ireland

<sup>2</sup>St. Mary's Hospital, Phoenix Park, Dublin, Ireland

\*Corresponding author: Warren Connolly, Mater Misericordiae University Hospital, Eccles Street, Dublin 7, Ireland, Tel: +353877636559, E-mail: [warrenconnolly@gmail.com](mailto:warrenconnolly@gmail.com)



### Abstract

Nursing Home (NH) residents are frail, functionally dependent and have a high prevalence of dementia. NH residents who attended the Emergency Department present with advanced disease and are more likely to require admission compared to their community-dwelling counterparts.

The aim of the study was to examine the reasons for admission of NH residents in a region with a NH outreach programme. The findings may help to develop alternative clinical pathways involving early community intervention which may help avert hospital admissions for this cohort.

**Methods:** NH residents from Dublin North Central who required hospital admission over a 12-month period were identified using the hospital electronic patient record. The demographics, frequency of admission, discharge diagnosis, length of stay (LOS) and inpatient mortality were recorded.

**Results:** Three hundred and fifty-six NH residents (140 men and 216 women) had 498 hospital admissions over a 12-month period. The common reasons for admission were infection (n = 197, 40%), falls and fractures (n = 96, 19%), cardiac causes (n = 42, 8%), gastrointestinal complaints (n = 37, 7%) and stroke or transient ischaemic attack (n = 26, 5%). The median LOS was 8 days and infection-related diagnoses accounted for one-third of the total bed-days and falls and fractures for another third of bed days. Forty-three (12.1%) NH residents died as inpatients and the median hospital LOS to death was 6 days (1-90).

**Discussion:** Infection, in particular respiratory infection, and falls were the two most common reasons for hospitalisation in NH residents. A clear pathway including vaccination, management of infection in the NH and rapid access to a community hospital may reduce acute hospital attendance. In severely frail residents, a clear advanced health care directive and skilled educated nursing staff in the NH may allow terminally ill patients to die in their NH.

### Keywords

Emergency, Nursing homes, Older people, Long term care

### Introduction

Nursing Home (NH) residents have multiple co-morbidities with significant functional impairment and a high prevalence of dementia. For unexpected acute deterioration in clinical status, which requires access to diagnostics and further interventions that are not available in the NH, residents may be transferred to the emergency department (ED) for further management [1]. Compared with community living peers, NH residents attending ED were more likely to present with more severe disease, require diagnostics and need admission [2,3]. Older patients including NH residents may present with non-specific complaints; Nemeč, et al. showed that 59% had serious conditions and 6% of them were deceased within 30 days [4]. Infection, fever, hypotension and falls are common causes of NH residents' presentations [2,4,5].

Attendance at ED and admission were associated with deleterious effects. A Canadian study showed that NH residents were three times more at risk of hospital acquired gastrointestinal or respiratory tract infection after a visit to ED compared with the residents who did not visit ED [6]. The NH residents were also more likely to develop further functional decline after acute hospitalization [7]. There are many collaborative programmes to reduce the ED attendance and admission to acute hospitals for NH residents in different countries [8-11].

The number of NH residents is projected to increase by 50% over period from 2006 to 2021 in Ireland [12]. It is important to proactively design health care to meet their medical needs. In Ireland, there are examples of collaboration between the general practitioners, directors of nursing of NH and geriatricians that provide appropriate chronic disease management and care which is delivered in the nursing homes in only a few regions. The main goals are to reduce hospital attendance and promote appropriate end of life care in the NH for severely frail NH residents. At present there is wide variation in the availability of specialist geriatric consultation to the NH across the country. The Dublin North Central has this service since 2009.

The aim of the study was to examine the reasons for admission of NH residents in a region with NH outreach programme. The findings may help to develop alternative clinical pathways involving early community intervention which may help avert hospital admissions for this cohort.

## Methods

The study was set in the ED of the Mater Misericordiae University Hospital (MMUH) which serves a total catchment population of 185,000. The MMUH is a 600-bedded tertiary and acute hospital. The ED also provides acute unselected emergency care for the population age 16 and over for the catchment area. In 2013, there were over 55,000 attendances at the ED. There were 1377 NH beds in the MMUH catchment area from 18 NH facilities during the study period. All the beds in the NH provided 24-h nursing and personal care except for 50 beds which were cared for based on the social model, i.e. they had low or medium dependency. The electronic record of patients was reviewed retrospectively, systematically and manually through each day from 1/1/2013 to 31/12/2013 by two researchers separately. The data were collected twice and reconciled. The NH residents who required inpatient care during the study period were identified from the electronic patient record based on their nursing home address. NH residents from outside the catchment were excluded. NH residents who register using their previous home address were also excluded from the study.

Information collected included age, gender, frequency of admissions in 2013, length of stay (LOS) in ED before admission (hours) and LOS in hospital (days), discharge diagnosis and if they died in hospital. The discharge diagnosis was categorised under infection (respiratory, urinary tract, infection from other source), falls (with and without fractures), cardiac causes, gastrointestinal causes, stroke-related diagnosis and miscellaneous.

All patient data were collected on password protected computers in a locked office, and all patient data were anonymised for the analysis. Patient confidential

ity was protected by the researchers. All data were entered on an Excel worksheet (Microsoft Office 2010). Student's t test was used to compare means of continuous variables. The results were presented as mean (standard deviation), median (range) and OR (95% CI). Significance was set at 0.05.

## Results

Three hundred and fifty-six NH residents (140 men and 216 (61%) women) had 498 hospital admissions over a 12-month period. The mean age was 82.9 (7.4) years. Women were older than men (84.0 (7.2) years vs. 81.2 (7.4) years,  $p = 0.0005$ ). The median length of stay was 8 days (range 1-258) and 72 (14.4%) of the admissions resulted in LOS > 30 days. The total inpatient bed-day was 9,295 days. Forty-three (12.1%) NH residents died as inpatients and the median hospital LOS to death was 6 days (1-90).

### Frequency of admission

Two hundred and fifty-nine (72.8%) NH residents had one admission and 64 patients were admitted twice in a year. Thirty-three NH residents had multiple admissions (25 thrice, 5 four times, 2 five times and 1 six times). There was no difference in age ( $p = 0.81$ ) or gender ( $p = 0.79$ ) between patients with single or multiple admissions. The median interval between re-admission was 66 days (range 2-299). Forty-one (28%) of the readmissions were within 28 days.

### Time in ED before admission

The median wait time from registration to admission was 15 hours (range 1-51). Ninety-four patients (18.9%) were admitted within the 6 hour target and 142 (28.5%) within the 9-hour target. See [Figure 1](#).

### Final diagnoses

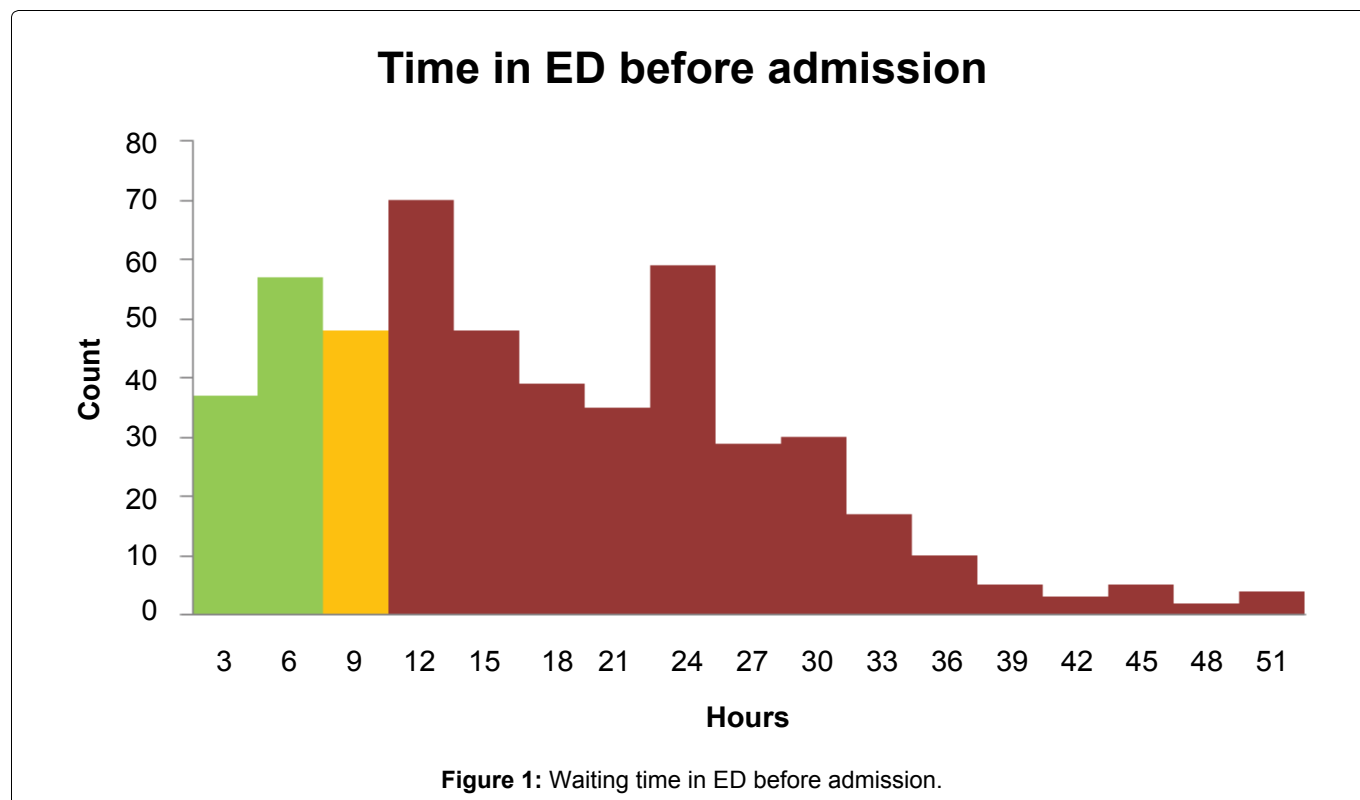
The common reasons for admissions were infection (197), falls and fractures (96), cardiac causes (42), gastrointestinal complaints (37) and stroke or transient ischaemic attack (26). See [Table 1](#).

The total number of bed-day for infection-related diagnoses was 3,070 days and for falls/fractures related diagnoses was 3,121 days.

## Discussion

Our study showed that infection, in particular respiratory infection, and falls are the two most common reasons for admission to an acute hospital for NH residents. This was consistent with the systematic reviews from Arendt [13] and Dwyer [14]. Infection-related diagnoses in our study accounted for one-third of the total bed-days. Falls and fractures related diagnoses accounted for another third of bed days.

Our study showed that the NH residents spend a median of 15 hours awaiting admission to the wards



**Table 1:** Final diagnoses by age, gender, the odds of dying within 30 days, wait in emergency department before admission and length of stay.

	N	Age mean (sd)	Women N (%)	OR death within 30 days OR (95% CI)	ED median (hours)	LOS median (days)
<b>Infection</b>						
Respiratory	124	82 (7.2)	92 (74%)	3.41* (1.97-5.90)	16	8
Urinary tract	48	83 (7.1)	29 (60%)	0.28 (0.07-1.19)	15.5	7.5
Other	25	83 (6.2)	29 (59%)	0.60 (0.14-2.60)	14	7
<b>Falls</b>						
Non fracture	49	85 (7.8)	31 (63%)	0.43 (0.13-1.43)	18	13
Fractures	47	86 (6.3)	36 (77%)	0.14 (0.02-1.05)	14	20
Cardiac	42	82 (6.4)	23 (54%)	1.23 (0.50-3.05)	16	8
GI	37	84 (7.6)	22 (60%)	2.47* (1.11-5.53)	13	4
CVA	26	83 (6.4)	12 (46%)	0.91 (0.26-3.13)	10	8.5
Other	101	81 (7.2)	61 (60%)	0.38* (0.16-0.91)	15	5

Abbreviation: OR = Odds Ratio; ED = Emergency Department; LOS = Length of Stay; GI = Gastrointestinal conditions; CVA = Cerebrovascular Events (stroke, transient ischaemic attack); \* =  $p < 0.05$ .

and the majority (73%) of them lie outside the target of 9-hours for admission. Prolonged waiting in ED for beds on wards in this severely frail cohort of patient may contribute to the development of delirium, sleep deprivation and pressure ulcers. While the majority of the NH residents had one admission in the year, one in nine of them had three or more admissions. The LOS in hospital was similar to two other urban acute hospitals in Ireland

[3,15]. The inpatient mortality rate of 12% in our study was lower than Romero-Ortuno [3] but comparable to Briggs [15].

### Respiratory infection

As nursing home acquired pneumonia (NHAP) is a common presentation, there is a wealth of research focusing on this subject from prognostic value of sever-

ity of the pneumonia [16] and predictors of mortality of NHAP [17], to pneumonia management guidelines [18,19]. NH residents are at increased risk of respiratory infection due to factors including chronic respiratory conditions, swallow impairment and impaired immunity. Respiratory infection accounted for a quarter of the admissions in our study.

Dwyer, et al. in a systematic review showed that the severity of the infection was greater in NH residents than in community-living peers [14]. Ewig [20] and Ugajin [16] showed that NHAP resulted in a three to four-fold increase in mortality compared to community acquired pneumonia. Pneumonia in a NH cohort therefore confers a poor outcome and may inform the discussion surrounding prognosis and end of life care for the NH patients.

### Intervention for nursing home acquired pneumonia

There were several initiatives shown to reduce the incidence of respiratory infection and hospitalisation of NH residents. Pneumococcal vaccination was effective in reducing the incidence of pneumonia from 20% to 13% in the NH population but not the overall mortality rate [21]. A large 9-year retrospective survey of over 1 million NH residents showed that the influenza vaccination programme reduced pneumonia and influenza death and hospitalisation rates by 2.0% and 4.2% respectively [22]. Loeb, et al. demonstrated a 12% reduction in hospitalisation (with no difference in mortality) by treating pneumonia in the nursing home using a clinical pathway with intervention including oral antimicrobials, portable chest radiographs, oxygen saturation monitoring, rehydration and close monitoring by a research nurse [8]. In our opinion, this intervention may require a change in the infrastructure of the care delivery pathway and may not be feasible in smaller NH facilities. Dosa in a literature review proposed that some cases of pneumonia could be treated in the nursing home but is dependent on obtaining the antibiotics and adequately trained staff to care for the acutely unwell patient [18].

### Model of care to reduce admission

The North Dublin Central region provide a community geriatric medicine outreach programme to NHs within the catchment area since 2009. The programme includes providing specialist geriatric consultations to the NH, providing educational programmes for nursing staff in the NH, the promotion of advanced care directives and facilitating medical reviews at the community hospital. The ongoing goal of the collaborative effort is to reduce inappropriate transfer of NH residents to the emergency hospital by providing appropriate chronic disease management and care which is delivered in the nursing homes.

There have been a number of interventions reported in the literature to reduce hospital admissions of NH residents. INTERACT II [11], draws on the collaborative

effort between physicians, nursing and care attendants in the NH and the ED. There was an overall reduction in ED transfers depending on the engagement of the NH with the programme. The projected cost savings per year for a 100-bed NH was \$125,000. In the Irish context, the state bears the cost of transfer, ED attendance and inpatient care. There may not be sufficient incentive to engage with an INTERACT II like programme.

In another intervention, Hullick, et al. developed a clinical care manual for the NH staff to support care along with a nurse-led telephone triage line in ED, for education and establishing goals of care prior to ED transfer [10]. There was a case manager assigned for NH patients in ED as well. While there was no difference in the rate of transfer of NH residents to ED, the ED length of stay for NH residents was reduced by 45 minutes and there was a 40% reduction in ward admission rate. This programme will require adequately trained staff in ED to triage and manage sick NH residents as well as offer ongoing training to NH staff. Key trainers in each NH facility may also be needed.

The Hospital in the Home programme in Australia delivered intravenous antibiotics in the NH [9]. The closest model of care in Ireland to this service is the Outpatient Parenteral Antimicrobial Therapy (OPAT) and this may be a viable alternative. There is little in the literature regarding falls but given our findings where falls was the second commonest reason for admission, we must show some consideration to addressing falls prevention and bone health in this cohort.

### Limitations

The study is limited by the accuracy of the information recorded from an electronic patient record rather than the review of medical charts. This information may therefore not be complete.

In conclusion, NH residents often become acutely unwell and require hospitalisation. The most common causes for admissions are infection and falls. Their wait before admission to the ward was long and commonly outside the 9 hour target. We can learn from the international centres to improve the care we provide for the NH residents when they attend ED. There is significant risk to health and functionality associated with hospital admission and this must be weighed against the benefit of same. Community services must proactively utilise the evidence base available in order to treat the patient in their home environment.

### Disclosure Statement

The authors have nothing to disclose.

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