

## SYSTEMATIC REVIEW

# A systematic review of outcomes following emergency transfer to hospital for residents of aged care facilities

ROSAMOND DWYER<sup>1</sup>, BELINDA GABBE<sup>1</sup>, JOHANNES U. STOELWINDER<sup>1,2</sup>, JUDY LOWTHIAN<sup>1</sup><sup>1</sup>Monash University, Department of Epidemiology and Preventive Medicine, School of Public Health and Preventive Medicine, The Alfred Centre, Alfred Hospital 99 Commercial Road Melbourne, VIC, Melbourne, Victoria 3004, Australia<sup>2</sup>Epidemiology and Preventive Medicine, Monash University, Melbourne, Victoria, Australia

Address correspondence to: R. Dwyer. Tel: (+61) 399030555; Fax: (+61) 399030556. Email: rosamond.dwyer@monash.edu

## Abstract

**Background:** residential aged care facility (RACF) resident numbers are increasing. Residents are frequently frail with substantial co-morbidity, functional and cognitive impairment with high susceptibility to acute illness. Despite living in facilities staffed by health professionals, a considerable proportion of residents are transferred to hospital for management of acute deteriorations in health. This model of emergency care may have unintended consequences for patients and the healthcare system. This review describes available evidence about the consequences of transfers from RACF to hospital.

**Methods:** a comprehensive search of the peer-reviewed literature using four electronic databases. Inclusion criteria were participants lived in nursing homes, care homes or long-term care, aged at least 65 years, and studies reported outcomes of acute ED transfer or hospital admission. Findings were synthesized and key factors identified.

**Results:** residents of RACF frequently presented severely unwell with multi-system disease. In-hospital complications included pressure ulcers and delirium, in 19 and 38% of residents, respectively; and up to 80% experienced potentially invasive interventions. Despite specialist emergency care, mortality was high with up to 34% dying in hospital. Furthermore, there was extensive use of healthcare resources with large proportions of residents undergoing emergency ambulance transport (up to 95%), and inpatient admission (up to 81%).

**Conclusions:** acute emergency department (ED) transfer is a considerable burden for residents of RACF. From available evidence, it is not clear if benefits of in-hospital emergency care outweigh potential adverse complications of transfer. Future research is needed to better understand patient-centred outcomes of transfer and to explore alternative models of emergency healthcare.

**Keywords:** emergency, nursing homes, older people

## Introduction

As people age they become more likely to require assistance with activities of daily living. Some require care in nursing homes or residential aged care facilities (RACF). The proportion of people living in RACF increases significantly with age from 2% of people aged 65–75 years to 26% of people 85 years and over [1].

People living in RACF frequently have advanced cognitive and functional impairment and medical co-morbidities. Many are transferred to hospital emergency departments

(ED) for management of acute changes in health, with up to 75% experiencing an emergency transfer each year [2–14]. Residents of RACF have a higher rate of ED presentation and hospital admission than their community-dwelling peers [3, 10, 15–17].

Despite the substantial burden of acute hospital transfer, the implications are not well quantified. This systematic review summarises current evidence relating to patterns of presentation, clinical consequences and health system utilisation surrounding emergency hospital transfer of RACF residents.

## Methods

### Search strategy

A comprehensive search of the peer-reviewed literature was conducted using the electronic databases Medline, Embase, CINAHL and Informit in December 2013. [Box 1](#) shows the Medline(OVID) search strategy. Strategies for other databases were adjusted for database-specific indexed terms. Reference lists of selected articles were hand-searched for additional papers. The search was not restricted by year of publication.

### Inclusion criteria

Broad inclusion criteria were used to ensure a comprehensive overview. These included participants living in RACF, aged at least 65 years, outcomes reported of acute transfer to ED or hospital admission, and published in English. A RACF was defined as nursing home, care-home, or long-term care, skilled nursing or residential care facility. Studies referring to acute or chronic illness, palliative care or end-of life care, without reference to ED or hospital transitions were excluded.

### Synthesis

Slavin's [18] method was followed to produce a best-evidence synthesis of the peer-reviewed literature. This includes selection of studies based on appropriate and consistent inclusion criteria, examination and evaluation of study characteristics and synthesis of the included literature with systematic description and analysis of key concepts [18, 19].

#### Box 1. Search strategy for Medline (OVID)

1. exp Nursing homes/OR nursing hom\*.mp. OR exp Residential Facilities/OR residential facilit\*.mp. OR exp Long-Term Care/OR long term care .mp. OR exp Skilled Nursing Facilities/OR skilled nursing facilit\*.mp.
2. exp Geriatrics/OR geriatri\*.mp. OR exp Aged/OR aged .mp. OR elderly .mp. OR exp Frail Elderly OR frail elderly .mp. OR exp 'Aged, 80 and over'/OR 'Aged, 80 and over' .mp. OR gerontolo .mp.
3. 1 AND 2
4. exp Housing for the Elderly/OR housing for the elderly .mp. OR exp Homes for the Aged/OR homes for the ages .mp. OR residential aged care .mp. OR exp Geriatric Nursing/OR geriatric nurs\*.mp.
5. 3 OR 4
6. exp Emergency Medical Services/OR emergency medical servic\* .mp. OR exp Emergencies/OR emergenc\*.mp. OR exp Emergency Treatment/OR emergency treatmen\*.mp. OR exp Emergency Service, Hospital/OR emergency servic\* .mp. OR exp Trauma Centers/OR trauma servic\* .mp. OR exp Emergency Nursing/OR emergency nurs\*.mp. OR exp Emergency Medicine/OR emergency medicine.mp. OR 'accident and emergency'.mp. OR emergency department.mp. OR exp Ambulances/OR ambulanc\*.mp. OR paramedi\*.mp. OR prehospital.mp. OR prehospital care.mp. OR pre-hospital.mp.
7. 5 AND 6

## Findings

### Overview of included studies

Eighty-three papers, from 15 high-income nations met the inclusion criteria (Figure 1). No studies from low- or middle-income countries were found. Most studies were conducted in the USA (30/83, 36%), Australia (17/83, 20%), the UK (11/83, 13%) and Canada (8/83, 10%). Study settings varied by healthcare systems, funding models and access to care.

Most studies analysed hospital-based data; 42% (35/83) from a single hospital, and 27% (22/83) multiple hospitals within a specified jurisdiction. Others analysed RACF data (20%,17/83) or national data sets (11%,9/83). Most (63%,52/83) involved a 12-month study period.

Methodologies were diverse. Medical record review, combined with hospital administrative data was the most common (63%,52/83), while 24% (20/83) used patient interviews and 13% (11/83) included data from national health agencies such as Medicare and Medicaid. Sample size varied from <100 admissions to >500,000 episodes.

### Patterns of presentation

Common reasons for transfer of RACF residents to ED are summarised in Table 1. They had high rates of falls and fall-related injuries [20–22] and more frequently presented with fractures (particularly hip fractures) than community-dwelling peers aged >65 years [16, 23–27]. Watson *et al.* found RACF residents accounted for 30% of medically treated falls despite comprising only 5.6% of the study population [28]. Overall, RACF residents accounted for up to 26% of all hospital admissions with femoral fractures [27].

Residents of RACF were more commonly diagnosed with infection, particularly of the respiratory and urinary systems, and presented more frequently with severe sepsis than community peers [3, 16, 27, 29, 30]. However, they had lower admission rates for cardiac and gastrointestinal conditions, and neoplasms [16, 26, 31, 32]. Reflecting substantial comorbidity, cognitive and functional decline, RACF residents were commonly transferred to ED with aspiration pneumonia or drug-related complications [33, 34].

Compared with the general ED population, RACF residents were more commonly acutely unwell on arrival according to ED triage categories. Street *et al.* found 59% of RACF residents were triaged in emergent and urgent categories compared with 45% of all ED presentations [35]. More broadly, 14–36% were assigned to category 1–2 (resuscitation, emergent), 49–80% to category 3 (urgent) and 15–35% to category 4–5 (semi-urgent, non-urgent) [5, 6, 8, 16, 26, 36, 37]. Variability in these proportions reported may reflect difficulties in rapidly assessing these patients. Residents of RACF more frequently presented with hypotension, tachycardia, impaired consciousness, delirium, dehydration, respiratory failure and septic shock, compared with community-dwelling older people [20, 29, 32, 33, 38–40]. This may reflect the relatively advanced age of RACF residents, as proportions

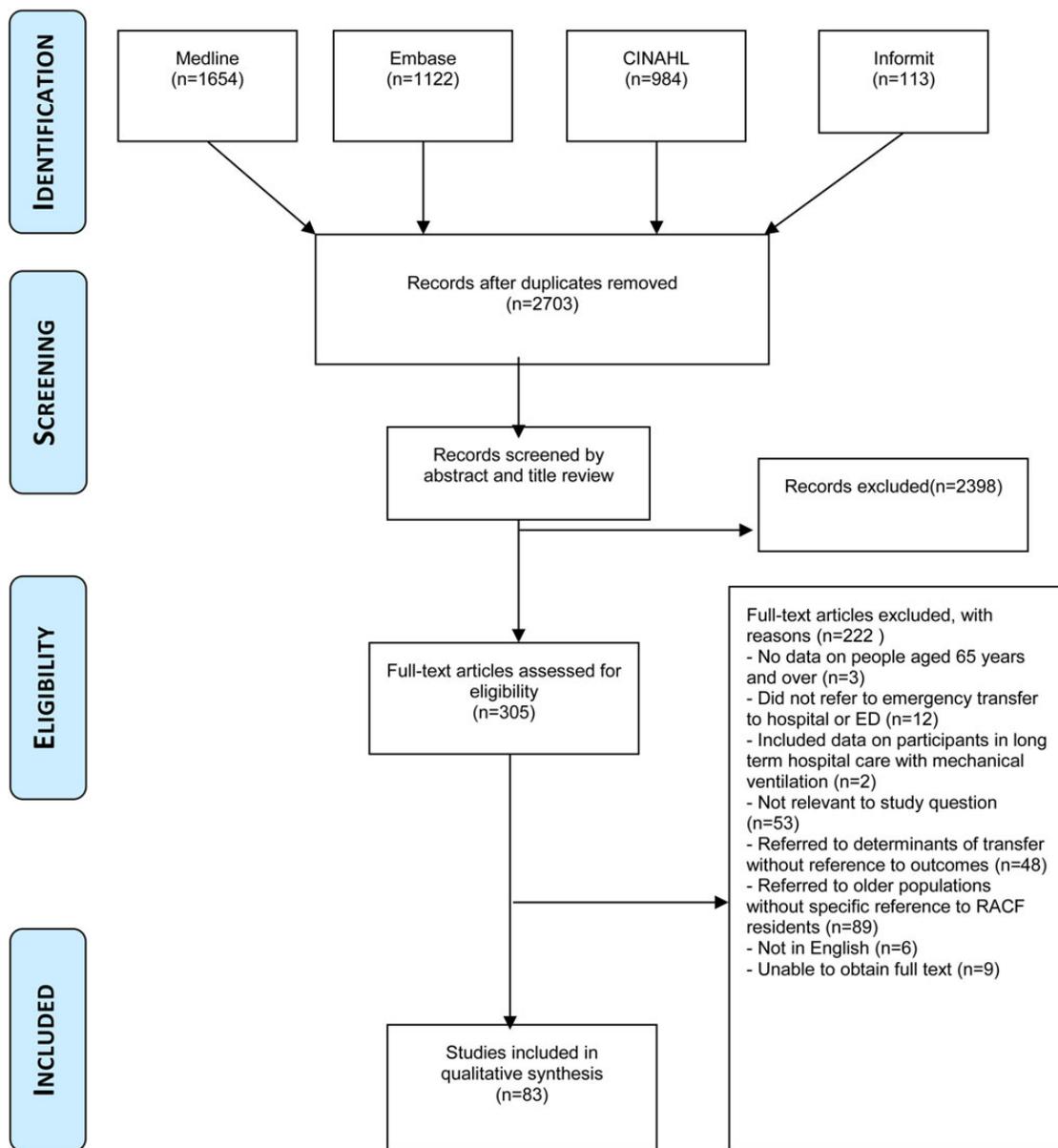


Figure 1. Search results (PRISMA) [89].

Table 1. Reasons for transfer of RACF residents to ED

	Proportion of total presentations
Respiratory tract disease	12–37% [5, 6, 8, 10, 16, 26, 29, 32, 37, 45, 47, 50, 71]
Fall-related presentations	12–23% [8, 10, 14, 35, 46, 47, 50]
Fractures and orthopaedic injuries	6.7–24% [8, 16, 26, 29, 35, 37, 82]
Cardiovascular illness	11–28% [5, 6, 10, 16, 26, 29, 32, 35, 37, 47, 71]
Infection	5.3–24% [6, 14, 29, 82]
Altered mental state	7.2–12% [5, 35, 46, 50]
Device (usually PEG tube or IDC)-related complication	2.3–10% [37, 46, 47, 50]

are comparable with those for all ED patients aged over 65 years [26, 37], or may indicate their susceptibility to severe, acute illness.

Further, RACF residents typically presented with multisystem disease, with an average of 3.4–4.5 diagnoses [10, 35, 41], and 69% having four to seven secondary diagnoses applied in hospital [10]. Polypharmacy (93%), nutritional deficiency, pressure ulcers, cognitive and functional impairment (up to 81%), incontinence (up to 76%), immobility (up to 89%) and vision/hearing loss (up to 57%) were prevalent [39, 42–45]. Although comparator rates for community-dwelling populations were largely absent, Han *et al.* described cognitive impairment in 38% and vision/hearing impairment in 22% of older people living in the community who were seen in ED [39].

## Clinical consequences

### Intervention and investigation

In ED, RACF residents experienced high rates of investigation and intervention [8, 37, 41]. These included potentially invasive procedures, with 43–80% having blood tests [6, 45, 47, 49, 50], 25% having arterial blood gas sampling [50], 40–66% undergoing insertion of an intravenous cannula [6, 41, 45, 47, 50] and 12–23% placement of an indwelling urinary catheter [6, 45, 50]. Smaller numbers underwent more invasive procedures such as ventilatory support and cardiopulmonary resuscitation with questionable benefit given the extremely poor survival to discharge rates in this population [45, 50, 51]. Up to 85% of residents experienced radiological examinations [6, 29, 45, 47, 49, 50]. Although largely non-invasive, radiological investigations commonly involve intra-hospital transfers, movement between beds and pharmacological or physical restraints to restrict movement. Up to 70% received medication or blood products in the ED with associated potential for drug interactions or adverse drug reactions [6, 29, 45, 50]. Patients from RACF had higher rates of intervention and investigation than community-dwelling older people [29, 41]. Wang *et al.*, reported 72% of RACF residents underwent imaging, 92% diagnostic testing and 72% experienced a procedure in ED compared with 44, 72 and 49%, respectively, of patients presenting from the community [29].

### In-hospital complications

A greater proportion of RACF residents had pressure ulcers upon admission and developed new pressure ulcers in hospital (19%) compared with community-dwelling older people (4.3%) [52]. Compared with residents with no transfers, residents transferred to hospital had higher rates of new pressure ulcers and longer healing times [53, 54].

Thirty-eight percent of RACF residents seen in ED had developed delirium [39]. Delirium was associated with dementia, greater functional impairment, hearing loss and the presence of systemic inflammatory response syndrome [39, 55]. Of RACF residents seen in the ED, 6-month mortality was higher for those with delirium than those without (46 versus 27%) [55]. Despite the prevalence and adverse outcome associated with delirium, proportion of patients assessed or managed for this condition in ED is unclear.

An ED visit was associated with a three-fold increased risk of new, likely hospital acquired, gastrointestinal or respiratory tract infection for RACF residents [56]. Further, people living in RACF had increased rates of antibiotic resistant bacteria, which can result from frequent, or inappropriate antibiotic prescription, shared amenities and reduced awareness of optimal infection control practices within RACFs [57–62]. Moreover, among RACF residents, recent or recurrent hospitalisation or ED transfer was associated with increased acquisition of resistant organisms [57, 59, 60, 63, 64]. RACF residents appear particularly susceptible to iatrogenic illness and hospital-acquired infection, potentially

adversely influencing the complexity, cost and success of treatment.

Acute hospital admission was associated with further functional decline in this population [65]. Post-hospitalisation functional decline, measured using the minimum data set activity of daily living score (MDS-ADL), was greater for people with significant pre-existing cognitive impairment. Average increases in scores among those admitted with fractured hip (7.65), stroke (6.53) and septicaemia (2.97) indicated deteriorations in functional ability [65]. Studies have suggested that functional outcomes following infection and pneumonia are better for residents treated in their facility compared with those who were hospitalised [53, 66, 67]. However, it was uncertain whether these effects resulted from acute transfer or greater severity of initial illness.

### Mortality

Mortality from acute illness and transfer to hospital was high; 1–5% of RACF residents transferred to hospital died in the ED [8, 35, 37, 45, 50, 68, 69]. Once admitted a further 5–34% of residents died in hospital [2, 10, 26, 32, 35, 37, 41, 45, 68–71]. Most deaths occurred within 1 week of admission, and up to half within the first 3 days [14, 29, 41, 70, 71]. Mortality rates were higher compared with older people admitted from the community, and RACF residents had a shorter time to death as an inpatient [3, 16, 31, 32, 70, 72, 73]. Among all patients admitted with pneumonia or sepsis, transfer from RACF was independently associated with mortality [30, 72, 74].

Up to 52% of RACF residents died within 3 months of acute hospital transfer [14, 70, 75] and 12–29% died within 1 month of leaving hospital [8, 10, 33, 76]. Higher 30-day mortality rates were reported for people admitted with respiratory (43%) and circulatory disease (34%) [10]. Risk of transfer to ED and admission to hospital increased considerably over the last few months of life [77, 78].

Higher C-reactive protein, lower estimated glomerular filtration rate, higher Modified Early Warning Score and polypharmacy on admission were associated with higher odds of death within 1 week of admission [71]. Multiple comorbidities and advanced age were also associated with an increased risk of in-hospital mortality [37, 70].

## Health system utilisation

### Appropriateness of ED presentation

There have been attempts to quantify avoidable or inappropriate transfers from RACF to ED. Methods of classifying presentations varied between studies, often relying on subjective, retrospective assessment by healthcare professionals, resulting in estimates of inappropriate transfers ranging from 5–60% [7, 8, 14, 46–48, 68, 79]. Improved advance care planning and use of existing resources, for patients transferred with non-urgent symptoms, or without prior assessment by their GP could reduce avoidable transfers [7, 14, 47, 50, 68,

75, 79]. However, other ‘inappropriate’ transfers although not needing emergency care would require additional services, which may not yet be available in care facilities, for example, care of indwelling devices, radiology services or provision of parenteral medications [7, 47, 50, 79].

### Ambulance use

A greater proportion of RACF patients than community-dwelling elderly people used ambulance transport [29, 41] with almost all (80–95%) transferred to ED by emergency ambulance [7, 8, 29, 37, 41, 43, 48, 69].

### Hours of arrival

Approximately half of RACF transfers arrived in the ED during normal business hours, with the remaining arriving in late evening or overnight [6, 8, 16, 20, 26, 29, 37, 43, 48, 50, 69, 80]. These proportions are comparable with those for community-dwelling older people [26, 29]. This suggests some RACF residents could potentially have accessed other ‘in-hours’ services such as general practitioners, pathology and radiology services. Although most EDs operate 24 h-a-day, outside of standard business hours there may be fewer senior staff, and reduced access to radiology and specialist consultation [81].

### Emergency department length of stay

Residents of RACF transferred to ED had an average length of stay (LOS) of 3.1–7.9 h [7, 26, 29, 35, 37, 50]. Emergency department LOS was longer for patients more unwell at presentation, and those admitted to inpatient units compared with those discharged [35, 37, 47]. In comparison with community-dwelling older people, RACF residents experienced longer average ED LOS and more frequently remained in the ED for over 4-h, with up to 37% of residents still in the ED 8-h after presentation [26, 29, 35, 37, 41]. A longer ED LOS was associated with out-of-hours presentations [26, 37], possibly due to medical complexity of RACF residents and lack of access to specialist services.

### Admission and inpatient LOS

People transferred from RACF had a high rate of hospital admission with 41–81% of residents seen in ED admitted to inpatient beds [5–8, 16, 26, 35, 37, 41, 45–47, 50, 68, 69] and short stay units [37, 45]. RACF residents had a greater rate of inpatient admission than community-dwelling older people [16, 26, 29, 41, 47], and longer average inpatient LOS [26, 31]. The average inpatient LOS for patients transferred from RACF ranged from 3 to 19 days [2, 5–7, 10, 26, 32, 35, 37, 45–47, 75, 76, 82].

### Re-presentation to ED

Up to 37% of residents represented within 2 weeks of the initial ED visit and up to 66% re-presented within 12 months [8, 26, 35, 45, 46, 71, 75, 80]. Re-presentation rates were higher for older people from RACF compared with those living in the community [26, 83]. Associated characteristics included greater number of medical diagnoses, greater functional or cognitive impairment and depressed mood [84].

### Economic estimates

Costs of care were higher for residents admitted to hospital compared with those discharged from ED [50]. In North America, costs per resident for each ED presentation have been estimated at USD 748 (GBP452); with an additional USD 486 (GBP94) for each ambulance transfer and total costs per hospitalisation up to USD 6,796 (GBP4109) per person [50, 79]. Estimated cost of managing residents with pneumonia was higher for those hospitalised compared with those managed within the RACF [85, 86]. Bookvar *et al.* reported average costs of USD 5,202 (GBP3145) per hospitalised resident with pneumonia compared with USD 996 (GBP602) for those treated in the RACF [86]. It has been suggested that average hospital costs were higher for people admitted from RACF compared with those admitted from the community [5, 31]. Other studies estimated average inpatient costs per RACF resident of AUD 5,715 (GBP3165) in Australia and EUR 5177 in Norway [14, 35].

### Discussion

This review provides a comprehensive overview of international evidence surrounding clinical and health system-related outcomes of emergency transfer to hospital of people living in RACF. The findings show RACF residents experience high rates of transfer to the ED, comprise a distinct group of ED patients, and when compared with community-dwelling older people, present with higher acuity of disease and a different case-mix. Outcomes of emergency hospital transfers include a number of adverse clinical consequences and mortality remains high despite often intensive use of acute healthcare resources.

A previous systematic review by Arendts *et al.*, described transfer rates of up to 1.5 ED visits per RACF resident bed/per year associated with a diverse range of clinical presentations [88]. Lower rates of presentation with cardiac disease and neoplasm, and higher rates of infection and fall-related injury is a consistent finding. This may reflect greater susceptibility of RACF residents to these conditions or may indicate a more restricted referral pattern from RACF staff. Infection and injury may potentially be more treatable or reversible than other conditions, or may lead to more rapid clinical deterioration, lowering the threshold for acute transfer. It was not clear from the reviewed studies whether referral for particular presentations was guided by policy or individual clinical judgment and it is likely this varies between facilities.

Frequent, pre-existing disease, polypharmacy, cognitive and functional impairment may complicate acute illness and higher rates of delirium and confusion on presentation can contribute to difficulty in patient assessment and treatment. Thus management of acutely unwell RACF residents may be highly complex and time critical. There may also be differences in the goals of care, in balancing palliative and curative therapy for this compared with other ED patient groups.

A number of adverse clinical consequences of acute transfer of RACF residents were identified. In-hospital complications for this patient group were high compared with people admitted from the community [33]. Adverse events reported with inpatient treatment of RACF residents included falls, medication errors, nosocomial infection, delirium, pressure ulcers and potentially unnecessary invasive interventions [45, 52, 56]. Whether these are outweighed by the benefit of specialist hospital-based emergency care is unclear. Importantly, there is little evidence about patient-centred outcomes of care such as pain and symptom control, management of delirium or agitation and patient comfort and privacy.

High mortality rates were evident in the ED and with inpatient admission, possibly indicating some acute transfers are not associated with the intended outcomes of improved quality of life or increased life expectancy. Potentially, patients who are seriously unwell and die soon after transfer may benefit more from appropriate and earlier palliative care within the RACF. Alternatively, it may be that these adverse outcomes reflect late or delayed transfer of residents, or transfer of only the very ill and perhaps with improved recognition of deteriorating patients and earlier management, outcomes could be improved. This requires further exploration through prospective studies within RACF.

Overall, in the ED, residents of RACF experienced a high rate of intervention of varying levels of invasiveness. This may contribute to adverse clinical outcomes as well as increased costs of care and prolonged LOS in the ED. While these interventions may be necessary to ensure good patient care, their benefits have not been widely explored, and it could be argued that some could be undertaken in the RACF.

The current model of acute care for RACF residents may contribute to substantial healthcare costs through high rates of ambulance usage, investigation and inpatient admission. These would be of less concern if patient outcomes were clearly favourable. Despite frequent use of emergency ambulance services, no studies reported on the degree of pre-hospital intervention or treatment. Furthermore, there has been no evaluation of which residents could be treated by paramedics within the RACF, without ED transfer. It is therefore unclear if this type of emergency pre-hospital service is appropriate, if additional supports are required or if other community-based services may be more suitable to best care for these patients. In hospital, RACF residents experienced longer ED and inpatient LOS, and greater rates of re-presentation, compared with other patient groups, potentially exacerbating the problems of hospital and ED overcrowding and quality of care delivery.

The wide variation in study methodologies restricted synthesis and prevented meta-analysis. Studies were observational and from diverse healthcare systems, limiting conclusions of causality and generalisability of findings. It was not possible to specify results for subsets of RACF residents (e.g. low- versus high-level care). Nevertheless, we have systematically reviewed the current evidence and found a number of consistent findings across a range of international settings. These provide a broad description of clinical-, patient- and health system-related outcomes for RACF residents following emergency transfer to hospital.

## Conclusion

The complex clinical presentations, high acuity and frequent adverse outcomes of RACF residents indicate the need for specialist emergency care for this population. However, exploration of risks and benefits of in-hospital acute and emergency care is currently limited by deficiencies in alternative models of acute care, significant variation in healthcare systems in different settings, and potential differences in capabilities between individual facilities and hospital outreach services. The current evidence is insufficient to appraise the quality of care provided, identify training requirements and develop evidence-based guidelines for emergency healthcare professionals caring for RACF residents. Ideally randomised trials are needed to systematically investigate outcomes of care from ED versus RACF-centric models of acute care. Future research should quantify patient-centred outcomes from current care pathways better, examine determinants of adverse outcomes of emergency transitions and explore efficacy of alternate emergency healthcare models.

---

## Key points

- High proportions of residents of aged care facilities are admitted to emergency departments each year.
  - Transfer to the emergency department may have adverse consequences for this group of patients.
  - Alternative models of care might be more effective and cost effective.
- 

## Conflicts of interest

None declared.

## Funding

R.D. is supported by Monash University Postgraduate Research Scholarship. B.G. is supported by a NHMRC Career Development Fellowship (GNT1048731). J.L. is supported by an NHMRC Early Career Fellowship (1052442).

## References

The very long list of references supporting this review has meant that only the most important are listed here and are represented by bold type throughout the text. The full list of references is available on Supplementary material online, Appendix S1.

3. Godden S, Pollock AM. The use of acute hospital services by elderly residents of nursing and residential care homes. *Health Soc Care Comm* 2001; 9: 367–74.
4. Aminzadeh F, Dalziel WB, Molnar FJ, Alie J. An examination of the health profile, service use and care needs of older adults in residential care facilities. *Can J Aging* 2004; 23: 281–94.
6. Jensen PM, Fraser F, Shankardass K, Epstein R, Khera J. Are long-term care residents referred appropriately to hospital emergency departments? *Can Fam Phys* 2009; 55: 500–5.
8. Gruneir A, Bell CM, Bronskill SE, Schull M, Anderson GM, Rochon PA. Frequency and pattern of emergency department visits by long-term care residents—a population-based study. *J Am Geriatr Soc* 2010; 58: 510–7.
9. Tang M, Woo J, Hui E. *et al.* Utilization of emergency room and hospitalization by Chinese nursing home residents: a cross-sectional study. *J Am Med Direct Assoc* 2010; 11: 325–32.
10. Graverholt B, Riise T, Jamtvedt G, Ranhoff AH, Kruger K, Nortvedt MW. Acute hospital admissions among nursing home residents: a population-based observational study. *BMC Health Services Res* 2011; 11: 126.
11. Gruneir A, Bronskill S, Bell C *et al.* Recent health care transitions and emergency department use by chronic longterm care residents: a population-based cohort study. *J Am Med Direct Assoc* 2012; 13: 202–6.
12. Walsh EG, Wiener JM, Haber S, Bragg A, Freiman M, Ouslander JG. Potentially avoidable hospitalizations of dually eligible Medicare and Medicaid beneficiaries from nursing facility and Home- and Community-Based Services waiver programs. *J Am Geriatr Soc* 2012; 60: 821–9.
14. Vossius CE, Ydstebo AE, Testad I, Luras H. Referrals from nursing home to hospital: reasons, appropriateness and costs. *Scand J Public Health* 2013; 41: 366–73.
16. Ingarfield SL, Finn JC, Jacobs IG *et al.* Use of emergency departments by older people from residential care: a population-based study. *Age Ageing* 2009; 38: 314–8.
24. Brennan nee Saunders J, Johansen A, Butler J *et al.* Place of residence and risk of fracture in older people: a population-based study of over 65-year-olds in Cardiff. *Osteopor Int* 2003; 14: 515–9.
26. Crilly J, Chaboyer W, Wallis M, Thalib L, Green D. Predictive outcomes for older people who present to the emergency department. *Austral Emerg Nurs J* 2008; 11: 178–83.
27. Ronald LA, McGregor MJ, McGrail KM, Tate RB, Broemling AM. Hospitalization rates of nursing home residents and community-dwelling seniors in British Columbia. *Can J Aging* 2008; 27: 109–15.
29. Wang HE, Shah MN, Allman RM, Kilgore M. Emergency department visits by nursing home residents in the United States. *J Am Geriatr Soc* 2011; 59: 1864–72.
30. Ginde AA, Moss M, Shapiro NI, Schwartz RS. Impact of older age and nursing home residence on clinical outcomes of US emergency department visits for severe sepsis. *J Crit Care* 2013; 28: 606–11.
31. Barker W, Zimmer J, Hall J, Ruff B, Freundlich C, Eggert G. Rates, patterns, causes, and costs of hospitalization of nursing home residents: a population-based study. *Am J Public Health* 1994; 84: 1615–20.
32. Romero-Ortuno R, O'Shea D, Silke B. Predicting the in-patient outcomes of acute medical admissions from the nursing home: the experience of St James's Hospital, Dublin, 2002–2010. *Geriatr Gerontol Int* 2012; 12: 703–13.
35. Street M, Marriott JR, Livingston PM. Emergency department access targets and the older patient: a retrospective cohort study of emergency department presentations by people living in residential aged care facilities. *Austral Emerg Nurs J* 2012; 15: 211–8.
36. Cwinn MA, Forster AJ, Cwinn AA, Hebert G, Calder L, Stiell IG. Prevalence of information gaps for seniors transferred from nursing homes to the emergency department. *CJEM* 2009; 11: 462–71.
37. Arendts G, Dickson C, Howard K, Quine S. Transfer from residential aged care to emergency departments: an analysis of patient outcomes. *Inter Med J* 2012; 42: 75–82.
41. Giron-Fragkoulakis C, Gardner C, Cross S, Mason S, Walters S. Assessing the impact older people from care homes place on the emergency services. *Eur J Emerg Med* 2011; 18: 81–5.
43. Jaysinghe S, Young L, Santiano N. *et al.* Hospital care of people living in residential care facilities: profile, utilization patterns and factors impacting on quality and safety of care. *Geriatr Gerontol Int* 2007; 7: 271–8.
45. Lane H, Zordan RD, Weiland TJ, Philip J. Hospitalisation of high-care residents of aged care facilities: are goals of care discussed? *Inter Med J* 2013; 43: 144–9.
46. Jones JS, Dwyer PR, White LJ, Firman R. Patient transfer from nursing home to emergency department: outcomes and policy implications. *Acad Emerg Med* 1997; 4: 908–15.
50. Ackermann RJ, Kemle KA, Vogel RL, Griffin RC Jr. Emergency department use by nursing home residents. *Ann Emerg Med* 1998; 31: 749–57.
55. Han JH, Shintani A, Eden S *et al.* Delirium in the emergency department: an independent predictor of death within 6 months. *Ann Emerg Med* 2010; 56: 244–52.
56. Quach C, McArthur M, McGeer A *et al.* Risk of infection following a visit to the emergency department: a cohort study. *CMAJ* 2012; 184: E232–9.
65. Kruse RL, Petroski GF, Mehr DR, Banaszak-Holl J, Intrator O. Activity of daily living trajectories surrounding acute hospitalization of long-stay nursing home residents. *J Am Geriatr Soc* 2013; 61: 1909–18.
67. Fried T, Gillick M, Lipsitz L. Short-term functional outcomes of long-term care residents with pneumonia treated with and without hospital transfer. *J Am Geriatr Soc* 1997; 45: 302–6.
69. Mitchell JS, Young I. Utilization of a UK emergency department by care home residents: a retrospective observational study. *Eur J Emerg Med* 2010; 17: 322–4.

Received 18 April 2014; accepted in revised form 8 July 2014