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SYSTEMATIC REVIEW

The interface between residential aged care and the emergency department: a systematic review

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Background: emergency care for older people living in residential aged care facilities (RACF) is a complex area of health policy. The epidemiology of patient transfer between RACF and hospital emergency departments (ED), clinical outcomes and costs associated with transfer and efficacy of programs aiming to reduce transfer are not well known.
Design: systematic review based on a comprehensive literature search in three electronic databases and published article reference lists.
Results: the incidence of transfer from RACF to ED is >30 transfers/100 RACF beds/year in most studies. The casemix from RACF is varied and reflects that of the broad elderly population, with some risk difference. At least 40% of transfers are not admitted to hospital. There is insufficient data to fully address our other questions; however, hospitalisations from RACF can be reduced through advanced care planning, use of management guidelines for acute illnesses and improved primary care.
Conclusions: residents of RACF have a high annual risk of transfer to ED. The clinical benefit and cost effectiveness of ED care, and alternate programs to reduce ED transfer, cannot be confidently compared from published work. Further research is required to accurately describe these and to determine their comparative worth.

Keywords: *aged care facilities, emergency department, patient transfer, systematic review, elderly*

Introduction

Worldwide in the last decade, the annual rate of presentations to hospital emergency departments (ED) has increased substantially [1]. Older patients are disproportionately represented in this increase [2].

Whilst ED care is generally of high quality, the ED may be ill-equipped for the complex medical problems and special needs of older people [3]. People living long term in residential aged care facilities (RACF) have characteristics that distinguish them from the broader elderly population, providing potential to intervene to reduce ED presentations. RACF provide a level of accredited professional care, albeit generally with high patient to staff ratios, presenting the opportunity for appropriate supervision of medical care within the facility. A number of complications may arise during transfer between RACF and ED. Older people living in RACF are chronically ill and dependent; the priority for their medical care is disease management rather than cure. To this end, ED care with a focus on acute illness and injury is often unsuited to the needs of the RACF patient, for whom care within the facility may be more desirable [4].

We conducted a systematic review of the published literature on ED care for RACF patients, to address three key questions:

(i) How often, and with what conditions, do older people living in RACF present to ED?
(ii) What are the clinical outcomes and costs of ED transfer and care for RACF patients?
(iii) What are the components, clinical outcomes and costs of programs that directly aim to reduce ED transfer and care for RACF patients?

We were specifically interested in studies that considered patient outcomes and the benefits or costs of patient transfer, and studies that compared ED based care with alternatives.

Search Strategy And Selection Criteria

A literature search (search strategy in Supplemental Data Appendix 1 in *Age and Ageing* online) was conducted in July

2008 in three electronic databases [MEDLINE (1950–2008), EMBASE (1988–2008) and CINAHL (1982–2008)]. Abstracts were assessed for relevance and full text articles reviewed where relevance was established or in doubt. Reference lists from papers were manually searched for additional material. Papers published in languages other than English were translated for analysis.

We defined RACF as facilities that coupled permanent accommodation with the provision of facility-specific nursing services in addition to personal care services. Studies referring to nursing homes, extended care facilities and skilled nursing facilities were automatically accepted as RACF. Studies using other descriptions of RACF (e.g. low care facilities, assisted living facilities, homes for the elderly) were excluded unless we could establish they met our definition.

We included papers that contained data on RACF to ED transfer and on RACF patients aged 65 and over (even if these were not the primary focus of studies). For determining RACF to ED transfer volume and casemix, data was not used if presented as hospitalisation from RACF without reference either to ED transfer or transfers not resulting in hospitalisation. However, as most studies examining alternate care provided within RACF referred to avoidance of hospital rather than ED transfer as their outcome, we analysed these as a secondary analysis.

Studies were initially reviewed by the first author and then checked by the second author with inclusion determined by agreement. We sought to conduct meta-analyses, with descriptive analysis where this was not possible.

Results

Twenty-seven studies met inclusion criteria for primary analysis including one systematic review (Figure 1). Fifty-three studies including three systematic reviews were used in the secondary analysis.

The review yielded no studies suitable for statistical meta-analysis. Few comparative trials were found and clinical and methodological heterogeneity precluded meta-analysis. Therefore, we exclusively report a descriptive analysis.

i. How often, and with what conditions, do people living in RACF present to ED?

Thirteen studies from seven countries answered this question (Table 1) [**5–17**]. A number of studies were excluded

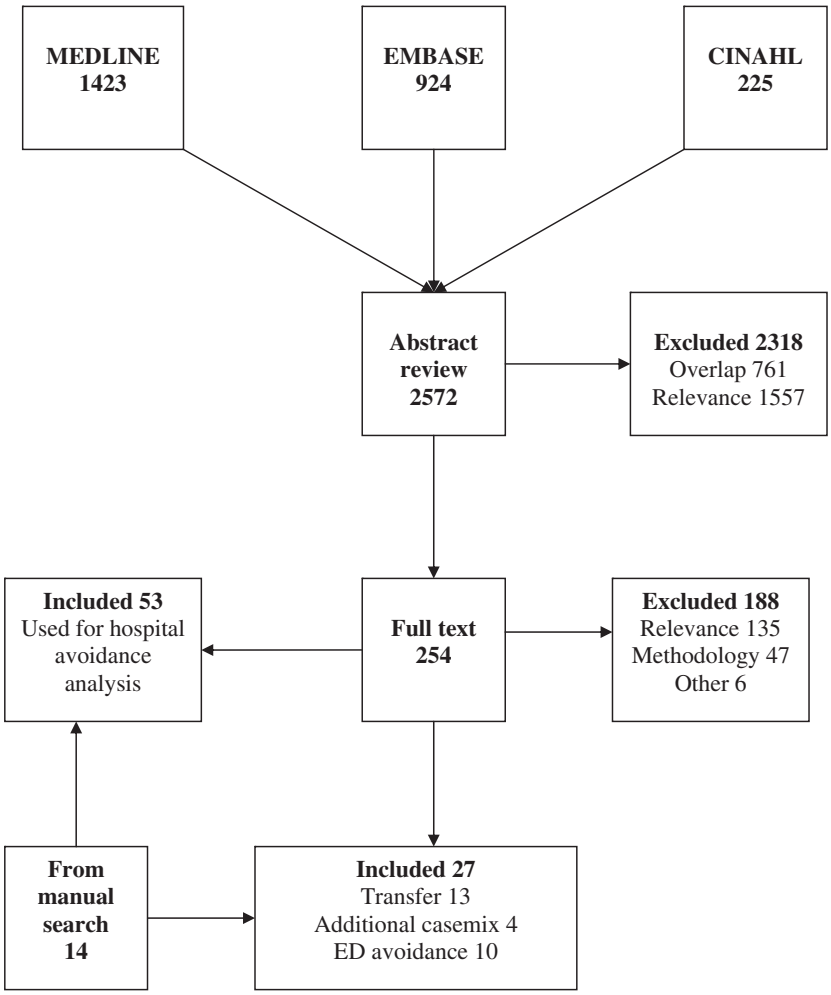

Figure 1. Identification of studies for inclusion in systematic review.

Table 1. Summary of studies examining volume of RACF to ED transfer

Principal author	Country	Period	Patients (N)	Setting	Method	Results	Comments
Ackermann	USA	1995	873	4 ED, 10 RACF in one state	Retrospective review	1.3% ED visits, 1.1 ED visits per RACF resident per yr	Only 83% of RACF pts aged 65+
Bergman	Canada	1981-83	55	Single RACF	Retrospective review	0.3 ED visits per RACF resident per yr	
Burton	USA	1992-95	2153	59 RACF in one state	Prospective observational	0.4-0.7 ED visits per RACF resident per yr	Data extracted from larger study
Finn	Australia	2002	541	Single hospital	Retrospective review	2.1% ED visits	
Finucane P	Australia	1998	300	Single hospital	Prospective	2.4% ED visits	Restricted to age 65+; 50% from hostel
Finucane T	USA	1988	3535	58 RACF in 11 states	Retrospective questionnaire	0.4 ED visits per RACF bed per yr	Secondary data extracted from study examining CPR in RACF
Hui	China (HK)	1998	299	Single RACF	Prospective	1.5 ED visits per RACF bed per yr	Data extracted from study evaluating telemedicine in RACF
Iwata	Japan	2002-03	116	Single hospital	Prospective	0.4% ED visits	
Jones	USA	1993	709	Two hospitals in two states	Prospective	1.3% ED visits	
Lee	Singapore	2001	201	Single hospital	Prospective observational	0.7% ED visits	Proportion ED visits extrapolated from average daily attendance
Reuben	USA	1995-96	402	3 centres across US	Cross sectional and retrospective	0.1-0.4 ED visits per RACF resident per yr	Comparative trial of 3 different methods of primary care in RACF
Schwebel	France	2002	572	52 RACF referring to one hospital	Retrospective	0.2-0.4 ED visits per RACF bed per yr	Heterogeneity of RACF population
Wilson	Canada	1997-99	4774	All RACF in one province	Prospective	0.4 ED visits per RACF resident per yr	Data from larger epidemiological study

on various grounds (Supplemental Data Appendix 2 in *Age and Ageing* online).

Frequency of patient transfer is reported either as a proportion of total ED presentations or annual incidence per RACF bed or resident. Transfers from RACF comprise 0.4 to 2.4% of all ED presentations. There are 0.1–1.5 ED transfers per RACF resident/bed per year, though most studies found at least 30 transfers for every 100 residents/beds. Where the incidence was less, circumstances specific to those studies may explain the findings—two studies reported up to 40 transfers per 100 residents per year but methods of primary care provision within the facility [**17**], or the type of facility [**7**], led to lower rates.

Few studies contained comprehensive casemix data. One reported that musculoskeletal problems were most prevalent and accounted for 25% of ED presentations from RACF, whilst the most common individual diagnoses were pneumonia (11%), soft tissue injury (10%) and fracture (10%) [**12**]. Another found similar results [**13**]. Two studies describe a symptom casemix, with fever and fall amongst the top three diagnoses [**6, 16**]. Only one study discussed the relationship between presenting symptom and likelihood of discharge from ED back to the referring RACF—more than two-thirds of patients with fall or injury are discharged, compared to less than one-third with respiratory or neurological symptoms [**9**].

One systematic review contains no primary data but reports the most common presenting symptoms in patients transferred to ED from RACF are falls (7–29%), gastrointestinal (10–13%), respiratory (8–14%), altered mental status (9–12%), catheter problems (4–15%) and fever (5–10%) [18]. The casemix of all patients aged 65 or over in ED (not restricted to those from RACF) is similarly broad, but the prevalence of conditions such as minor trauma from fall is higher in patients from RACF compared to the general elderly population [19, 20].

ii. What are the clinical outcomes and costs of ED transfer and care for RACF patients?

Data addressing this question was sparse. Studies tended to report overall hospital admission rates from RACF, rather than focus on the clinical outcomes and costs of ED transfer and care. Two studies reported retrospective analysis of cases. One found 42% of RACF transfers result in hospital admission and a further 1% died in ED; 70 and 40% of transfers undergo investigation and procedure in ED, respectively; and the average cost per visit (in 1995)

was $US1239 [**9**]. A second found 60% of transfers resulted in admission with 15% of those admitted dying in hospital; in ED, 80% underwent investigation and 66% at least one procedure [**12**].

Two prospective single hospital studies found comparable hospital admission rates [**13, 16**]. A larger prospective cohort study describes costs and outcomes over 2 years associated with hospitalisation from RACF, but results are presented without reference to ED [21].

iii. What are the components, clinical outcomes and costs of programs that directly aim to reduce ED transfer and care for RACF patients?

Nine trials with a primary outcome measure of ED transfer were found (Table 2) [**15, 17, 22–28**]. In each the intervention comprised one or more geriatric trained professionals providing additional RACF care. Results are conflicting; some found significant reduction in ED referrals whilst others showed non-significant or no reductions. No cost-effectiveness analyses were found. These results refer only to the effect of the intervention on ED transfer; studies may have found additional positive outcomes associated with interventions. One trial was excluded as the authors make a distinction between the setting of their trial and RACF [29]. Additionally, a single centre study evaluated a system comparing direct admission to hospital versus admission via ED of selected RACF patients and found no difference in clinical outcome [30]. The study was retrospective, inadequately powered to find clinical differences and contained no cost-effectiveness analysis.

Most studies instead refer to programs designed to reduce hospitalisation in RACF residents. Hospitalisation and ED transfer are not synonymous; hospitalisation may be direct, bypassing ED, and at least 40% of transfers to ED are discharged back to RACF without admission [**12**, 30]. Additionally, some studies reported after the introduction of geriatric nurse practitioners within RACF that the number of hospitalisations decreased but the number of ED visits were unchanged [**25, 27**, 31]. The cost effectiveness of nurse practitioners may rely almost entirely on their capacity to prevent hospitalisations even though they increased the use of other medical services including ED visits [31]. As such, there is insufficient evidence to assess whether interventions influencing hospitalisation rates also influence ED transfer rates, or to determine the direction of that influence.

Nonetheless, although not an aim of our study initially, we have chosen to summarise the literature on programs designed to decrease hospitalisation from RACF. There are likely to be many similarities between programs designed to reduce hospitalisation and ED transfer. We summarise the evidence for these strategies under three headings.

Management of defined medical illness within RACF

These studies report on strategies of enhanced management of circumscribed illnesses within the RACF as an alternative to hospitalisation. Nursing home-acquired pneumonia has been most comprehensively studied, but other conditions such as heart failure [32] and psychiatric illness [33] have been examined.

A 2005 systematic review summarised the nursing home-acquired pneumonia evidence to that date, finding in observational or case control studies management of this condition within RACF for selected patients resulted in reduced cost, morbidity and possibly mortality [34]. This review did not include one trial that found no change in hospitalisation with

Table 2. Summary of studies with primary outcome measure of ED transfer from RACF

Principal author	Country	Method	Intervention	Findings and Comments
Aigner	USA	Retrospective review	NP	No reduction in ED visits or cost saving
Burl	USA	Retrospective review	NP	17% reduction in ED visits, significant cost reduction, no CEA
Cavalieri	USA	RCT	MGAT	Non-significant reduction in ED visits
Chappell	USA	Before-after study	Nurse visitation to RACF	20% reduction in ED visits, inappropriate statistical analysis of results
Hui	China (HK)	Before-after study	Telemedicine added to MGAT	9% reduction in ED visits, no statistical comparison, reduced total costs, no CEA
Kane (1)	USA	Retrospective with facility matching	NP	No reduction in ED visits, significant reduction in hospitalisations
Kane (2)	USA	Before-after	Altered financial arrangements for NP	No reduction in ED visits, improvements in other outcomes
Kane (3)	USA	Cross sectional	NP	Significant reduction in ED visits
Reuben	USA	Retrospective	Three systems of managed care within RACF	Significant reduction in ED visits with one of three systems

CEA cost-effectiveness analysis.
MGAT multidisciplinary geriatric assessment team.
NP nurse practitioner.
RCT randomised controlled trial.

pneumonia management guidelines [35]. Subsequent to this review, a randomised trial of a clinical pathway with study nurse support versus usual care to manage nursing home-acquired pneumonia found reduced hospitalisation and cost with no increase in mortality or adverse event in the intervention arm [36]. Residents that received treatment within the RACF in this trial expressed a preference for remaining within the RACF even though they anticipated receiving good care in hospital [37].

Enhanced undifferentiated primary or acute care within RACF

Rather than focusing on specific illnesses, these utilise various methods of adding external clinical resources to the usual RACF resource pool, aiming to reduce hospitalisation through enhanced surveillance and management of illness within the facility [38].

A 1997 review summarises results from five studies that showed reductions in hospitalisation with enhanced RACF care [39]. Two of these are by Kane *et al.*, and further work by his group found similar results [**28**]. In addition to these, our search found three others, none with robust comparative methodology. A before–after study in a single RACF found significant reduction in hospitalisation rates, total hospital bed days and costs with the introduction of 15 h per week of geriatric physician assistant care to the facility [40]. In another, a panel of three physicians retrospectively assessed 112 cases from nine RACF and found in 76% of cases that the patient would have required hospitalisation or ED transfer if not for the managed care program [41]. This study used a number of assumptions to estimate total cost savings but no cost-effectiveness analysis. A third describes a program of managed care using physicians and nurse practitioners that reduced hospital usage compared to historical controls [42]. A lack of clinical detail for both the intervention and comparator groups makes the results difficult to interpret. No cost-effectiveness analysis was reported with results expressed in bed days saved without a description of the incremental cost of the intervention. Many 'hospital in the nursing home' studies are purely descriptive [43]. As noted, at least one study found nurse practitioners within RACF associated with decreased hospital admissions, but increased ED transfers [31].

Enhanced use of advanced care directives and end-of-life palliative care within RACF

Advanced care directives are documents expressing a resident's wish for care, encompassing one or more of do not hospitalise orders, do not resuscitate orders, appointment of a medical proxy and prohibitions on interventions such as nutrition by tube feeding [44]. Palliative care improves the quality of life through the prevention and relief of suffering during terminal illness. Though there is overlap between the two, they should be considered complementary strategies.

In a cluster randomised controlled trial in Canadian RACF, advanced care directives were found to almost halve the hospitalisation rate, number of hospital bed days and total healthcare costs [45]. Two less rigorous comparative trials found approximately 25% reductions in hospitalisation with programs that incorporated advanced care directives with other documentation and management strategies such as hospital in the nursing home. [46, 47].

The overall prevalence of do not hospitalise orders is modest and the proportion of residents in any one RACF with such orders varies widely, from 0 to 99% [48–51]. The prevalence of do not resuscitate orders in individual RACF is also broad [52, 53]. Compliance with do not hospitalise, do not resuscitate and other treatment directives is generally good [54–56], though not universal [57, 58]. Institutional orders are sometimes employed as an alternative to individual patient orders [**14**, 59, 60].

In a questionnaire study more than half the family members of people that had died in RACF after receiving specialist palliative care believed that without such care their relative would have required hospitalisation [61]. A small before after study found significant increases in palliative care provision and the number of residents dying in RACF as opposed to hospital with a focused end-of-life program [62]. As few as 1% of patients that die in RACF receive such care, suggesting overcoming barriers to provide such may impact on hospitalisation frequency [63].

Discussion

We have conducted a comprehensive review of published literature to assess the evidence for the effectiveness and cost-effectiveness of interventions to reduce ED transfer for RACF patients. We found the proportion of ED cases that arise as transfers from RACF ranges from 0.4% to 2.4% and the rate of transfer to ED from 0.2 to 1.5 ED visits per RACF bed/resident per year, with Western countries at the upper end of these ranges. Variation is likely driven by the type of RACF, the functional and clinical status of residents within the RACF, the density of RACF in the community and individual RACF transfer policies. For example, transfer figures may be at the lower end if a proportion of hospitalisations from RACF are booked admissions direct to an inpatient bed, bypassing ED [64, 65].

There is a broad casemix seen in ED from RACF and a sizeable proportion of patients transferred from RACF to ED are not hospitalised. The diversity of clinical presentations and the high proportion of discharges after ED care need to be considered when interpreting studies that focus on hospitalisations from RACF for discrete illnesses.

Given the paucity of data, we are unable to definitively determine the relative merit of ED transfer versus alternate care. Available data suffers from methodological limitations - the only two randomised controlled trials were small and not sufficiently powered to detect a difference [**24**, 29]. Whilst there may be other clinical benefits of geriatric assessment teams and nurse practitioners in RACF, most studies reveal no or non-significant reductions on ED transfer rates and

are unaccompanied by any cost-effectiveness analysis. One study [30] poses the question of whether ED transit en route to hospitalisation in selected cases is of any clinical or economic benefit – an area worthy of further research.

In comparison, there is reasonable data to assess alternates that aim to reduce hospital admission from RACF. However, avoidance of hospital admission is not synonymous with avoidance of ED transfer; we therefore caution care in drawing conclusions about ED from studies that refer only to hospital admission avoidance.

Our review divided strategies to reduce hospitalisations from RACF into three categories; management of specific acute illnesses, enhanced primary care provision and enhanced use of advanced care directives. There is good evidence that nursing home-acquired pneumonia guidelines reduce hospitalisation, and this may be used as a template for trials to compare RACF with hospital management for defined conditions.

The evidence is weaker but still suggestive that enhanced primary care reduces hospitalisation. Primary care services in RACF are influenced by factors to do with the physician (training, availability), physician support (interdisciplinary teams, skill mix at facility) and government (funding, legal requirements) [66, 67]. The decision to transfer can be distorted by financial incentives where these strongly favour hospitalisation such as cost shifting from a private operator to the public hospital system [68–70], although in one survey [71] of RACF management less than 1% agreed that financial factors were the major influence in decision to transfer. Different funding systems across nations need to be borne in mind when comparing outcomes associated with primary care in RACF [72]. A recent study describes the scope of general practitioner services in RACF [73]. However, availability of these is not universal, influencing decision to transfer to ED [**12**, 74, 75]. In studies limited to acute infectious illnesses it was found less than a third of calls to physicians from RACF resulted in a physician visit to the facility [76, 77]. Finally, individual clinicians faced with the same clinical scenario will have different thresholds for deciding that referral to ED is appropriate [67, 78].

There is good evidence that advanced care directives reduce hospitalisation. A number of factors limit advanced care directive uptake [79–86]. These include not only clinical, demographic and facility factors but physician factors such as fear of litigation and philosophical opposition to advanced care directives [44, 49, 79, 86–88].

The RACF population is heterogeneous and there is a complex interplay of factors influencing hospitalisation, shown in a study that dichotomised RACF into low (hospitalisation rates less than 25/100 RACF residents/year) and high (>40/100 RACF residents/year) transfer facilities [89]. Amongst other factors the level of patient functional and cognitive impairment, the ability to undertake procedural work within the RACF, facility philosophy towards transfer and perceived medicolegal risk all differed between low and high transfer facilities. Other research has found that after controlling for many patient factors some facilities have higher transfer rates – suggesting transfer heterogeneity is not based entirely on patient heterogeneity within or between facilities [90]. Likewise multiple factors influence decisions to hospitalise by personnel of RACF [91, 92]. Interventions to reduce hospitalisation in high transfer facilities are likely to yield more impressive results than studies undertaken in RACF with low hospitalisation rates. Nursing workforce shortages, funding shortfalls for RACF and increasing litigation have all been postulated as contributors to increasing hospitalisation rates [93].

Limitations

We adopted an inclusive definition of RACF for comprehensiveness, but this means that our review includes studies with variant levels of patient disability and illness. We have focused on peer-reviewed published quantitative data [94]. Other RACF programs exist which have not yet published peer-reviewed results, the inclusion of which would strengthen this review. Although we chose to look at strategies reducing hospitalisation rates as a secondary analysis, our search strategy was directed towards ED transfer, and we cannot be confident that all studies looking at reducing hospitalisation are included in our review.

A number of qualitative studies have explored the views of patients and staff concerning RACF to ED transfer. Whilst important for understanding the complexity involved in deciding to transfer the frail and terminally ill, they were outside the scope of our review. A systematic analysis of these publications would supplement our findings. We also did not review hospital in the home programs that may involve RACF patients amongst the broader population of patients treated by such services. It should be noted that many referrals to such programs come from ED and they are primarily aimed at reducing hospital bed day occupancy [95].

Conclusions and future research directions

There is a high annual risk of transfer to ED from RACF. Our review highlights the need for methodologically sound prospective trials that compare ED care versus alternatives, such as care provided in the RACF for acute illness and injury or direct hospitalisation bypassing ED. Such trials should include rigorous cost-effectiveness analyses.

Keypoints

- The incidence of transfer between aged care facilities and ED is high.
- There is a paucity of evidence demonstrating benefit of programs aiming to reduce transfer to ED.
- Future comparative research with cost effectiveness analysis is needed to decide if such programs are effective or efficient.

Conflicts of interest

None.

Supplementary data

Supplementary data are available at *Age and Ageing* online.

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(The long list of references suppporting this review has meant that only the most important are listed here and are represented by bold text throughout the review. The full list of references is available at *Age and Ageing* online.)

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