REVIEW PAPER

Effectiveness of gerontologically informed nursing assessment and referral interventions for older persons attending the emergency department: systematic review

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Abstract

Title. Effectiveness of gerontologically informed nursing assessment and referral interventions for older persons attending the emergency department: systematic review.

Aim. This paper is a report of a literature review conducted to analyse data from published studies reporting nursing interventions targeted at older attendees of emergency departments (EDs), and to provide a critical appraisal of the evidence concerning their effectiveness.

Background. Attendance at hospital EDs by older persons presents opportunities for targeted interventions to address actual and potential problems associated with or in addition to the presenting problem. The evidence concerning the effectiveness of such interventions is mixed.

Data sources. Studies were retrieved from a systematic search of published works indexed in CINAHL, MEDLINE (PubMed), Science Direct and the Cochrane Central Register of Controlled Trials (CENTRAL).

Methods. A systematic review of effectiveness was conducted using the Cochrane Effective Practice and Organisation of Care guidelines and a narrative synthesis approach for data handling and presentation. The review period was 1992 to 31 August 2008.

Results. Nursing assessment and referral interventions have demonstrated effectiveness in reducing service use and improving physical function, but have failed to demonstrate statistically significant effects on predicted patient and/or health systems outcomes.

Conclusion. The evidence of the effectiveness of gerontologically informed nursing assessment and referral interventions in EDs must be accepted with caution, as not all studies demonstrated effectiveness in predicted patient and/or health systems outcomes, and the testing of complex social interventions in randomized clinical trials is inherently problematic. Further evidence of the effectiveness of nursing interventions is required, and such evidence might be usefully demonstrated using pragmatic, as opposed to explanatory, trials.

Keywords: effectiveness, emergency department, gerontology, nursing, older persons, systematic review

Introduction

When compared with the younger population, older adults are more frequent users of emergency departments (EDs), have more repeat visits to EDs, higher hospital admission rates from EDs, and have higher re-admission rates after discharge (Burns 2001, Downing & Wilson 2005). Often presenting with a history of short-term health decline (Caplan *et al.* 2004), the majority of older adults are treated and discharged from EDs (Aminzadeh & Dalziel 2002). Nevertheless, many are at increased risk of re-admission in the short-term (Poncia *et al.* 2000, Caplan *et al.* 2004), with unplanned admission rates as high as 28% at 28 days after ED discharge (Burns 2001). Attendance at EDs gives opportunities for healthcare professionals to conduct interventions aimed at screening for risk of health decline and interventions aimed at follow-up transitional and preventive care (McCusker *et al.* 2001, Hastings & Heflin 2005). Targeted assessment and greater emphasis on discharge planning appear to be critical in achieving optimal health outcomes for older people admitted to acute care settings (Hickman *et al.* 2007).

While a number of reviews of interventions for older ED attendees have been published, to date no effectiveness review has focussed exclusively on gerontologically informed nursing interventions in this group. A systematic review of interventions designed to improve outcomes for elders discharged from the ED demonstrated that gerontological nursing assessment and home-based services can reduce functional decline among high-risk elders (Hastings & Heflin 2005). A review of comprehensive geriatric assessment (CGA) interventions among non-institutionalized older adults indicated that CGA reduces ED use (McCusker & Verdon 2006). However, Aminzadeh and Dalziel (2002) reviewed aspects of ED use among older adults, including the effectiveness of interventions, and concluded that CGA and coordinated discharge planning may result in better identification of previously undetected health problems, thereby increasing rather than decreasing service use. Overall, results from reviews indicate that the effectiveness of assessment and referral interventions in older ED attendees has proved inconclusive (Aminzadeh & Dalziel 2002, Hastings & Heflin 2005).

Typology of nursing interventions

Nursing interventions aimed at older ED attendees may be categorized according to the following simple typology: (i) assessment and screening interventions; (ii) referral and follow-up interventions and (iii) novel programmes and care protocols.

The most common types are assessment and screening interventions and postdischarge referral for transitional or preventive care, delivered either singly or in combination. Interventions categorized as novel programmes and care protocols include quick response programmes, case management and care coordinator approaches, and interventions aimed at addressing a particular problem or need. The focus of the present effectiveness review was on intervention types (i) and (ii) only, as these are frequently deployed in combination in randomized controlled trials (RCTs) and in before-and-after designs, and because published reports on their use contain effectiveness data.

The review

Aim

The aim of the review was to analyse data from published studies reporting nursing interventions targeted at older ED attendees, and to provide a critical appraisal of the evidence concerning their effectiveness.

With a specific focus on *nursing* interventions conducted in association with ED attendance, we aimed to complement other published reviews in the field, and to answer the following review questions:

How effective are gerontologically informed nursing assessment and referral interventions aimed at older ED attendees?

What are the methodological issues associated with evaluating the effectiveness of these interventions?

Design

The review design was informed by current best practice guidelines, as set out in the Cochrane Effective Practice and Organisation of Care (EPOC) approach for appraising trials in systematic reviews (Grimshaw *et al.* 2003), in particular those elements relating to the identification and screening of sources, quality assessment, and data extraction. The rationale for drawing on the EPOC approach was its focus on the effectiveness of professional interventions, and because the approach allows for inclusion of commonly used nursing intervention designs in the field, including RCTs and before-and-after designs (Grimshaw *et al.* 2003). Although no statistical aggregation of results was performed, we also drew on elements of the QUORUM Statement on conducting meta-analysis of RCTs (Moher *et al.* 1999), in particular the elements relating to content and quality of RCT reporting.

Search methods

Search strategy

A systematic search of published works indexed in CINAHL, MEDLINE (PubMed), Science Direct, and the Cochrane Central Register of Controlled Trials (CENTRAL) was conducted. The search terms used were older people, older adult, elderly, aged, emergency, ED, nurse, nursing, intervention, trial, treatment, and outcome. Search keywords were combined with the nursing subject headings 'Gerontological Nursing,' 'Emergency Nursing', and with MeSH terms 'Emergencies' and 'Emergency Care'. Bibliographies of retrieved articles were examined for the key search terms in their titles. The search was confined to English language publications and the review period was 1992 to 31 August 2008. For the purpose of the review, 'gerontologically informed nursing intervention' was operationally defined as a nurse-led care action, programme or care protocol conducted within the scope of nursing practice, and informed by the scholarship of gerontology and related nursing science. 'Older people' were defined as adults aged 60 years and over. 'ED' was defined as the department of a hospital or tertiary care facility that provides care to patients in immediate need. Since EDs vary in their scope of services and serve particular communities with particular demographic profiles and needs, details of ED and population characteristics are reported where available.

Inclusion and exclusion criteria

Studies were included if they constituted reports of interventions undertaken by a nurse(s), or involving a nurse(s) in multidisciplinary interventions, in which the *content* of the intervention was activities conducted within the scope of nursing practice and the *context* of the intervention was the index ED visit. Accordingly, reports of clinical trials, before-and-after designs, and descriptive-evaluative studies were included.

Studies involving interventions outside the scope of nursing practice and/or not directly associated with the index ED visit were excluded, as were reports of interventions led by medical researchers, and reports of the development and testing of risk screening instruments. To avoid reporting bias, findings from review papers were excluded from the results.

Search outcome

The database search yielded a total of 296 citations, from which 32 papers were selected for further screening based on abstract content and, of this number, six did not meet the inclusion criteria. The remaining 26 papers, which reported

on nursing interventions associated with the index ED visit, were then categorized according to intervention *type*. Thirteen of these were categorized as novel programmes and care protocols and 13 as nursing assessment and referral interventions, of which 11 reported effectiveness data and were selected for final inclusion in the review (Figure 1). Independent analysis indicated that each report contained no significant or substantial threats to internal validity based on criteria related to group assignment and comparability, intervention and follow-up bias, and so forth. Accordingly, and notwithstanding design limitations reported by authors, it was determined that no paper warranted exclusion based on methodological quality.

Quality appraisal

The abstracts were examined by the first author and a second reviewer for eligibility for inclusion and, once selected, quality appraisal and data extraction was performed independently and simultaneously by the same reviewers using a common approach to data extraction (Grimshaw *et al.* 2003). The methodological quality of the selected studies was independently assessed by the first author and a second reviewer. Using the checklist described by Grimshaw *et al.* (2003), clinical trials were quality appraised with reference to key attributes that might constitute intervention bias or overestimation of effectiveness, including sampling, randomness, blinding, intention-to-treat (ITT) analysis, intervention characteristics, and outcome measures. Methodological quality of non-RCTs was considered with reference to intervention type, outcomes, and bias. With the focus on the magnitude of effects on predicted outcomes, we did not apportion extrinsic or intrinsic value to outcome variables measured. Involving a component of quality checks approach (Moher *et al.* 1999, Grimshaw *et al.* 2003), the process of quality assessment of internal validity indicated no fundamental methodological flaws in study designs.

Data extraction

Using the EPOC checklist, study data were analysed with reference to their inclusion criteria, participant and provider characteristics, setting, location and country of intervention, study methods, quality criteria, characteristics of intervention and delivery method, control measures, desired outcomes, outcome measures used, and results. Both primary and secondary outcomes were included for reporting. No re-analysis of study data was undertaken and no contacts with authors were undertaken for missing data. Extracted

Figure 1 Study flow chart.

data were processed by collating and displaying in tabular summaries, and cross-checking was performed to reduce the risk of errors in data handling. Particular design characteristics, such as clinician and outcome assessor awareness of group assignment, follow-up procedures, and reported odds ratios, were identified and further highlighted in a narrative summary. The impact of methodological quality on results was considered.

Synthesis

In common with similar reviews (Aminzadeh & Dalziel 2002, Hastings & Heflin 2005, McCusker & Verdon 2006), statistical aggregation of results of primary outcomes was not undertaken due to heterogeneity of outcome variables and the methods for measuring them. Instead, the review involved a narrative synthesis approach; the construction of the narrative synthesis of findings from selected studies was iterative and involved textual descriptions, complemented with tabular summaries, and aspects of the main design and results elements were presented in the narrative with a particular focus on effectiveness and effect size.

Results

Design features: randomization, blinding and control

Of the assessment and referral intervention studies containing effectiveness data, seven were clinical trials and two were before-and-after designs (Table 1). In the clinical trials reviewed, randomization of participants was undertaken in five instances (Runciman *et al.* 1996, Gagnon *et al.* 1999,

Mion *et al.* 2003, Caplan *et al.* 2004, Basic & Conforti 2005), while quasi-randomization (by day of ED visit) was reported in one trial (McCusker *et al.* 2001, 2003a, 2003b), and non-randomization in another (Miller *et al.* 1996). Blinding of participants was not undertaken in any of the trials reviewed, but observer blinding to group assignment was reported by Mion *et al.* (2003), while partial observer blinding was reported by McCusker *et al.* (2003a). Intention-to-treat analysis was undertaken in four trials (Gagnon *et al.* 1999, McCusker *et al.* 2001, 2003a, 2003b, Mion *et al.* 2003, Caplan *et al.* 2004), and these same studies had acceptably high rates of follow-up (Hastings & Heflin 2005). Self-reported design limitations included possible contamination bias due to the control arm inadvertently receiving elements of the treatment (Gagnon *et al.* 1999), dilution of intervention effect due to non-administration of the intervention to all the intervention participants (McCusker *et al.* 2001, 2003b), bias due to non-blinding of observers (Caplan *et al.* 2004), lower rate of follow-up in control participants (McCusker *et al.* 2001), and uncertainty as to which intervention components were effective in achieving outcomes (McCusker *et al.* 2001). In non-experimental designs the main design limitation was absence of a control arm.

Interventions and outcome measures

A variety of assessment and referral interventions were deployed. These included an ED-based assessment by an aged care nurse specialist, carer and healthcare provider liaison, and postdischarge referrals (Basic & Conforti 2005), nursing assessment at the ED and at home (incorporating care planning and referrals), weekly interdisciplinary case

Table 1 Assessment/screening and referral/follow-up interventions

Study	Design	Sample and setting characteristics	Nursing intervention type	Primary and secondary outcome variables measured	Results
Hegney <i>et al.</i> (2006)	Before-and-after design	Elder ED attendees ($n = 2139$) over 70 years of age regional hospital, Australia, serving population of approximately 89,000 people	Discharge and Referral to Services risk screening tool was administered by community nurse to older ED attendees	Re-presentations to the ED; average LOS; hospital admissions and re-admissions within 28 days	Overall re-presentation and re-admission rates statistically significantly lower at the end of the postintervention period
Basic and Conforti (2005)	Randomized controlled trial	Elderly ED attendees ($n = 224$) admitted to a busy tertiary referral hospital, Sydney, Australia	Aged care nursing intervention (comprehensive geriatric assessment) based in the ED, liaison with carers and health providers, organized referrals postdischarge, assisted in care of those admitted from the ED	Admission to hospital, LOS, functional decline during hospitalization	No significant effect on admission to hospital, LOS or functional decline during hospitalization
Caplan <i>et al.</i> (2004)	Randomized controlled trial	ED attendees aged 75 years ($n = 739$) discharged from an urban ED (area trauma centre), Sydney Australia	Nursing assessment at the ED and at home, formulation of a care plan, urgent interventions and referrals, case presentation at weekly interdisciplinary team meetings, and initiation of appropriate interventions for up to 4 weeks	Admission to hospital, admission to the ED, time to first ED admission, physical and cognitive functioning	Statistically significantly fewer total admissions in intervention participants; statistically significant decrease in emergency admissions among intervention participants over the 18 months of follow-up; greater decline in physical function in control participants at 6 months
Guttman <i>et al.</i> (2004)	Pre- and postintervention design	ED attendees aged 75 years and older ($n = 1724$) at university affiliated tertiary care hospital ED, Montreal, Canada	ED-based NDPC (patient education, coordination of appointments, telephone follow-up, access to the NDPC for up to 7 days postdischarge)	Level of unscheduled return visits within 14 days of discharge, satisfaction with discharge recommendations, adherence with discharge instructions, and perception of well-being	Relative risk reduction for unscheduled return visits up to 8 and 14 days postdischarge; significant increases in patient satisfaction with clarity of discharge information and perceived well-being in intervention participants

Table 1 (Continued)

Study	Design	Sample and setting characteristics	Nursing intervention type	Primary and secondary outcome variables measured	Results
Mion <i>et al.</i> (2003)	Randomized controlled trial	ED attendees aged 65 years and over ($n = 650$) discharged home from two urban academic EDs, Cleveland, USA	Comprehensive assessment in the ED undertaken by ANP, discharge plan and referrals	Service use after the index ED visit (subsequent ED visit, hospitalization or nursing home admission) and satisfaction with care	Lower nursing home admissions and increasing satisfaction with care in intervention participants, but failed to demonstrate statistically significant results
McCusker <i>et al.</i> (2003a)	Secondary data analysis from McCusker <i>et al.</i> (2001) study	ED attendees aged 65 years and older ($n = 388$) discharged from four university-affiliated hospital EDs in Montreal, Canada	Risk assessment tool administered by community nurse, either by interview in the ED or by telephone postdischarge	Process of care variables (patient referrals and visits to primary physician and local community health centre, return visits to the ED)	Intervention participants more likely to have a referral to local community health centre and primary physician, and to have received home care services 1 month following index ED visit; intervention participants more likely to make return visit to the ED
McCusker <i>et al.</i> (2003b)	Secondary data analysis from McCusker <i>et al.</i> (2001) study	ED attendees ($n = 356$) aged 65 years discharged from four academic hospital EDs, Canada	Risk assessment tool administered by community nurse, either by interview in the ED or by telephone postdischarge	Process of care variables: patient referrals and visits to primary physician and local community health centre, return visits to the ED)	Intervention was cost effective in not increasing overall societal costs
McCusker <i>et al.</i> (2001)	Quasi-randomized trial (randomization by day of ED visit)	ED attendees aged 65 years and older ($n = 388$) discharged from four university-affiliated hospital EDs in Montreal, Canada	Identification of Seniors at Risk screening tool administered by community nurse, either by interview in the ED or by telephone postdischarge	Patient and caregiver satisfaction, decline in functional status, death or nursing home placement. Change in depressive symptoms. Change in caregiver health status	Reduced functional decline at 4 months; no significant effect on depressive symptoms, caregiver outcomes or satisfaction
Gagnon <i>et al.</i> (1999)	Randomized controlled trial	ED attendees ($n = 427$) aged 70 years or older discharged home from the ED of a university hospital in Montreal, Canada during the previous 12 months	Nurse case management. Minimum of a monthly telephone call and home visit every 6 weeks	Hospital admissions and LOS. ED re-admission. Mortality, health status, satisfaction with care, functional status	Patients re-admitted to ED statistically significantly more often; increased average number of ED visits in intervention group; no statistically significant difference in quality of life, satisfaction, functional status, admission to hospital or length of hospital stay

Table 1 (Continued)

Study	Design	Sample and setting characteristics	Nursing intervention type	Primary and secondary outcome variables measured	Results
Runciman <i>et al.</i> (1996)	Randomized controlled trial	Older ED attendees aged 75 years and older ($n = 424$) discharged from a single urban centre, Edinburgh, Scotland	Visit by health visitor who conducted a standardized assessment and screening for new dependency and support needs, and referred to appropriate community services	Dependence with ADLs and IADLs at 4 weeks postdischarge rates of re-admission	Less dependent in IADLs. No statistically significant difference in ADL dependence or rates of re-admission
Miller <i>et al.</i> (1996)	Non-randomized clinical trial	Older ED attendees aged 65 years admitted and discharged from an urban ED, USA	A 30-minute assessment performed by a gerontological nurse clinician in the ED, referral and telephone follow-up	Participant mortality, institutionalization, health status, use of medical and social services, advance directive, quality of life	No significant difference, although evidence of a trend toward fewer subsequent ED visits among the intervention group

ED, emergency department; ADL, activities of daily living; IADL, instrumental activities of daily living; LOS, length of stay; NDPC, nurse discharge plan coordinator; ANP, advanced nurse practitioner.

presentation, and 4-week follow-up (Caplan *et al.* 2004), case-finding assessment and referral intervention conducted by an advanced practice nurse during the ED visit (Mion *et al.* 2003), and a 30-minute nursing assessment with tailored education and limited telephone follow-up by a 'geriatric nurse clinician' in the ED (Miller *et al.* 1996). Other interventions included a risk screening and referral intervention that also incorporated limited follow-up of high risk older ED attendees (McCusker *et al.* 2001, 2003a, 2003b), postdischarge health visitor assessment and screening for new dependency and support needs (Runciman *et al.* 1996), community nurse-led risk screening intervention administered either in the ED or by telephone postdischarge (Hegney *et al.* 2006), and an ED-based nurse discharge plan coordinator (NDPC) intervention combining assessment with referral/discharge planning elements (Guttman *et al.* 2004).

The most frequently used primary outcome measure in the studies reviewed was service use following the index ED visit, and included rates of re-admission or re-presentation to the ED (Miller *et al.* 1996, Runciman *et al.* 1996, McCusker *et al.* 2003a, Caplan *et al.* 2004, Basic & Conforti 2005, Hegney *et al.* 2006), time to first ED admission (Caplan *et al.* 2004), level of unscheduled return visits within 14 days of discharge (Guttman *et al.* 2004), visits to primary physician and local community health centre (McCusker *et al.* 2003a), and nursing home placement (McCusker *et al.* 2001, Mion *et al.* 2003). Physical function has been measured as either a primary (Runciman *et al.* 1996, Gagnon *et al.* 1999, McCusker *et al.* 2001, 2003b) or secondary outcome (Mion *et al.* 2003, Caplan *et al.* 2004, Basic & Conforti 2005) using a range of standardized instruments. Other outcomes have included cognitive functioning (Caplan *et al.* 2004), satisfaction with and adherence to discharge instructions and perception of well-being (Guttman *et al.* 2004), satisfaction with care (McCusker *et al.* 2001, Mion *et al.* 2003), changes in depressive symptoms (McCusker *et al.* 2001, 2003b), changes in caregiver health status (McCusker *et al.* 2001), and costs of post-ED care (McCusker *et al.* 2003b).

Effectiveness of assessment and referral interventions

For predicted outcomes related to service use, statistically significant differences between intervention and control groups were reported in a number of trials. Hegney *et al.* (2006) reported a statistically significant decrease in the ED re-presentation rate from 21% to 5% over an 8-month postintervention period ($\chi^2 = 15.59$, $P = 0.001$). In addition, re-admission rates were statistically significantly lower at the end of the postintervention period than in a 4-month preintervention period ($\chi^2 = 4.61$, $P = 0.05$), and there was a trend

towards reduced average length of stay (LOS) for those admitted to hospital from 7–8 days to 4–5 days after the intervention. Caplan *et al.* (2004) reported statistically significantly fewer elective and emergency admissions for intervention participants [61 (16.5%) vs. 82 (22.2%); $P = 0.048$], and a statistically significant decrease in the number of emergency admissions for intervention participants [164 (44.4%) vs. 201 (54.3%); $P = 0.0072$] over the 18 months of their follow-up intervention. Guttman *et al.* (2004) observed a relative risk reduction for unscheduled return visits postdischarge of 27% (95% CI: 0–44%) for up to 8 days, and 19% (95% CI: –2% to 36%) for up to 14 days among intervention participants, when outcome measures were adjusted for perceived severity of illness and functional autonomy. Mion *et al.* (2003) demonstrated effectiveness in lowering service use: at 30 days after the index ED visit, intervention participants were less likely than controls to have nursing home admission (0.7% vs. 3.0%; OR 0.21; 95% CI: 0.05–0.99). High-risk intervention participants had fewer hospital days (0.6–2.3 vs. 1.6–5.6; mean difference –1.0; 95% CI: –2.0 to 0), fewer nursing home admissions (2% vs. 7%; OR 0.2; 95% CI: 0.04–0.96) at 30 days, and continued to have lower nursing home admissions (3% vs. 10%; OR 0.3; 95% CI: 0.07–0.94) at 120 days when compared with usual care high-risk participants (Mion *et al.* 2003). However, a statistically significantly greater number of community agency referrals were observed among intervention participants (56% vs. 1%; OR 59.3; 95% CI: 21.6–163.1). McCusker *et al.* (2003a) reported that intervention participants were more likely to have a documented referral to their local community health centre (adjusted OR 4.0, 95% CI: 1.7–9.5) and primary physician (adjusted OR 1.9, 95% CI: 1.0–3.4) and to have received home care services (adjusted OR 2.3, 95% CI: 1.1–5.1) 1 month following the ED visit. However, intervention participants were also more likely to make a return visit to the ED (adjusted OR 1.6, 95% CI: 1.0–2.6).

Effectiveness in other outcomes has been reported. Caplan *et al.* (2004) reported less decline in physical functioning among intervention participants at 6 months [decline of 0.25 points ($P = 0.260$) vs. 0.75 points ($P = 0.001$) in Barthel scores] and less decline in cognitive functioning at 6 and 12 months, although physical and cognitive function scores were similar for both groups at 18 months. Guttman *et al.* (2004) observed statistically significant increases in satisfaction with clarity of discharge information [1.7 (1.3–2) vs. 1.5 (1.0–2.0), $P < 0.0001$] and perceived well-being [1.3 (95% CI: 1.03–1.56)] in the intervention group, while Mion *et al.* (2003) observed greater satisfaction with care among intervention participants (3.41 vs. 3.03; mean difference 0.37; 95% CI: 0.13–0.62). Runciman *et al.* (1996) reported that while no statistically significant differences in ADL dependence or re-

admission rates between intervention and control participants were observed, intervention participants were statistically significantly more independent in instrumental ADLs ($P = 0.027$) at 4 weeks postdischarge. McCusker *et al.* (2001) observed a statistically significantly reduced rate of functional decline at 4 months among intervention participants (adjusted OR = 0.60, 95% CI: 0.36–0.99 and unadjusted OR = 0.53, 95% CI: 0.31–0.919). This same team reported that the estimated ratio of overall adjusted costs per patient in the intervention vs. control group was 0.94:1 in favour of the control (95% CI: 0.75–1.17) (McCusker *et al.* 2003b).

Some of these same studies failed to demonstrate statistically significant results for certain other predicted outcomes. While Mion *et al.* (2003) demonstrated effectiveness in lowering nursing home admissions, they failed to show statistically significant results in reducing ‘overall service use’, indicating that their intervention was not effective in meeting its primary outcome. McCusker *et al.* (2001) observed no statistically significant effect of their intervention on depressive symptoms (adjusted OR –0.48, 95% CI: –1.29 to 0.33) or satisfaction. Basic and Conforti (2005) found no statistically significant effects of their assessment intervention on admission to hospital (OR 0.7, 95% CI: 0.3–1.7), LOS (hazard ratio 1.1, 95% CI: 0.7–1.5) or functional decline (OR 1.3, 95% CI: 0.5–3.3) during hospitalization, and referral rates to other healthcare professionals were similar for both intervention and control participants. While Miller *et al.* (1996) observed a trend toward fewer subsequent ED visits among intervention participants (0.26 vs. 0.39, $P < 0.1$), the difference was not statistically significant, and no statistically significant differences were observed in outcome measures associated with institutionalization, health status, use of medical and social services, advance directive, quality of life, functional outcomes and mortality.

Discussion

With a focus on gerontologically informed nursing assessment and referral interventions for older ED attendees, the aim of this systematic review of literature was to appraise the evidence concerning the interventions’ effectiveness, and to address methodological issues in intervention studies in the field.

Effectiveness of interventions

The effectiveness of nursing assessment and referral interventions for older ED attendees has been demonstrated in reduced number of postintervention hospital admissions and/or representations to the ED (McCusker *et al.* 2003a, Mion *et al.* 2003, Caplan *et al.* 2004, Guttman *et al.* 2004, Hegney

et al. 2006), reduced hospital days, nursing home admissions, and community agency referrals (Mion *et al.* 2003), and reduced rate of hospital admissions in the longer term (Caplan *et al.* 2004). Effectiveness has also been demonstrated in reduced dependence in instrumental activities of daily living (Runciman *et al.* 1996), and reduced short to medium-term functional decline (McCusker *et al.* 2001, Caplan *et al.* 2004). Assessment interventions that incorporate a post-ED discharge planning and referral component appear to be more effective, and CGA and multidisciplinary follow-up can improve health outcomes for ED-discharged elders (Caplan *et al.* 2004), thereby reducing subsequent service use (Hastings & Heflin 2005).

While assessment and referral interventions may reduce service use, somewhat paradoxically, such interventions frequently highlight health problems that may increase service use (Sanders 2001, Aminzadeh & Dalziel 2002). For example, Caplan *et al.* (2004) reported that, on average, 1.65 new problems were identified in the intervention group, resulting in increased general practitioner (GP) and outpatient visits and some return visits to the ED. The paradox is further illustrated in the findings that patients who received a nursing assessment intervention were more likely to be admitted to hospital (Basic & Conforti 2005), and those who received postdischarge follow-up were more likely to make a return ED visit in the month following the index visit (McCusker *et al.* 2003a), or have an increased average number of ED visits (Gagnon *et al.* 1999). It may be that the overall economic benefits of such interventions are questionable; based on the DEED 11 study findings (Caplan *et al.* 2004), Gill *et al.* (2005) calculated that, in order to prevent one hospital admission, it would be necessary to treat 17.54 older adults with CGA for up to 28 days, and when precise economic models are applied, it appears that the financial benefits of such interventions are negligible.

The findings from this review indicate that, while some nursing assessment and referral interventions were effective in demonstrating reduced service use and improved physical function, others failed to demonstrate statistically significant effects in predicted outcomes related to service use (Mion *et al.* 2003), admission to hospital and LOS (Basic & Conforti 2005), and subsequent visits to the ED (Miller *et al.* 1996). Where evidence of effectiveness has been shown, it must be accepted with a degree of caution, as not all studies demonstrated improved health systems or patient outcomes, and because testing complex social interventions in randomized clinical trials is inherently problematic.

Bridges *et al.* (1999) question the real value of interventions of this type, as most focus on supplementing what EDs currently offer, rather than fundamentally re-thinking ED

service provision for older people. As self-referral is the most common source of referral to the ED (Basic & Conforti 2003) and many older people present with problems requiring urgent intervention (Eagle *et al.* 1993), ED-based interventions aimed at reducing service use may have little overall impact, as healthcare professionals may ultimately have little real influence on decision to attend the ED.

Some of the mixed evidence on the effectiveness of assessment and referral interventions at index ED visit may be a function of intervention place and timing. Screening – preventive measures may be most effective when routinely administered in the community and *before* the individual has reached a position of immediate need for ED services. Nevertheless, as Caplan *et al.* (2004) found, CGA interventions administered following ED discharge can result in reduced hospital admissions, increased outpatient care, and slower decline in physical and cognitive function, and they concluded that people aged 75 years and older should be referred for CGA after an ED visit. The fact that an assessment and referral intervention could be more effective for high-risk than low-risk elders (Mion *et al.* 2003) suggests that a preliminary predischarge risk assessment in the ED should be a routine prelude to CGA and referral (Aminzadeh & Dalziel 2002). The benefits of a screening assessment and referral intervention appear to derive from early provision of home care rather than early contact with the primary physician (McCusker *et al.* 2003a). Thus, effectiveness may also be a function of establishing continuity of home-based care rather than prompting further medical intervention. It is also possible to consider increased service use, particularly GP attendance, as a positive healthcare systems outcome from such interventions, as it generally involves health monitoring, health education and other preventive activities.

Aminzadeh and Dalziel (2002: 238) write that ‘the current disease-oriented and episodic models of emergency care do not adequately respond to the complex care needs of frail older patients.’ Similarly, Hastings and Heflin (2005: 986) question whether further health service use can be consistently altered and, accordingly, the development of post-ED-discharge interventions to improve the care of older people ‘requires further research into system and patient-centred factors that impact healthcare delivery in this situation’. More understanding of why older people seek help is also important in understanding patterns of ED use (Walters *et al.* 2001). Confounding evidence concerning the effectiveness of interventions to improve the care of older people only serves to highlight a lack of understanding of the key characteristics of care models used to treat older patients in acute settings (Hickman *et al.* 2007), and the best models of care for older ED attendees are not known (Basic & Conforti 2005).

What is already known about this topic

- Older adults are frequent users of hospital emergency services and have higher re-admission rates after hospital discharge.
- Attendance at emergency departments by older adults gives healthcare professionals opportunities to conduct targeted interventions aimed at identifying those at risk of health decline, and providing follow-up transitional and preventive care.
- Previous reviews of evidence in the field have indicated mixed results concerning the effectiveness of health and social interventions aimed at older emergency department attendees.

What this paper adds

- Nursing interventions aimed at older emergency department attendees may be classified according to a typology, with assessment and referral interventions being the most common type.
- While gerontologically informed nursing assessment and referral interventions for older attendees of emergency department reduce service use and functional decline, a number of trials have failed to demonstrate effectiveness in predicted patient and/or healthcare systems outcomes, and in some instances have also identified increased service use.
- Gerontologically informed nursing assessment and referral interventions constitute complex social interventions, and are inherently difficult to test in randomized clinical trials.

Implications for practice and/or policy

- Routine comprehensive assessment and postdischarge referral of older emergency department attendees may reduce service use, including hospital admissions and/or re-presentations to the emergency department, and may lead to reduced functional decline.
- Further research is needed to test the effectiveness of nurse-led assessment and referral interventions for older emergency department attendees.

Methodological issues

The most important test of therapeutic benefit (Kruse *et al.* 2002), the randomized controlled trial, retains the 'gold standard' status among research designs (Lindsay 2004).

Translational science demands detailed reporting of intervention evaluation studies (Altman *et al.* 2001) to permit understanding of the relationship between results, designs and assessment of efficacy in demonstrating clinically significant results (Conn *et al.* 2008). While many nursing intervention studies lack the requisite detail about study design (Lindsay 2004, Conn *et al.* 2008), among the studies reviewed here, the reporting clarity with which to judge effectiveness evidence was generally good. However, information was lacking on aspects such as participant attrition (Caplan *et al.* 2004, Basic & Conforti 2005), and the characteristics of nurses performing the interventions (Lindsay 2004). Absence of a control arm in non-experimental designs carried inherent uncertainty as to the precise source of positive outcomes.

While the RCT has been the principal design deployed to test the effectiveness of nursing interventions for older ED attendees, its use in such contexts gives rise to some methodological concerns (Lindsay 2004), particularly as trials in the setting are difficult to standardize, blind and randomize (Hastings & Heflin 2005), and it is difficult to procure adequate sample sizes (Lindsay 2004). These concerns are borne out by the fact that authors have reported reduced control over some factors and events, such as lack of control over medical and social service delivery during and after the ED visit (Miller *et al.* 1996), contamination of control participants by inadvertent replication of intervention activities (Basic & Conforti 2003, Gagnon *et al.* 1999), and possible differential compliance with follow-up assessment among more dependent control participants (Runciman *et al.* 1996).

While there is evidence that fewer than half of RCTs report intention-to-treat analysis (Kruse *et al.* 2002), our findings in this review do not mirror this wider evidence; four of the five RCTs reports included analysis by intention-to-treat, thereby affording greater confidence that bias was minimized and that erroneous conclusions concerning effectiveness were not made (Altman *et al.* 2001). Another consideration is the timescale over which the effects of interventions can or should be reasonably measured, particularly in older ED attendees who may be considered at relative risk. For example, a number of researchers reported a delayed effect of the intervention (McCusker *et al.* 2001, Mion *et al.* 2003).

Given the inherent lack of control over events, interventions of the nature under review here may be considered as complex social interventions, being characterized by 'actions that are difficult to define and by varied and difficult to control contextual factors', thereby lacking reliability, validity and generalizability (Lindsay 2004: 85). Hence, precision in defining the intervention is needed (Lindsay 2004). While the studies under review here were precise on intervention

content, their context dependency resulted in a potential or real threat of bias caused by diminished control over factors and events in a small number of studies.

While the advantage of the RCT is its great capacity to rule out confounding variables by generating two groups that are similar in most respects, its main disadvantage is its lack of external validity, given that the very controlled events in a trial may not match real-world conditions (Hotopf 2002). A possible solution to these methodological challenges is to use the pragmatic trial, a design that permits the testing of complex social interventions by attempting to capture real events and measure outcomes, including subjective outcomes, as real-life concerns that clients themselves experience and define (King & Thompson 2008). Hence, instead of measuring outcomes as continuous variables that may be of limited relevance to patients and nurses, functional and discrete outcomes may be measured that capture participants' particular and unique responses (Hotopf 2002). The pragmatic trial models everyday practice by maximizing external validity but maintaining acceptable internal validity through randomization but not double-blinding or placebo control (King & Thompson 2008). While beyond the scope of this review, the use of the pragmatic trial in interventions for older ED attendees might provide effectiveness evidence that is grounded in the real world of patients and nurses and is thus more likely to be implemented. Finally, the collection of qualitative data on the older attendees' social and personal circumstances that gave rise to attendance at the ED might prove beneficial in identifying aspects of need, thereby rendering interventions more individualized and relevant, and pointing to outcomes that might be examined in future intervention studies.

Conclusion

The evidence concerning the effectiveness of gerontologically informed nursing assessment and referral interventions for older ED attendees indicates benefits in terms of reduced service use and reduced functional decline. However, there is also evidence of ineffectiveness in predicted patient and/or health systems outcomes, and the findings are broadly consistent with those reported by Hastings and Heflin (2005) and Aminzadeh and Dalziel (2002). While nursing assessment and referral interventions can lead to reduced service use, perhaps unsurprisingly, they can also increase service use. Additionally, the picture remains somewhat unclear as to the precise role of particular interventions in achieving particular predicted outcomes. The appropriateness of the traditional RCT as the basis for establishing effectiveness evidence from complex social interventions involving interpersonal interactions

remains a challenge in this field of research (Lindsay 2004). Accordingly, the effectiveness of the interventions under review demands further research, and such effectiveness might be more usefully tested using the pragmatic trial.

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Conflict of interest

No conflict of interest has been declared by the authors.

Author contributions

GF, MMcC, DO'N, PMcC, MC, VS, AO'D and AC were responsible for the study conception and design. GF performed the data collection. GF and MMcC performed the data analysis. GF, MMcC and DO'N were responsible for the drafting of the manuscript. MMcC, DO'N, PMcC, MC and VS made critical revisions to the paper for important intellectual content. MMcC, PMcC and MC provided statistical expertise.

References

- Altman D.G., Schulz K.F., Moher D., Egger M., Davidoff F., Elbourne D., Gøtzsche P.C. & Lang T. (2001) The revised CONSORT statement for reporting randomized trials: explanation and elaboration. *Annals of Internal Medicine* 134(8), 663–694.
- Aminzadeh F. & Dalziel W.B. (2002) Older adults in the emergency department: a systematic review of patterns of use, adverse outcomes, and effectiveness of interventions. *Annals of Emergency Medicine* 39(3), 238–247.
- Basic D. & Conforti D.A. (2005) A prospective, randomised controlled trial of an aged care nurse intervention. *Australian Health Review* 29(1), 51–59.
- Bridges J., Spilsbury K., Meyer J. & Crouch R. (1999) Older people in A & E: literature review and implications for British policy and practice. *Reviews in Clinical Gerontology* 9, 127–137.
- Burns E. (2001) Older people in accident and emergency departments. *Age and Ageing* 30, 3–6.
- Caplan G.A., Gideon A., Williams A.J., Daly B. & Abraham K. (2004) A randomized, controlled trial of comprehensive geriatric assessment and multidisciplinary intervention after discharge of elderly from the emergency department – the DEED II study. *Journal of the American Geriatrics Society* 52, 1417–1423.
- Conn V.S., Cooper P.S., Ruppar T.M. & Russell C.L. (2008) Searching for the Intervention in intervention research reports. *Journal of Nursing Scholarship* 40(1), 52–59.
- Downing A. & Wilson R. (2005) Older people's use of accident and emergency services. *Age and Ageing* 34(1), 24–30.

- Eagle D.J., Rideout E., Price P., McCann C. & Wonnacott E. (1993) Misuse of the emergency department by the elderly population: myth or reality? *Journal of Emergency Nursing* 19(3), 212–218.
- Gagnon A.J., Schein C., McVey L. & Bergman H. (1999) Randomized controlled trial of nurse case management of frail older people. *Journal of the American Geriatrics Society* 47, 1118–1124.
- Gill S.S., Gibson M. & Al-Hammadi A. (2005) Economic implications of discharge of elderly from the emergency department trial results. *Journal of the American Geriatrics Society* 53(9), 1642.
- Grimshaw J., McAuley L.M., Bero L.A., Grilli R., Oxman A.D., Ramsay C., Vale L. & Zwarenstein M. (2003) Systematic reviews of the effectiveness of quality improvement strategies and programmes. *Quality & Safety in Health Care* 12, 298–303.
- Guttman A., Afilalo M., Guttman R., Colacone A., Robitaille C., Lang E. & Rosenthal S. (2004) An emergency department-based discharge coordinator for elder patients: does it make a difference? *Academic Emergency Medicine* 11, 1318–1327.
- Hastings S.N. & Heflin M.T. (2005) A systematic review of interventions to improve outcomes for elders discharged from the emergency department. *Academic Emergency Medicine* 12(10), 78–86.
- Hegney D., Buikstra E., Chamberlain C., March J., McKay M., Cope G. & Fallon T. (2006) Nurse discharge planning in the emergency department: a Toowoomba, Australia, study. *Journal of Clinical Nursing* 15, 1033–1044.
- Hickman L., Newton P., Halcomb E.J., Chang E. & Davidson P. (2007) Best practice interventions to improve the management of older people in acute care settings: a literature review. *Journal of Advanced Nursing* 60(2), 113–126.
- Hotopf M. (2002) The pragmatic randomised controlled trial. *Advances in Psychiatric Treatment* 8, 326–333.
- King K.M. & Thompson D.R. (2008) Guest editorial: pragmatic trials: is this a useful method in nursing research? *Journal of Clinical Nursing* 17(11), 1401–1402.
- Kruse R.L., Alper B.S., Reust C., Stevermer J.J., Shannon S. & Williams R.H. (2002) Intention-to-treat analysis: who is in? Who is out? *The Journal of Family Practice* 51(11), 969–971.
- Lindsay B. (2004) Randomized controlled trials of socially complex nursing interventions: creating bias and unreliability? *Journal of Advanced Nursing* 45(1), 84–94.
- McCusker J. & Verdon J. (2006) Do geriatric interventions reduce emergency department visits? A systematic review. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences* 61, 53–62.
- McCusker J., Verdon J., Tousignant P., de Courval L.P., Denkukuri D. & Belzile E. (2001) Rapid emergency department intervention of older people reduces risk of functional decline: results of a multicenter randomized trial. *Journal of the American Geriatrics Society* 49(10), 1272–1281.
- McCusker J., Dendukuri N., Tousignant P., Verdon J., deCourval L.P. & Belzile E. (2003a) Rapid two-stage emergency department intervention for seniors: impact on continuity of care. *Academic Emergency Medicine* 10(3), 233–243.
- McCusker J., Jacobs P., Dendukuri N., Latimer E., Tousignant P. & Verdon J. (2003b) Cost-effectiveness of a brief two-stage emergency department intervention for high-risk elders: results of a quasi-randomized controlled trial. *Annals of Emergency Medicine* 41(1), 45–56.
- Miller D.K., Lewis L.M., Nork M.J. & Morley J.E. (1996) Controlled trial of a geriatric case-finding and liaison service in an emergency department. *Journal of the American Geriatrics Society* 44, 513–520.
- Mion L.C., Palmer R.M., Meldon S.W., Bass D.M., Singer M.E., Payne S.M.C., Lewicki L.J., Drew B.L., Connor J.T., Campbell J.W. & Emerman C. (2003) Case finding and referral model for emergency department elders: A randomized clinical trial. *Annals of Emergency Medicine* 41, 57–68.
- Moher D., Cook D.J., Eastwood S., Olkin I., Rennie D. & Stroup D.F. (1999) Improving the quality of reports of meta-analyses of randomised controlled trials: the QUOROM statement. *The Lancet* 354(9193), 1896–1900.
- Poncia H.D.M., Ryan J. & Carver M. (2000) Next day telephone follow up of the elderly: a needs assessment and critical incident monitoring tool for the accident and emergency department. *Journal of Accident and Emergency Medicine* 17, 337–340.
- Runciman P., Currie C.T., Nicol M., Green L. & McKay V. (1996) Discharge of elderly people from an accident and emergency department: Evaluation of health visitor follow-up. *Journal of Advanced Nursing* 24(4), 711–718.
- Sanders A.B. (2001) Older persons in the emergency medical system. *Journal of the American Geriatrics Society* 49, 1390–1392.
- Walters K., Iliffe S. & Orrell M. (2001) An exploration of help-seeking behaviour in older people with unmet needs. *Family Practice* 18(3), 277–282.

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