Effect of ED-based transitional care interventions by healthcare professionals providing transitional care in the emergency department on clinical, process and service use outcomes: a systematic review

Steef van den Broek, Gert P Westert, Gijs Hesselink, Yvonne Schoon

ABSTRACT

Objective Suboptimal transitional care (ie, needs assessment and coordination of follow-up care) in the emergency department (ED) is an important cause of ED revisits and hospital admissions and may potentially harm patients, especially frail older adults. We aimed to systematically review the effect of ED-based interventions by health professionals who are dedicated to providing transitional care to older adults.

Design Systematic review.

Measurements We searched five biomedical databases for published (quasi)experimental studies evaluating the effects of health professionals in the ED dedicated to providing transitional care to older ED patients on clinical, process and/or service use outcomes. Reviewers screened studies for relevance and assessed methodological quality with published criteria (Robins-I and the Cochrane risk of bias tool). Data were synthesised around study and intervention characteristics and outcomes of interest.

Results From the 6561 references initially extracted from the databases, 12 studies were eligible for inclusion. Two types of interventions were identified, namely, individual needs assessment of ED patients (8 studies; 75%) and discharge planning and coordination of services (4 studies; 25%). Structured individual needs assessment was associated with a significant decrease in hospital admissions, hospital readmissions and ED revisits. Individualised discharge plans from the ED were associated with a significant decrease in ED revisits and hospital readmissions. The overall methodological quality of the included studies was relatively low.

Conclusions Comprehensive assessment of patient needs and ED discharge planning and coordination of services by health professionals interested in transitional care can help optimise the transition of care for older ED patients and reduce the risk of costly and potentially harmful (re)admissions for this population. However, more robust research is needed on the effectiveness of these interventions aiming to improve clinical, process and service use outcomes.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ To our knowledge, this is the first systematic review describing the characteristics of emergency department (ED)-based interventions that facilitate the care transition for older adult ED patients and their effects on reducing potential harmful and unnecessary costly hospital and ED use.

⇒ The heterogeneity in intervention content and used study designs hindered us from performing a meta-analysis.

⇒ Findings need to be interpreted with caution, as individual study findings may be subjected to bias due to the poor reliability and validity of evaluation methods used.

INTRODUCTION

Healthcare systems are challenged by an increasing number of emergency department (ED) visits, particularly by older adults with acute care needs for often multiple (ie, physical, functional, cognitive and mental) health problems. Older adults (ie; people aged 65 years or older) are the fastest growing population worldwide, and this group uses the ED at a higher rate compared with other age groups. This trend is a major challenge for professionals working in the ED setting, which has been organised for the assessment and management of specific and acute health problems. Providing adequate transitional care in the ED is often hindered by a busy ED setting and by ED professionals’ limited knowledge of community care resources and contacts. The WHO defines transitions of care as moments where a patient moves to, or returns from, a particular physical location or makes contact with a healthcare professional for the purposes of receiving healthcare. This
includes transitions between home, hospital, residential care settings and consultations with different healthcare providers in outpatient facilities. Previous studies have shown that patient transitions from the ED to the outpatient setting are often suboptimal. Consequently, patients may be hospitalised while they could have been discharged home or revisit the ED due to breakdowns in the continuity of care after ED discharge. These ED revisits and hospital admissions introduce significant risks for the older population, including cognitive and functional impairment, loss of independence and even malnutrition or increased fall risk. This often results in increased hospital and ED use.

In the last decade, care transitions from hospital to home have received a great deal of scientific attention. Multiple studies have evaluated interventions to improve the continuity of care and reduce the risk of adverse outcomes such as rehospitalisation. Interventions varied from follow-up calls, nurse-led discharge plans and case management programmes to fully organised care transition programmes. However, insight into the effectiveness of interventions executed by health professionals in the ED specifically responsible for transitional care remains limited, while such an intervention could be helpful in assisting busy acute care clinicians in the ED.

We hypothesise that interventions initiated and performed in the ED could have a positive effect on reducing hospital admissions and ED revisit and ultimately improve care transitions from the ED back home. Several literature reviews on the same topic have been published, although each with a narrowed (specific intervention and outcomes) or a different scope (ie, specific type of intervention and specific outcomes). Cassarino et al reviewed the effectiveness of interdisciplinary health care professionals in the ED regarding patient and process outcomes. Jay et al reviewed the effectiveness of geriatric-led team consultation in the ED on patient outcomes. A more recent systematic review focused on care transition interventions (CTIs) for adult ED patients and their effect on ED readmission rates and outpatient follow-up rates, concluding that ED-based CTIs do not appear to reduce ED revisit rates of admissions. However, most of the interventions studied in this review took place after discharge from the ED, while previous literature showed the importance of interventions aimed at the transition of care to take place in the hospital rather than after discharge.

Better insight into the characteristics and effects of ED-based care transition interventions could help to reduce hospital admissions and ED revisits. Therefore, our aim is to systematically review the effect of ED-based interventions in older adults by health professionals dedicated to transitional care.

METHOD
We planned and reported this systematic review in accordance with the guidelines for performing and reporting systematic reviews and meta-analyses (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). The protocol of this review (online supplemental file 1) is accessible on the PROSPERO website.

Data sources and searches
We systematically searched for publications in PubMed, CINAHL, PsycINFO, the Cochrane Library and EMBASE until 1 February 2021. We searched for articles of original research by using the following combination of search terms: emergency medical services, emergency department, community or social health care professional, transitional care, needs assessment, care coordination, patient navigation and follow-up care (eg, see online supplemental file 2). An additional search (using the same search strings and databases) was performed in January 2023 to identify newly published papers since our initial search in February 2021. The references of the selected articles were manually checked to identify additional relevant studies that were missed in the database search.

Study selection
Two reviewers (GH and SvdB) independently assessed the inclusion eligibility of the retrieved articles. Each article had to meet the following criteria to be included in this review: (1) full-text articles published with an abstract and in English; (2) have a quantitative experimental or quasi-experimental design (ie, randomised or non-randomised clinical trial, controlled or uncontrolled before-after, case control and time-series); (3) evaluate the effect of an intervention (initiated and executed at the ED) by a healthcare professional responsible for improving transitional care to home or other healthcare facilities (eg, discharge to home or nursing home, hospital admission, rehabilitation centre); and (4) report effects on clinical, process and/or service use outcomes.

The initial selection for inclusion was based on the title and abstract of the article. When the title and abstract provided insufficient information to determine the relevance, a full-text copy of the article was retrieved and reviewed. For the final selection, a full-text copy of the study was examined to determine whether it fulfilled the inclusion criteria. Disagreements about inclusion were resolved by discussion. When no consensus could be achieved, a third reviewer (YS) made the final decision.

Data extraction
Two reviewers (GH and SvdB) independently extracted data from the included studies. A standardised form was used to ensure consistency of data extraction. The following data were extracted from individual studies: country, publication year, study design, study setting, population characteristics, sample size, intervention details and outcomes of interest.
Assessment of risk of bias in included studies

Two reviewers (GH and SvdB) independently assessed the risk of bias using the Cochrane risk of bias tool for randomised controlled trials and the Robins-I for non-randomised studies (online supplemental file 3). Inter-rater agreement for the individual domains of the risk of bias was calculated by between-group Kappa agreement using the assessments from each reviewer before resolution of disagreements via discussion or a third researcher (YS).

Data synthesis and analysis

Study outcomes were organised in tabular form, and assessments were made based on the quality of methods, characteristics of intervention, outcomes, statistical significance and effects observed. Interventions were then classified based on intervention type and professional. A narrative synthesis of the findings from the included studies, structured around the type of intervention, type of outcome and intervention content, was described. Manuscript was revised by a native English speaker after completion (online supplemental file 4).

Patient and public involvement

There were no patients involved in the design of this study.

RESULTS

Search results

Our initial search identified 6561 records. A total of 5647 records remained following the exclusion of duplicates. Subsequent screening by title and abstract excluded 5624 records. The full texts of the remaining 23 studies were retrieved and reviewed, and 14 were excluded. Three additional studies were identified through snowballing. The additional search did not result in more papers that met our inclusion criteria. Thus, the final set consisted of 12 included studies (figure 1).

Characteristics of included studies

The characteristics of the included studies are summarised in table 1. Six studies had a before–after (BA) design,16–21 5 studies were non-randomised controlled trials (NRCT)22–26 and 1 study was a randomised controlled trial (RCT).27 Most of the included studies were conducted in Australia (n=5)19 20 22 23 and in the USA (n=4).24 25 The other studies were conducted in Canada,17 the UK18 and Belgium.21 Almost all studies were single-centre studies (n=10),16 24 27 while two studies were multicentre studies.25 26

Study samples in most (75%) of the included studies consisted of older adult patients. Six studies (n=6) focused on ED patients aged 65 years and older.20 22 26 Two studies...
<table>
<thead>
<tr>
<th>First author (year)</th>
<th>Professional(s) (single vs group; specialty)</th>
<th>Patient characteristics</th>
<th>Activities</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hegney et al (2006)</td>
<td>Single; ED-nurse; discharge services</td>
<td>&gt;70 y; NR</td>
<td>Screening, Identifying and organising required referrals and services.</td>
<td>↓ ↓ X</td>
</tr>
<tr>
<td>Wallis et al (2009)</td>
<td>Single; ED-nurse; discharge services</td>
<td>18–70 y; minor illness</td>
<td>Assessment of patient needs. Coordination of episode of care. Providing discharge information, medication and equipment advice. Arrange follow-up with other healthcare providers.</td>
<td>↑</td>
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<tr>
<td>Waldron et al (2011)</td>
<td>Care coordination team</td>
<td>&gt;65 y; fall injury</td>
<td>Arranging referrals, feedback and mentoring after fall. Organisational interventions (expanding geriatric ward and staff).</td>
<td>↑</td>
</tr>
<tr>
<td>Arendts et al (2012)</td>
<td>Care coordination team</td>
<td>&gt;65 y; Infection, neurological, musculoskeletal or cardiovascular</td>
<td>Functional assessment and initiating services to address needs.</td>
<td>↓</td>
</tr>
<tr>
<td>Arendts et al (2013)</td>
<td>Care coordination team</td>
<td>&gt;65 y; non-critical</td>
<td>Screening, full functional and needs assessment and initiate post discharge referral.</td>
<td>↑</td>
</tr>
<tr>
<td>Aldeen et al (2014)</td>
<td>Single; ED-nurse; geriatric</td>
<td>&gt;65 y; ISAR score &gt;2</td>
<td>Assessment of cognition delirium, functional status, fall risk, caregiver strain and care transitions.</td>
<td>X ↓ ↑</td>
</tr>
<tr>
<td>Seaberg et al (2017)</td>
<td>Single; patient navigator</td>
<td>All ages; &gt;5 ED visits a year</td>
<td>Review diagnosis and prescriptions. Arrange follow-up appointments and transportation Identify community resources.</td>
<td>↓ X</td>
</tr>
<tr>
<td>First author (year)</td>
<td>Professional(s) (single vs group; specialty)</td>
<td>Patient characteristics</td>
<td>Activities</td>
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<tr>
<td>Heeren <em>et al</em> (2019)</td>
<td>Single; ED-nurse; geriatric</td>
<td>NR; NR</td>
<td>Identify patients at risk. Conducting comprehensive geriatric assessment and plan interdisciplinary care and follow-up.</td>
<td>X</td>
</tr>
<tr>
<td>Dresden <em>et al</em> (2020)</td>
<td>Single; regular nurse; transitional care</td>
<td>&gt;65 y; ED visit &lt;30 days after prior admission</td>
<td>Evaluation of cognitive function, delirium, functional status, fall risk, care transitions and caregiver strain.</td>
<td>↓</td>
</tr>
</tbody>
</table>

α Health problem assessment, treatment plan and recommendations, referral to community health professionals and telephone follow-up.
X No statistically significant change reported on this outcome.
↓ A statistically significant decrease reported on this outcome (p<0.05).
↑ A statistically significant increase reported on this outcome (p<0.05).
ED, emergency department; ISAR, Identification of Seniors At Risk; LOS, length of stay; NR, not reported; y, years.
focused on patients 70 years and older, and one study included only patients aged above 75 years. Two studies sampled the clinical condition of the patients instead of their age, namely, self-poisoning and minor illnesses. One study focused on a different characteristic, namely, the frequency of (earlier) ED visits. The sample sizes ranged from 103 to 5930 for the control and preintervention groups and from 128 to 6230 for the postintervention groups.

Most studies used ED revisit rates (n=8) and hospital admission rates (n=7) as primary outcomes. Three studies used the length of stay (LOS) in the ED as a secondary measure to evaluate the intervention’s effect on ED throughput time. Other outcomes used were patient satisfaction, and scores on indicators to determine the quality of the patient’s transition from the ED to another setting (eg, the number of follow-up appointments and the Care Transition Measure score).

**Risk of bias in included studies**

An overall risk of bias judgment per study is presented in online supplemental table 1. The risk of bias assessments per domain for each of the included studies are shown in online supplemental file 3. Overall, the studies showed a low risk of bias in the domains of participant selection and classification of the intervention (ie, eligibility criteria, reasons for exclusion and intervention characteristics were clearly described). Six of the 11 BA studies and NRCTs had a high risk of bias. Most of these studies took insufficient account of possible confounding or did not address any possible confounders. Study results may also be biased by possible or actual deviations from the intended intervention. Possible cointerventions not being reported or accounted for, as well as not implementing the intervention for all participants, were major contributors to these deviations. Time-varying confounding (ie, confounding due to past exposure to intervention) in BA studies was not addressed properly in four out of seven non-randomised studies. The remaining five non-randomised studies all had a moderate risk of bias (45%), in which the domains of confounding and intervention deviation were scored with moderate risk for bias. The only RCT showed some concerns regarding bias, mostly in the randomisation domain due to not concealing the allocation process to investigators and participants.

**Intervention characteristics and effects**

Table 1 and online supplemental table 1 summarise the intervention characteristics and observed outcome effects.

We identified four different types of ED-based individual health professionals or groups designated to facilitate care transitions from the ED, namely, care coordination teams consisting of at least one physiotherapist, one social worker and one occupational therapist, ED nurses with specific interests (ie, geriatrics and discharge services), regular nurses with specific interest in transitional care and patient navigators (individual trained in hospital case management). Across the studies, we identified two types of interventions that were performed in the ED to facilitate the transition of care to other settings (table 1), namely, (1) a structured assessment of the patient’s individual needs (n=8; 66.7%) and (2) the coordination of care by developing an individualised discharge plan, referral to community services and treatment plans (n=4; 33.3%). Assessment of individual patient needs consisted of a comprehensive assessment of the patient’s health condition, social network and care needs (eg, cognitive function, functional status, care transitions and strain on caregiver) and addressing these needs by site-specific or outpatient resources when possible. Coordination of care by developing an individualised discharge plan consisted of summarising treatment, medication and referral plans with patients, arranging transportation and identifying community services and initiating primary care referrals.

**Structured assessment of patient’s individual needs**

Comprehensive assessment of individual patient needs, cognitive function, functional status, care transitions and strain on patient caregivers was reported in eight studies. The effects of transitional care nurses performing comprehensive needs assessments on ED revisits and hospital admissions were described in two studies. Hwang et al reported a statistically significant decrease in <72-hour ED revisit in only one of their three research sites (p=0.03 vs 0.06 and 0.11), but a significant decrease in hospital admission rates was determined in all three research sites (p≤0.001 in two sites and p=0.01). Dresden et al reported a decrease of 5.6% and 16.2% at two out of three of their research sites in the transitional care nurse intervention group (p≤0.001 for both). The third site reported no statistically significant effect (p=0.91). Needs assessment by care coordination teams decreased the likelihood of hospital admission within 30 days following the ED visit (OR: 0.88; 95% CI 0.76 to 1.00, p=0.046) according to the study by Arens et al. However, Arens et al reported a 3% increase in ED revisits within 28 days after the index visit in a population of 1449 cases (p=0.05). Aldeen et al reported no statistically significant effects of needs assessments performed by ED discharge nurses on ED revisits, hospital admissions and ED LOS. Patients in the intervention group faced a lower risk of hospital admission after the ED visit than their counterparts in the control group (risk difference of −13.8; 95% CI −17.3 and −8.4 but at the cost of a 1.1-hour longer ED LOS (p≤0.001). Wallis et al reported that the needs assessment by an ED discharge nurse contributed to an increase of 15.7% of follow-up arrangements made (p≤0.001). They also reported an increase of 19.1 points on the Care Transition Measure, a 100-point scoring system reflecting the overall quality of care transition (p≤0.001). Needs assessment by geriatric ED nurses did not have a statistically significant effect on ED revisit within 90 days after the index visit (p=0.11), and
increased admission rates were found in the intervention group (p≤0.003) from a total sample of 1680 patients.21
ED LOS, however, decreased significantly more than 6 hours after the needs assessment by a geriatric ED nurse (p=0.01)21 Morgan and Coleman reported a decrease in ED revisit rates (p=0.03) after patients underwent a self-harm assessment by a nurse liaison.16

ED discharge planning and coordination of services
ED discharge planning and coordination of services were described in four studies. In two studies,17 18 a nurse liaison made an individualised ED discharge plan based on the health problem, treatment plan and organised referrals to community services. In one study, a care coordination team in the ED organised the referral following ED discharge.26 The team identified and approached local barriers in the care transition to other settings and created a referral pathway. Another study described the use of a patient navigator (ie, an individual health professional trained in hospital case management) in the ED to review the patients’ medical diagnosis and medication prescriptions, arrange transportation and identify community resources for follow-up.27

Guttmann et al showed a 3.1% reduction in ED revisits within 8 days (relative risk ratio; RR: 0.72, p≤0.001) after introducing a nurse liaison-led discharge service. This intervention also led to a statistically significant increase in patient satisfaction regarding information on symptoms and warning signs (ORs: 8.5 and 11.0; 95% CIs 4.3 to 17.2 and 5.5 to 21.9, p values not reported), respectively, and a significant increase in patient satisfaction on discharge information (OR 1.3; 95% CI 0.9 to 1.9, p value not reported).17 Hegney et al reported a decrease in ED revisits within 7 days of the index visit (p≤0.001) following discharge services by an ED nurse based on a sample of 2139 patients.18 Furthermore, they reported a decrease of 5.5% (p≤0.05) in readmission rates measured with 28 days of the index visit.18 Waldran et al found a statistically significant increase of 14 points (100 points total) on the quality of care index (p≤0.001) for patients supported in the ED by a care coordination team organising the referral to the primary care setting. ED discharge care organised by a patient navigator led to a statistically significant decrease in ED revisits (p<0.001). However, patient-reported satisfaction did not change significantly (p=0.57).27

DISCUSSION
To our knowledge, this is the first systematic review describing the characteristics of ED-based interventions to facilitate care transition for older adult ED patients and their effects on clinical, process and service use outcomes. After an extensive search, only 12 relevant studies were found. This shows that, thus far, there is limited scientific attention directed to optimising the care for this ever-increasing older adult patient group in this critical care episode.

All studied interventions consisted of multidisciplinary teams or designated and trained nurses (ie, from the ED or a regular ward) focusing either on the individual assessment of patient needs (n=8) or discharge planning and coordination of services (n=4). The interventions, regardless of content and by whom activities were provided (team vs one professional), were associated with reduced ED revisits and (re)admissions in most of the studies using these outcomes. Comprehensive assessment of older patient (transition) needs in the ED seems to be effective in reducing the likelihood of a new emergency admission. Four studies evaluating this intervention component29 24-26 found a statistically significant decrease in (re)admission rates. Another study reported increased admissions after performing additional ED-based assessments, but this effect was attributed to the fact that physicians were more likely to admit the patient as a result of a more comprehensive assessment.21 Discharge planning and the coordination of services by one or more health professionals in the ED seems especially effective in reducing ED revisits for older adults. All three studies evaluating this intervention component29 24-26 on this particular outcome reported a significant decrease in ED revisit rates.17 18 27 No clinically meaningful short-term risk regarding, for example, patient mortality and morbidity was found in any of the included studies. Two out of 12 studies reported on patient-perceived quality of transition outcomes, both showing statistically significant higher scores (improved quality) on these outcome measures.19 20 Of the two studies reporting on patient satisfaction, only one reported a significant increase.17 Both needs assessment and discharge planning were performed by professionals with a background or specific interest in transitional care. This leads to a better understanding of community care and possible outpatient resources, improving the care transition of older patients. Remarkably, we found no studies combining the above-mentioned interventions, most likely due to the time and work involved in performing and implementing these comprehensive interventions and the possible fear of increasing ED length of stay and lowering ED throughput times.

Although limited evidence was found, our findings are a valuable contribution to the literature and evidence on effective ED-based care transition interventions. Any intervention that can reduce potentially harmful or unnecessary ED visits or emergency admissions for older adults should be welcomed, especially in the light of the ever-increasing hospital and ED use particularly by vulnerable older adults. Previous systematic reviews on this topic contradict our findings, for example, with regard to intervention effects on ED revisits and admissions.13 15 29 These inconsistencies can be explained by the different foci and design of the reviews. For example, contrary to our review, interventions in other reviews were not solely conducted in the ED (eg, house visits, reminders).13 A possible explanation for these differences is that ED-embedded interventions have a more direct effect on patient...
management due to direct patient and family contact and interaction between professionals in the ED. Instant action to facilitate smooth transitions may have a more positive impact than post-ED interventions. This theory is supported by earlier research on hospital-based interventions directed at transition care. Furthermore, our findings suggest that discharge planning and coordination of services, often provided by a singular healthcare individual (eg, discharge nurse or patient navigator), was particularly effective in reducing ED revisits.

We performed a transparent and systematic method of identifying, appraising and reporting our findings to ensure a reliable and repeatable mode of conduct and reporting of the research. However, our findings must be seen in light of several limitations. First, the low number of included studies and the heterogeneity in intervention content and used designs make synthesising results and drawing conclusions difficult. Statistically significant effects are based on single studies, and interventions are not supported by other studies with a similar type of intervention on the same outcome. Second, across the studies, many outcomes may be subjected to bias due to the poor reliability and validity of the evaluation methods used. Third, most studies were performed in Australia and the USA and involved interventions that were mainly tested in a single ED. These aspects may limit the external validity of the interventions and the extrapolation of estimated effects to ED settings elsewhere serving different older adult populations in other healthcare systems. Fourth, our review did not focus on other outcomes that may impact professionals’ and policymakers’ decision to implement an intervention, such as feasibility and cost-effectiveness. Further research including these outcomes is recommended. Finally, as with any systematic review, publication bias is possible. Although we conducted an extensive search of electronic literature, the search was limited by peer-review full-text publications in English language only.

In conclusion, despite its limitations, this study increases our knowledge about the nature and effects of ED-based interventions aimed at improving the care transitions of older adult ED patients. Two types of interventions by dedicated transitional care professionals seem to have a relevant effect on hospital and ED use, although on different outcomes representing this use. Comprehensive assessment of the care needs of older adult patients in the ED seems most likely to reduce potential emergency admissions, while discharge planning and the coordination of services in the ED appear to be most effective in reducing ED revisits. No studies combining these types of interventions were found; it is possible that this combination of interventions could further enhance patient care transitions from the ED. To our knowledge, this is the first systematic review to distinguish intervention type effects on desired transitional care outcomes. In light of the ever-number of older adults attending EDs, these findings may guide policymakers and ED professionals in improving care transitions from the ED to other settings for this vulnerable patient group. Further research is needed to provide more robust evidence on the effects of these (possibly combined) interventions on a variety of outcomes, that is, healthcare use, patient health and cost-effectiveness.

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**Contributors** SvdB and GH designed the study and acquired the data. SvdB and GH performed the analyses. All authors (SvdB, GH, GPW and YS) were involved in interpretation of data. SvdB and GH wrote the first draft of the manuscript. All authors (SvdB, GH, GPW and YS) were involved in revisions and approving the final manuscript for publication. SvdB is guarantor for the manuscript.

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