

Transitional care interventions from acute care to long-term care facilities: a systematic review

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Abstract

Objectives: Older adults living in long-term care facilities (LTCFs) are particularly at risk during transitions in care, most notably from acute care back to their LCTF. Issues surrounding miscommunication of information or medications are often mentioned as important challenges. Transitional care interventions (TCi) have emerged as solutions to improve outcomes. The objective of this review was therefore to determine the effects of TCi on several indicators of quality of care, clinical outcomes, healthcare services use and satisfaction among older patients discharged from acute care to LTCFs. **Methods:** Medline, CINAHL, EMBASE, Cochrane Central and Social Work Abstracts were searched. Study selection (title/abstract, full-text), data extraction and assessment of study quality were conducted by two independent reviewers. A narrative synthesis of the data was performed. **Results:** From the 5,506 references identified, 11 were included. Eight studies reported on quality of care: six on medication problems, and two on advance directives. Four studies reported on clinical outcomes: three on mortality, two on mobility/function and one on confusion/behavioral symptoms. Seven studies reported on healthcare services use: six on hospital readmissions/ED visits, and five on hospital days. Three studies reported on satisfaction with TCi. While satisfaction levels were high with TCi, other outcomes were inconclusive. Medications problems appeared to be the outcome most likely to benefit from TCi. **Discussion:** TCi targeting the acute to long-term care transition have obtained inconclusive results so far. More studies investigating the outcomes of quality of care, clinical outcomes, healthcare services use are needed.

KEYWORDS:

Transition models; Health outcomes; Health services use; Nursing Homes

Introduction

Healthcare systems are currently facing an increasing number of vulnerable older patients who often require complex services and care. Older adults living in long-term care facilities (LTCFs) represent one of the most vulnerable groups in the geriatric population.¹ Often described as the “oldest old”, more than 45% of them are aged over 85 years old in the United States.^{1,2} This number is expected to grow further in the upcoming years to reach 19 million by 2050 only in the United States.³ They are expected to represent over 4% of the total American population³ and almost 6% of the Canadian population in thirty years.⁴ Older adults living in LTCFs also typically present multiple chronic diseases and require high levels of assistance for basic functional tasks.² Conditions associated with elevated care demands or with a potentially challenging management^{5,6} were found to be highly prevalent in this setting: up to 52% of LTCFs residents live with dementia or other related neurocognitive disorder, up to 49% with vascular diseases, including 21% with congestive heart failure, and up to 37% with depression.¹ With this profile, older adults living in LTCFs are

also particularly at risk of poor outcomes during transitions in care settings, such as from acute to long-term care (LTC).⁷

To explain this situation, issues pertaining to gaps in information about medical information, treatment plans, or modifications to medications prescribed are often raised.⁷⁻⁹ King et al (2013) reported that “poor quality discharge communication” is the main barrier to a safe and well executed transition miscommunication being associated with increased readmissions and medication errors, delays in providing care, and decreased satisfaction of healthcare professionals, caregivers and patients.^{7,10} Acute care stays constitute dramatic interruptions in the relationships and patterns of care previously put in place between the LTCFs staff and the residents and their family.¹¹ Hospital charts or discharge forms about the procedures or investigations performed and the modifications made to medications regimen may also not be adequately transmitted to LTCFs during the transfer.¹² As all acute care stays are not avoidable,¹³⁻¹⁵ the transition from acute to LTC represents a key issue for the care of the most vulnerable of older adults: the LTCFs residents. Transitional care interventions (TCi), such as timely medication reconciliation,¹⁶ formal post-discharge follow-up¹⁷⁻¹⁹ or early transmission of a tailored communication forms,^{20,21} have emerged as an answer to poorly executed transitions and their consequences. They commonly aim to enhance the communication and the collaboration between the sites of care,⁷ which are both particularly relevant to the acute care to LTC transition.

Some TCi studies in older populations with complex care needs have reported promising results on both clinical and health service use outcomes.²² Existing reviews on TCi, even when targeting the older population with complex care needs, however, have focused mainly on those conducted in community-dwelling patients.²² Furthermore, TCi reviews that did involve the LTCF settings have evaluated transitions from long-term to acute care settings, rather than from the acute care setting to LTC.⁹ These reviews also did not distinguish between Emergency Department (ED) visits and inpatient admission, as both were labelled in the “hospital” category. The effects of TCi on the transitions from acute care to a LTCF facility remains poorly studied. Therefore, we conducted a systematic review to comprehensively explore the effects of TCis for older adults transferred from the acute to LTC setting.

Methods

This systematic review followed the standard guidelines of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The review protocol was registered with the PROSPERO international prospective register of systematic reviews (registration number: CRD42016049061)

Eligibility Criteria

Study design : all quantitative studies (randomized controlled trials, observational or quasi-experimental studies, etc. . .).

Population : Older adults (aged 65 and over) from all countries, being discharged from acute care hospital in-patient stays to a LTCF. For the purpose of the study, LTC will be defined as health services provided for people with complex health needs/moderate to extensive functional deficits or chronic conditions, who are unable to remain at home or in a supportive living environment, and involving nursing care and personal care.²³ Acute care hospital in-patient stays could be for any health condition (i.e. frailty, geriatric syndrome, hip fracture, stroke, Alzheimer/dementia, multimorbidity, chronic disease exacerbation, oncology, infection. . .), planned or unplanned.

Interventions : Any TCi, defined as “a set of actions designed to ensure the coordination and continuity of healthcare as patients transfer between different locations or different levels of care within the same location”.²⁴ In this study, TCis were included if they targeted an acute care hospital in-patient discharge back to a LTCF. TCis could include care/discharge planning in conjunction with the patients/caregivers/nursing home personnel, systematic medication reconciliation by a pharmacist, telecare/telemedicine/telemonitoring,

formal discharge summary, structured follow-up and coordination among the different healthcare professionals.

Outcomes : Any quality of care, patient-related and healthcare services use reported outcomes.

A fully detailed list of inclusion/exclusion criteria is available in Supplementary Table 1.

Data Sources and Searches

Systematic searches were performed in Medline, CINHAL, EMBASE, Cochrane Central and Social Work Abstracts combining the concepts of LTC, hospital, older population and transitional care. We used MeSH terms and related and free key words (see Supplementary Table 2 for a more detailed search strategy). Reference lists of included studies were screened manually and companion papers were searched. Articles published between January 1st, 1995 (first TCis) and October, 2016 were considered for inclusion.

Study Selection

Based on inclusion criteria, two reviewers (MLB, AS) independently examined and selected the titles and abstracts obtained from the database searches. Full texts of the selected references were then retrieved and independently examined and selected by the same reviewers. At each step, any disagreement was resolved by consensus and discussion with a third reviewer (MW or IV).

Data Extraction and Quality Assessment

Data on study characteristics (authors, publication date, title, journal, study design), settings and participants (country, mean age, proportion of female, sample size, percentage going to a LTCF, reason of hospitalization, description of the intervention, healthcare professionals involved in the intervention, any coordination measures with the LTCF) were extracted from each study by two reviewers working independently (MLB, AS) and reconciled. Outcomes on quality of care (i.e. medication errors), patient-related (i.e. mortality, health-related outcomes) and healthcare services use (readmission, ED visits and total readmission days) were similarly extracted from the studies for all reported time points.

Study quality was assessed independently by two reviewers (MLB, AS) using the latest version Mixed Methods Appraisal Tool (MMAT), updated in 2018.²⁵

Data Synthesis and Analysis

The wide variety of the reported outcomes and the discrepancy of the various cutoffs used (i.e. “Patients with at least 1 medication error”, “Patients with at least 3 medication errors” and “Patients with at least 5 medication errors”) precluded any meta-analysis pooling. Thus, we conducted a narrative synthesis²⁶ by organizing the included studies into homogeneous groups according to the outcome of interest.

We thus reported the results, regrouped by the main key study outcomes identified: “Quality of care” (medication problems, and advance directives), “Clinical outcomes” (mortality, mobility and function and confusion/behavioral symptoms), “Services use” (hospital readmissions and ED visits and hospital days) and “Satisfaction” with TCi (from either healthcare professionals or patients/caregivers). We then looked for patterns within and across groups and compared similarities and differences.

A sensitivity analysis was performed by exploring the results with and without the studies with at least one MMAT item with a negative response in each identified study outcome.²⁵

Results

Search Results

A total of 5,506 references were initially identified from the databases searches. Of these, 5,375 were not eligible based on title/abstract screening and 121 based on full text reading. Eleven studies were finally included in the review: two randomized controlled trials (RCTs) and nine nonrandomized studies (Figure 1).

Characteristics of Included Studies

All the articles were published in English. The characteristics of the included studies are summarized in Table 1.

Quality of care

Eight different studies reported on quality of care indicators (Table 2): six reported on medication problems^{12,16,18,20,27,28} and two on advance directives.^{21,29}

Overall, the effects of TCi on medication problems were inconclusive: Four studies reported favorable TCi results^{12,16,27,28} with significantly fewer medication errors per patient,^{27,28} significantly lower odds of having discrepancy-related adverse drug events¹⁶ and significantly fewer patients with one or more missed or delayed doses.¹² One study reported no significant differences between the intervention and control groups.¹⁸ One study also reported better results in the control group.²⁰

Among studies reporting TCi involving advance directives, two reported positive effects on the quality of care. One study found that the satisfaction with Advance Care Planning was significantly higher in patients and caregivers enrolled in a TCi.²⁹ Another study reported significantly less discrepancy in advance directives documentation and Do-Not-Resuscitate orders between the acute and LTC settings.²¹

Clinical outcomes

Four different studies reported on clinical outcomes (Table 3): three on mortality,^{16,17,29} two on mobility, function and pain^{17,18} and one on confusion/behavioral symptoms.¹⁸

No studies reported a beneficial effect of TCi on mortality. One study only reported composite data, combining deaths and readmissions, with no significant differences between the post-intervention and pre-intervention groups.¹⁶ Another study reported very similar results for both the intervention and usual care groups.²⁹ Lastly, in a study that compared two interventions and did not include a control group, the authors reported reduced mortality with a tailored TCi as compared with standardized TCi.¹⁷ In tailored TCi, the number of follow-up visits and the healthcare professional performing them (physician, nurse or physiotherapist) was adapted according to the case and needs, whereas a strict protocol was followed in standardized TCi.

In terms of mobility, function and pain outcomes, reported results have been inconclusive. One study which reported on multiple outcomes found significantly fewer cases of worsening pain with TCi, compared with the control group, and fewer cases of decline in mobility with TCi but this difference was not statistically significant. This same study also reported a slightly higher number of falls in the TCi group, but this was also not statistically significant.¹⁸ One study found very similar effect between a tailored intervention and a standardized intervention when looking at functional autonomy differences measured using the “modified Barthel index” by Gregersen et al (2011) before and after the intervention period.

Finally, one study reported on confusion and behavioral symptoms. The authors reported fewer cases of confusion and fewer cases of worsening behavior with TCi but these differences were not statistically significant.¹⁸

Satisfaction

Three different studies reported on satisfaction with TCi by either healthcare professionals or patients/caregivers (Table 3).^{12,29,30} In all three studies, patients, caregiver and healthcare professionals interviewed all reported high levels of satisfaction with TCi.^{12,29,30}

Healthcare services use

Seven different studies reported on healthcare services use (Table 4): six evaluated hospital readmissions and ED visit outcomes,^{16-19,21,29} and five assessed changes in the number of hospital days.^{16,17,21,28,29} The results pertaining to hospital readmissions and ED visits are inconclusive. Two studies out of six showed a beneficial effect of TCi, with a significantly lower percentage of patients readmitted,¹⁹ and significantly reduced hospital usage (combining readmissions and ED visits) associated with TCi.¹⁸ A third study also reported fewer patients readmitted after TCi implementation, but this difference was not statistically significant.²¹ Two studies found no significant differences between TCi and usual care on hospital readmissions or on the combination of deaths and hospital readmissions.^{16,29} Lastly, the study that compared two interventions which did not include a control group reported reduced readmissions rate with the tailored as compared with the standardized TCi.¹⁷

Results have also been inconclusive as it pertains to studies measuring changes in length of stay. In one study, the authors reported a significantly shorter index stay with TCi.¹⁶ Two other studies found very similar numbers, both for index stay hospital days^{28,29} and hospital days during readmissions.²⁹ An additional study found a longer index stay with the implementation of TCi but the difference was not statistically significant.²¹ Lastly, one study found no differences in index length of stay between the participants enrolled in the tailored TCi or standardized TCi.¹⁷

Study Quality Appraisal

The quality of each of the eleven included studies was assessed using the 2018 updated MMAT (Supplementary Table 3).²⁵ All RCTs reported appropriate randomization and all nonrandomized studies reported including participants representative of their identified target population. Yet, the confounders were reported as adequately accounted for in only 56% (5/9) of the nonrandomized studies and the intervention was explicitly reported to have been administered as intended in only 33% (3/9) of the nonrandomized studies. Four studies (36%) had at least one MMAT item with a negative response and seven (64%) had at least one MMAT item with the mention “can’t tell”. Additionally, even among studies adequately reporting all the outcomes mentioned in their methods section, p-values were not commonly reported.

Sensitivity analyses

Out of 11 studies, 4 had at least one MMAT item with a negative response (Supplementary Table 3).^{18,19,21,29} The general conclusions for each outcome did not change when removing these four studies from the data synthesis. After removing these four studies, only five different studies reported on quality of care: five on medication problems^{12,16,20,27,28} and none on advance directives. Four still showed favorable results^{12,16,27,28} with TCi and one showed better results in the control group.²⁰

Additionally, after removing these four studies, only two different studies reported on clinical outcomes: two on mortality,^{16,17} one on mobility, function and pain¹⁷ and none on confusion/behavioral symptoms. There was still no beneficial effect of TCi on mortality and inconclusive results on mobility, function and pain.

For healthcare services use, after removing these four studies, only three different studies still reported data: two on hospital readmissions and ED visits^{16,17} and three on hospital days.^{16,17,28} The results were still inconclusive for both hospital readmissions and ED visits and hospital days.

Finally, after removing these four studies, only two different studies reported on satisfaction.^{12,30} Both caregivers and physicians still showed high levels of satisfaction with TCi.

Discussion

This systematic review presents the effects of TCi on quality of care, clinical outcomes and healthcare services use outcomes among older adults transferring from the acute care to the LTCF setting. Medications problems (quality of care), hospital readmission and ED visits (healthcare services use) and hospital days (healthcare services use) were the most documented outcomes, with data from six, six and five studies respectively. The reported results were however inconsistent. Medications problems as an outcome seemed nevertheless to hold the most promising results, with four individual studies out of six reporting significantly favorable results with TCi.^{12,16,27,28} Additionally, high levels of satisfaction were achieved with TCi.

Our results show that medications problem outcomes are the most likely to be reported as benefiting from TCi. Indeed, medications problems could represent an important target to improve care during transitions from acute care to LTC. More studies investigating more closely this outcome would be needed to confirm these results. Yet, previous studies reported that adverse drug events attributable to medication changes occur in 20% of patients going from acute care to LTC,³¹ with medication errors occurring during these transitions as being most harmful to patients.³² In the context where information gaps are reported in over 85% of transfers between ED and LTC,³³ this suggests that medications problems might be addressed by improving communication. Indeed, all four interventions where the situation improved significantly involved a specific discharge summary or communication form sent to the LTC setting before or at the time of patient transfer. These interventions further emphasized the importance of medication clarification, either through a formal medication reconciliation^{16,27,28} or via completion and transmission of a discharge prescriptions form.¹² It is worth noting that these four studies also involved a pharmacist as key healthcare professional in carrying out the intervention.^{12,16,27,28} Of the studies where no effect was reported, one used fax as a communication strategy,¹⁸ and important concerns have been raised about the use of this technology.³⁴ The other was a quality improvement pilot study that was possibly insufficiently powered to detect a significant change (10 patients in each group). The authors of this pilot study raised the issue of a possible unsuccessful implementation of the intervention and important group differences, notably in their health status and medication orders patterns.²⁰

Our results further suggested that increased communication between hospitals and LTC, including medication reconciliation or specific transfer forms, was not enough to decrease healthcare services use (hospital readmission and ED visits, hospital days). In this regard, the timing of the communication might be a key element to consider. Indeed, the recommendations to improve transitional care were not only to increase the communication per se but rather to “facilitate the timely transfer of essential information across settings”.⁷ In the case of the acute care to LTCF transition, this “timely” criterion could translate into the early transmission of the medications list before discharge, to ensure that the medications are ready to be administered upon patient’s arrival and to avoid delayed doses.¹² This would further allow LTCF’s physicians time to review the patients’ chart and status at an appropriate time rather than through an urgent visit or via a locum tenens.¹²

Among the frail population residing in LTC, transfers to the acute care setting are challenging and stressful life events.⁸ This is especially true for cognitively impaired patients,³⁵ who constitute between 45-84% of the LTC population.^{1,36} To address this issue, upstream interventions aiming to reduce potentially avoidable transfers to acute care are warranted.^{8,37} Admissions to acute care, however, cannot always be prevented, and may continue to represent a part of the care trajectory for some patients,^{13,14} with a 2000 study sug-

gesting that 60% of hospital admissions are necessary and recommended.¹⁵ As part of quality improvement initiatives, several LTCFs worldwide have implemented interventions to reduce potentially avoidable hospital admissions,³⁸ and TCi between these two care settings remain a highly relevant research area. The characteristics and particular components of impactful and efficient TCi in this specific context are still to be determined.

Our study also highlights the high levels of satisfaction reported by patients, caregiver and physicians with TCi. Enhanced continuity of care associated with TCi is particularly valued by older vulnerable patients, and can foster a strong foundation for a better communication with patients, and caregivers. It can also result in a greater sense of security and trust in the healthcare system overall.³⁹ In our review, the three studies reporting high satisfaction involved either phone calls or in-person support and sharing of information.^{12,29,30} Additionally, gaps in information exchange during transitions resulting in missing data from the medical charts of transferred patients can lead to frustration, increased work-stress and feelings of inadequacy and guilt among healthcare professionals working in LTC.¹⁰ TCi focusing on improving inter-facility communication are therefore also warranted.

This review has many strengths, starting with its systematic design and exhaustive literature search. Another strength is the fact that we focused specifically at TCi for older patients transitioning from acute care to LTC setting. Our review's principle limitation stems from heterogeneity in both the outcomes reported from each study and in the various tools used as interventions. This prevented us from conducting a meta-analysis and pooling results, but it did allow for a narrative synthesis that provides a rich and in-depth overview of the available relevant literature. Our study also suffered from a paucity of eligible articles in our sample. We identified only 11 studies, among which only 2 were randomized trials, whereas reviews reporting on TCi in other settings are usually much larger, with some reporting on up to 92 studies.²² Our small sample also limited our pooling possibilities and further highlights the need for more TCi studies targeting transfers to the LTC setting. Lastly, our sample quality appraisal MMAT scoring revealed reporting issues among several studies in our sample, with 4 studies receiving at least one negative MMAT item response, and a total of 7 where it was unclear whether or not an MMAT criterion was satisfied. P-values were also not routinely reported.

Future studies should aim to report standardized outcomes and their related p-values, using validated and relevant indicators to facilitate the pooling of data. Authors should also strengthen their efforts towards higher quality of reporting.

Conclusions and implications

TCi targeting older adults being transferred from acute care to the LTC setting aim to improve the transitions for the most vulnerable among the geriatric population.¹ Our review, however, was able to identify only a limited number of relevant studies, in spite of conducting an exhaustive search, and found that the literature is fraught with inconsistent results. In the identified interventions, a focus on medication reconciliation and timely intra-institutional communication appear to be important components that improve the acute care to LTCF transitions in this population. Future research should include well-designed large-scale TCi using standardized and validated outcome measures in order to improve our understanding of the effects of TCi on LTC patients being discharged from acute care.

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Conflicts of interest

The authors have no financial or personal conflicts to declare.

Table 1. Characteristics of the eleven included studies.

1st author (year) / Country	Study design	Mean age (sd) (intervention /control) Female % (intervention / control)	Total sample size	Intervention Description Coordination measures with LTCFs	Healthcare professionals involved: 1-nurse; 2-physician; 3- physiotherapist; 4-pharmacist; 5-other
Bergkvist (2009) / Sweden	Pre-Post	84 (6.2) / 84 (6.7) 71.2 / 60.3	115	Medication reconciliation done at hospital admission (pharmacist), creation of a systematic medication care plan, updated continuously (care team), patient information and education based on specially developed drug information leaflets (pharmacist), discharge summary (physician) checked by the pharmacist, reconcilia- tion\adjustment through discussion with the physician before the patient's discharge. <i>Discharge summary, carefully checked and approved by both pharmacist and physician</i>	2, 4

1st author (year) / Country	Study design	Mean age (sd) (intervention /control) Female % (intervention / control)	Total sample size	Intervention Description Coordination measures with LTCFs	Healthcare professionals involved: 1-nurse; 2-physician; 3- physiotherapist; 4-pharmacist; 5-other
Boockvar (2006) / United States	Pre-Post	84.4 (8.8) / 83.9 (10.3) 78.2 / 82.7	168	Medication reconciliation on patient discharge (pharmacist) charted on a communication form and sent to the LTCF physician. The form becomes part of the LTCF pharmacy record. <i>Communication form sent to the LTCF physician</i>	2,4

1st author (year) / Country	Study design	Mean age (sd) (intervention /control) Female % (intervention / control)	Total sample size	Intervention Description	Healthcare professionals involved:
Catic (2013) / United States	Pre-Post (pilot study)	90 / 84.4 60 / 62.5	29	In- person/telephone meeting with the proxy within 24h of admission. A pocket-sized printed booklet for decision support was given to all proxies to provide standardized information. At discharge, a 1-page report summarizing the consultation focusing on rec- ommendations for symptom control, goals of care, and advance care planning was sent to the patient's primary care providers. Two weeks post-discharge, the proxy was telephoned for support and to review the patient's health status, advance care planning, decision making, and proxy needs. <i>Report sent to primary care providers</i>	1-nurse; 2-physician; 3- physiotherapist; 4-pharmacist; 5-other 1 (palliative care nurse), 2 (geriatrician)

1st author (year) / Country	Study design	Mean age (sd) (intervention /control) Female % (intervention / control)	Total sample size	Intervention Description Coordination measures with LTCFs	Healthcare professionals involved: 1-nurse; 2-physician; 3- physiotherapist; 4-pharmacist; 5-other
Crotty (2004) / Australia	Randomized controlled trial	82 / 83.4 58.9 / 63	110	On patient's discharge, both the family physician and the community pharmacist were faxed a medication transfer summary compiled by the transition pharmacist. This communication included specific information on changes in medications that had been made in file hospital and aspects of medication management that required monitoring. The transition pharmacist also coordinated a case conference with the family physician, community pharmacist, and a registered nurse at the facility, to give information concerning medication use and appropriateness. <i>Communication form (discharge supplemental information on medications) sent to family physician and community pharmacist, case conference</i>	2,4

1st author (year) / Country	Study design	Mean age (sd) (intervention /control) Female % (intervention / control)	Total sample size	Intervention Description	Healthcare professionals involved:
Elliott (2012) / Australia	Pre-Post	84 (median) / 84 (median) <i>62.8</i> / <i>58.9</i>	428	A 7-day residential care medication administration chart (IRCMAC) was prepared (hospital pharmacist). The IRCMAC, photocopy of the discharge prescriptions and instructions for using the IRCMAC were was placed with the discharge medications and transported with the patient. The pharmacist telephoned the RCF prior to discharge to notify them that an IRCMAC would be provided. <i>Communication form (IRCMAC) sent to the LTCF, phone call prior discharge to notify</i>	1-nurse; 2-physician; 3- physiotherapist; 4-pharmacist; 5-other 4

1st author (year) / Country	Study design	Mean age (sd) (intervention /control) Female % (intervention / control)	Total sample size	Intervention Description Coordination measures with LTCFs	Healthcare professionals involved: 1-nurse; 2-physician; 3- physiotherapist; 4-pharmacist; 5-other
Gregersen (2011) / Denmark	Non-randomized trial	88 (2 intervention groups combined) <i>tailored group = 83% / standardized group = 68%</i>	238	Early discharge planning and in-hospital assessments, 2 post-discharge follow-up visits (or more in the tailored group), discharge summary sent to GP. <i>Discharge summary sent to GP</i>	1, 2, 3
Harvey (2014) / Australia	Randomized controlled trial	83.8 (7) / 86.7 (7) <i>66.7 / 59.3</i>	116	Tailored care plan development and in-hospital assessments, with possibility of additional visits as required, education and support to the LTCF staff and the GP. <i>"[E]ducation and support" of the GP</i>	1 (aged care nurse), 2 (geriatrician)

1st author (year) / Country	Study design	Mean age (sd) (intervention /control) Female % (intervention / control)	Total sample size	Intervention Description Coordination measures with LTCFs	Healthcare professionals involved: 1-nurse; 2-physician; 3- physiotherapist; 4-pharmacist; 5-other
Jacobs (2011) / United States	Pre-Post (quality improvement initiative)	not reported/ no control group <i>not reported / no control group</i>	not reported	Letter sent to the LTCF with contact information, phone contact with the LTCF facility within 2 days of discharge and review of the discharge orders, confirmation that the patient will see a doctor within 5 days. <i>Letter sent to the LTCF, phone call</i>	1 (heart failure nurse, RN care coordinator)

1st author (year) / Country	Study design	Mean age (sd) (intervention /control) Female % (intervention / control)	Total sample size	Intervention Description Coordination measures with LTCFs	Healthcare professionals involved: 1-nurse; 2-physician; 3- physiotherapist; 4-pharmacist; 5-other
Midlov (2012) / Sweden	Pre-Post	period1: 84.4 (65-99)/ period2: 85.6 (69-102)/ period 3: 85.1 (66-95) / no control group <i>period1: 74%/</i> <i>period2: 81%/</i> <i>period3: 68% /</i> <i>no control group</i>	123	Patient education and LIMM discharge information form. Medication reconciliation upon admission of the patient (clinical pharmacist) and review and monitoring of medication during hospital stay according to the LIMM-model. LIMM quality control forms for discharge medication reconciliation, performed by pharmacist who gives suggestions for changes/corrections to the physician before patient discharge Medication list, general information and report written by the physician, discussed at discharge and sent to the GP <i>Discharge form sent to the GP</i>	2,4

1st author (year) / Country	Study design	Mean age (sd) (intervention /control) Female % (intervention / control)	Total sample size	Intervention Description Coordination measures with LTCFs	Healthcare professionals involved: 1-nurse; 2-physician; 3- physiotherapist; 4-pharmacist; 5-other
Ward (2008) / United States	Non-randomized trial (quality improvement initiative)	85.6 (no sd) / 78.6 (no sd) Cumulative mean age (both groups) = 83.0 (9.22) 50 / 60	20	LTCF specific communication form for discharge instructions and medication list, transmitted before discharge instead of with the patient - allowing contact with pharmacist before discharge <i>LTCF specific communication form (so that nurses won't have to enter it in the charts, already in the right format), transmitted before discharge instead of with the patient (so that the staff has the time to order medication before the patient's arrival)</i>	1,2
Zafirau (2012) / United States	Pre-Post (quality improvement initiative)	76 / 72.8 53.9 / 50	247	New standardized transfer form and education about its use. <i>Standardized transfer form used between the acute care and the LTCF</i>	1, 5 (LTCF staff, director of nursing)

Reference	Follow-up time		P value
		Medication adverse event or interaction (n/N, %): Intervention=9/56 (16%); Control=6/54 (11%)	p=0.581
	At 8 weeks	Adverse drug event (n/N, %): Intervention=20/44 (45%); Control=19/44 (43%)	p=0.830
		Medication Appropriateness Index (mean, 95% confidence interval, N): Intervention=2.5 (1.4-3.7), N=44; Control=6.5 (3.9-9.1), N=44	NR
Elliott et al, 2012	12 weeks	Patients with [?] 1 doses missed or significantly delayed within 24h of discharge (n/N, %): Post=6/226 (3%); Pre=37/202 (18%)	p<0.001
		Number of medications with [?] 1 doses missed or significantly delayed within 24h of discharge (total n medications, N patients, %): Post=9/226 (4%); Pre=75/202 (37%)	NR
Midlov et al, 2012 ^b	At discharge	Patients with [?] 1 medication error (n/N, %): Intervention 1=27/49 (55%); Intervention 2=10/28 (36%); Control=16/32 (50[?]%)	NR
		Patients with [?] 3 medication errors (n/N, %): Intervention 1=6/49 (12%); Intervention 2=0/28 (0%); Control=5/32 (16%)	Int 1: p=0.41 Int 2: p=0.048

Reference	Follow-up time		P value
		Mean number of errors per patient (mean, N) ^c : Intervention 1=1.1, N=49; Intervention 2=0.46, N=28; Control=1.5, N=32	NR
Ward et al, 2008	At discharge	Patients with 0 (none) omitted medication (n/N, %): Intervention=0/10 (0%); Control=3/10 (30%) Patients with 1-3 omitted medications (n/N, %): Intervention=8/10 (80%); Control=3/10 (30%) Patients with 4-8 omitted medications (n/N, %): Intervention=2/10 (20%); Control=4/10 (40%)	p>0.05 ^d
		Number of omitted medication doses per patient (mean, sd, N): Intervention=3.8 (2.49), N=10; Control=2.9 (2.88), N=10	NR
		Medications with 1 omitted dose (n/N, %): Intervention=24/29 (83%); Control=29/29 (100%) Medications with 2 omitted doses (n/N, %): Intervention=3/29 (10%); Control=0/29 (0%) Medications with 4 omitted doses (n/N, %): Intervention=2/29 (7%); Control=0/29 (0%)	p>0.05 ^d

Reference	Follow-up time		P value
		Doses of omitted medications with potential low negative consequences (n/N, %): Intervention=5/38 (13%); Control=12/29 (41%)	p>0.05 ^d
		Doses of omitted medications with potential medium negative consequences (n/N, %): Intervention=18/38 (47%); Control=10/29 (34%)	
		Doses of omitted medications with potential high negative consequences (n/N, %): Intervention=15/38 (39%); Control=7/29 (24%)	
ADVANCE DIRECTIVES Harvey et al, 2014	ADVANCE DIRECTIVES At 6 months	ADVANCE DIRECTIVES Caregiver/patient satisfied with the Advanced Care Planning (n/N, %): Intervention=17/20 (85%); Control=9/24 (38%)	ADVANCE DIRECTIVES p=0.002
		Participation in at least 1 family meeting and Advanced Care Planning discussion (n/N, %): Intervention=36/54 (67%); Control=Not assessed	N/A ^e
		Documentation of advanced directives (n/N, %): Intervention=36/54 (67%); Control=Not assessed	N/A ^e

Reference	Follow-up time		P value
Zafirau et al, 2012	At 30 days	Advance directives status discordance between hospital and LTCF (%, N): Post=16.3%, N=117; Pre=26.7%, N=130 Do-Not-Resuscitate orders discordance between hospital and LTCF (%, N): Post=27.1%, N=117; Pre=40%, N=130	p=0.038 NR

^a Not reported

^b Intervention 1 (period 2)=medication list in the hospital electronic patient medical record and quality control of discharge medication reconciliation; Intervention 2 (period 3)=same as intervention 1, with an additional focus on specific medication dispensing system

^c No standard deviation (sd) reported

^d The authors used χ^2 tests for categorical variables, giving p values only for the difference in the outcomes overall distribution by group (Patients with omitted medications: 0 medication, 1-3 medications, 4-8 medications; Omitted doses of different medications: 1, 2, 4; Doses of omitted medications by potential for negative consequences: high, medium, low)

^e Not applicable

Table 3. Effects of transitional care interventions on Clinical Outcomes and Satisfaction

Reference	Follow-up time	
MORTALITY	MORTALITY	MORTALITY
Boockvar et al, 2006	2 months	Death or readmission
Gregersen et al, 2011 ^c	30 days	Number of deaths
	90 days	Number of deaths
Harvey et al, 2014	6 months	Number of deaths
MOBILITY, FUNCTION AND PAIN	MOBILITY, FUNCTION AND PAIN	MOBILITY, FUNCTION AND PAIN
Crotty et al, 2004	8 weeks	Number of participants
		Number of participants
		Number of participants
Gregersen et al, 2011 ^c	90 days	Differences in mobility
CONFUSION/BEHAVIORAL SYMPTOMS	CONFUSION/BEHAVIORAL SYMPTOMS	CONFUSION/BEHAVIORAL SYMPTOMS
Crotty et al, 2004	8 weeks	Number of participants
		Number of participants
SATISFACTION INDICATORS	SATISFACTION INDICATORS	SATISFACTION INDICATORS
Catic et al, 2013	30 days	Caregivers scores
Elliott et al, 2012	12 weeks	Physicians reports

Reference	Follow-up time	
Harvey et al, 2014	6 months	Physicians reported Physicians agreed Caregiver/patient

^a Mixed data on mortality and readmission, no data on mortality only were reported. Overall data only, no specific numbers per groups were reported

^b Not applicable

^c Intervention 1=Standardized home-based rehabilitation; Intervention 2=Tailor-made hospital-at-home intervention; no control group

^d NR= Not reported

Table 4. Effects of transitional care interventions on healthcare services use

Reference	Follow-up time	Follow-up time
HOSPITAL READMISSION	HOSPITAL READMISSION	HOSPITAL READMISSION
Boockvar et al, 2006	2 months	Death or readmission (%)
Crotty et al, 2004	8 weeks	Hospital usage ^c (n/N, %)
Gregersen et al, 2011 ^d	90 days	Number of participants
Harvey et al, 2014	6 months	Number of participants
		Total number of acute care
		Mean number of acute care
		Total number of subacute
		Mean number of subacute
		Total number of readmissions
		Mean number of readmissions
Jacobs et al, 2011	6 months	Number of participants
Zafraou et al, 2012	30 days	Number of participants
EMERGENCY DEPARTMENT VISITS	EMERGENCY DEPARTMENT VISITS	EMERGENCY DEPARTMENT VISITS
Harvey et al, 2014	6 months	Total number of Emergency Department
HOSPITAL DAYS	HOSPITAL DAYS	HOSPITAL DAYS
Boockvar et al, 2006	2 months	Index/Subsequent readmission
Gregersen et al, 2011 ^d	90 days	Index length of stay in days
Harvey et al, 2014	6 months	Total number of index hospitalizations
		Mean number of index hospitalizations
		Total number of acute care hospitalizations
		Mean number of acute care hospitalizations
Midlov et al, 2012 ^f	At discharge	Index length of stay in days
Zafraou et al, 2012	30 days	Index length of stay in days

^a Mortality and readmission as a composite outcome was reported.

^b Not applicable

^c Hospital readmissions and Emergency Department as a composite outcome was reported.

^d Intervention 1=Standardized home-based rehabilitation; Intervention 2=Tailor-made hospital-at-home intervention; no control group

^e Not reported

^f Intervention 1 (period 2)= electronic patient medication lists in medical record and quality control of discharge medication reconciliation;

Intervention 2 (period 3)=same as intervention 1, with an additional focus on a specific medication dispensing system.

Figures captions

Figure1. Flowchart of included studies.

