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Effectiveness of transitional care interventions in patients with serious illness and their caregivers: a systematic review and metanalysis of randomized controlled trial

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Abstract

Background Patients with serious illnesses require continuous care from professionals in multiple settings. The care transition interventions aim to promote the safe and timely transfer of patient care across settings through several components including discharge planning, post-discharge communication, and patient/caregiver education on self-management. Despite the reported evidence on transitional care interventions, little is known about their effectiveness for seriously ill patients and their caregivers and for those receiving or needing palliative care.

Objective Assess the effectiveness of transitional care interventions for outcomes related to seriously ill patients and their caregivers.

Methods A systematic review was conducted following the PRISMA and JBI guidelines. The search was conducted on MEDLINE, CINAHL, Embase, and Cochrane Central Register of Controlled Trials up to February 2024. Primary outcomes included mortality and/or survival, symptoms, functional status, caregiver burden, and health-related quality of life. Critical appraisal was performed using the JBI checklist. Evidence certainty was evaluated using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach.

Results We included 16 studies with 3781 participants. The pooled results of mortality and functional status did not show differences between transitional care and standard of care. Meta-analyses on quality of life (SMD = 0.20, 95% CI 0.08 to 0.33; 12 = 42%; p = 0.09, low certainty of evidence) and symptoms (SMD = -0.39, 95% CI -0.74 to -0.04; 12 = 77.5%; p < 0.01, very low certainty of evidence) suggest a small to moderate improvement for patients receiving transitional care interventions. Concerning caregiver burden, studies showed no difference between transitional care within a palliative care approach versus standard of care (SMD = -0.48, 95% CI -1.03 to 0.07; 12 = 60%; p = 0.11, low certainty of evidence).

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Conclusions Transitional care interventions can improve quality of life and symptoms, although based on low or very low certainty of evidence. Subgroup analysis suggests that transitional care intervention for those receiving palliative care improves quality of life and symptoms. Further research should increase the robustness of evidence on the effectiveness of transitional care interventions in seriously ill patients.

Registration number PROSPERO CRD42022319848.

Keywords Palliative care, Quality of life, Serious illness, Transitional care

Introduction

It has been estimated that globally approximately 12 million adults live with serious illness and, most of them experience progressive functional dependence and frailty, leading to an escalation in physical and psychological symptoms from the time of diagnosis and persisting for years [1, 2]. This complex and often prolonged situation results not only in negative health outcomes for the ill person and the care partner, but also in direct social-financial consequences related to the intensive use of financial and health resources [3, 4]. 'Serious illness' can be defined as a health condition that carries a high risk of mortality, negatively affects quality of life and daily function, and/or is burdensome in symptoms, treatments or caregiver stress [5, 6]. A serious illness can be summarised as a condition where one or more health issues become severe enough to cause a decline in general health and functioning, with treatments losing their effectiveness. This process often progresses into a chronic state until the end of life. People with serious illnesses are vulnerable to a reduced quality of life, shaped by multifaceted and multidimensional threats to their fragile wellbeing, such as complex symptoms, difficult treatment decisions, and uncertainty about the future.

It is precisely this situational complexity, diversity, and intensity of symptoms, as the illness evolves, that is responsible for multiple accesses to different care settings in which it is complicated to maintain a continuum of care. A study of 4,791 non-sudden deaths between 2009 and 2011 found that transitions between care settings are common across EU countries. Over 50% of patients were transferred at least once during the last three months of life [7].

Transitions can be hampered by problems of coordination, unmet care needs, medical errors, insufficient communication, and lack of coordination between acute and community care settings [8]. There is wide consensus that transitional care interventions should include initiating services during or immediately post-hospitalization, individualised disease education, self-management support, medication reconciliation, facilitating access to healthcare, and adequate post-discharge follow-up [9]. As key facilitators of patient-centered care, nurses are uniquely positioned to engage staff in implementing tailored care strategies based on individual patient needs. At the same time, case managers play a crucial role by combining planning and coordination with a therapeutic and supportive approach [9].

Health systems around the world have invested in the quality and improvement of care, combined with the optimisation of resources. Transition of care is a prominent element in this plan, in which transitional care interventions are not only mentioned in the literature [10] but also proposed by the World Health Organization as a feasible solution to ensure the quality and safety of healthcare services [11]. Transitional care interventions are defined as interventions targeted towards patients and their care partners who are at risk of readmission that promote the safe and timely transfer of patients from the hospital to their homes [12].

Although there is growing knowledge about the adverse outcomes experienced by patients with serious illness and their caregivers, as well as the importance of transitional care interventions, evidence remains limited [13]. Transitional care has been identified as a critical component in addressing the needs of these populations, as it seeks to ensure continuity and coordination of care across healthcare settings. However, significant gaps persist in our understanding of its impact across diverse populations. An overview of the available literature [14] found insufficient research to determine whether transitional care affects specific populations differently and claimed that few reviews explicitly examined the variation of intervention effects based on population criteria. Most existing studies and reviews have focused on generalized outcomes without explicitly examining the variation of intervention effects based on populationspecific criteria, such as disease type, severity, or sociodemographic characteristics. Indeed, our preliminary search identified four systematic reviews [15-18] that evaluated the efficacy of transitional interventions for patients with heart failure and adults with traumatic spinal cord injury, while another review focused only on outcomes related to healthcare utilisation [19]. Another review [20] on patients with serious and advanced illness focused on transition care interventions interwoven with continuity and coordination. A new approach is required in the management of seriously ill patients, for whom symptoms distress and quality of life represent the main concerns and for whom a care delivery model must be

flexible and extend beyond the walls of the health system to include the community and home settings.

Indeed, previous studies have shown that transitional care could be helpful in allowing discharged patients to stay in the community longer and in a better health state [21, 22].

Therefore, the objective of this review is to evaluate the effectiveness of transitional care interventions for outcomes related to seriously ill patients and their caregivers.

Review question

- I. What is the effectiveness of transitional care interventions on seriously ill patient—related outcomes (i.e., mortality and/or survival, symptoms, quality of life)?
- II. What is the effectiveness of transitional care interventions on caregiver outcomes (i.e., burden of disease, preparedness)?

Inclusion criteria Participants

Based on the aim of this review, we defined "serious illness" as a "health condition that affects patients for several years and carries a high risk of mortality and negatively impacts a person's daily function or quality of life or excessively strains the caregiver." [5]^(p.S8) The serious illness is thus characterised by a continuous worsening of general health and functioning, with a loss of effect of the therapy. This condition evolves until the end of life. Studies focussing on patients with serious illnesses receiving or needing palliative care and/or various levels of care (such as long-term institutions and nursing homes) will be included in this review.

Participants included were:

- i. Adult patients (≥ 18 years) with severe diseases, such as those with stage III or IV metastatic cancer, advanced conditions like dementia or chronic obstructive pulmonary disease, or any health condition that carries a high risk of mortality and either negatively impacts a person's daily function or quality of life; participants were excluded if they have an acute disease (such as major trauma).
- Caregivers: Only informal, unpaid caregivers (family members, friends) actively involved in patient care were included, as they are more prone to deterioration in mental and physical health due to stress [23, 24].
- iii. The population of each qualifying study was assessed to ensure alignment with the definition of 'serious illness' as outlined in this section.

Studies that included individuals with mental health conditions, paid caregivers, care transitions between healthcare providers or care transitioning from paediatric to adult settings were not included in this review.

Interventions

We defined 'transitional care interventions' as a set of actions designed to ensure coordination and continuity of health care as patients move between different locations or different levels of care within the same location, including primary, secondary, and community care.

We classified care transition interventions into 6 main categories based on the World Health Organization report [25]:

- i) medication management (the safe use of medications).
- ii) transition planning (a formal process that facilitates the transitions).
- iii) patient and family education (provision of education/ support/counseling).
- iv) information transfer (standardised documentation, sharing information).
- v) timely and appropriate follow-up (effective follow-up care activities).
- vi) patient and family participation (active patient/ family participation in their own care).

If the intervention fit one or more of the categories, studies were eligible. Moreover, we gathered data on the delivery approach such as the amount of support/intervention, the duration, and the provider who carried out the intervention.

Comparison groups

This review considered studies that compared the transition care intervention to usual care/routine care/standard care.

Outcomes

We considered studies that reported on the following outcomes of interest, regardless of whether these were designated as primary or secondary outcomes by the original study authors.

Regarding patients:

i) mortality and/or survival

Regarding symptoms:

- i) intensity/control
- ii) quality of life, functional status

Regarding caregivers:

i) burden of the caregiver

In contrast to what was originally proposed in the review protocol, we decided to add the 'functional status' outcome, as it is strictly associated with quality of life.

We also considered studies that included the following secondary outcomes.

Regarding patients:

 i) symptom burden (the overall impact that symptoms have on an individual's daily life, including physical, emotional, and social dimensions)

Regarding caregivers:

- i) caregivers' preparedness
- ii) caregiver well-being.

In the presence of not validated tools, these measures have been included but considered measures with a possible flaw.

Types of studies

This review included only randomised controlled trials.

Methods

This systematic review was conducted in accordance with the JBI methodology for systematic reviews of effectiveness [26] and with the Preferred Reporting Items for Systematic Reviews and Meta- Analyses (PRISMA) guidelines [27] following an a priori protocol, which includes further details of the method used to carry out this review [28]. The protocol was also registered in PROSPERO (CRD42022319848).

Search strategy

The search strategy was designed to find published and unpublished studies. A preliminary limited search of MEDLINE (PubMed) and CINAHL (EBSCO) was conducted to identify keywords and subject headings commonly used to index articles within this field of study. A second comprehensive search of articles published from 2003 (the year when one of the first definitions of transitional care was published [29]) to February 2024 was conducted using the identified keywords and index terms and tailored for each of the following databases: MED-LINE (PubMed), CINAHL (EBSCO), Embase and the Cochrane Central Register of Controlled Trials (Appendix I). Sources of unpublished studies and grey literature included ClinicalTrials.gov, the World Health Organization International Clinical Trials Registry Platform, and Google Scholar. The last step in the search strategy included reviewing the reference lists of all the studies selected for critical appraisal.

Study selection

All identified studies were collected and uploaded to End-Note v.21 (Clarivate Analytics, PA, USA) and duplicates were removed. Independently, two reviewers (DD and JF) examined the titles and abstracts to ensure compliance with the inclusion criteria. The full texts of all studies identified as potentially eligible were then retrieved. The full texts of the studies were independently reviewed by two reviewers (DD and MD) according to the inclusion criteria. Studies that did not meet the inclusion criteria were excluded, and the reasons for their exclusion are given in Appendix II. At this stage, articles were excluded if they were written in languages other than English, Italian, Spanish, French, and German. Any disagreements between reviewers were resolved through discussion or with the participation of a third reviewer (GC) if consensus could not be reached.

Assessment of methodological quality

Eligible studies were critically appraised by two independent reviewers (DD and MD) at the study level for methodological quality using JBI standardised critical appraisal instruments from JBI for randomised controlled trials (RCT). This tool contains 13 evaluation criteria, and each criterion was rated as "yes," "no," "unclear," or "not applicable." For each criterion rated as "yes," one point was assigned to a study; these points were added together to calculate a total score. The overall instrument quality score ranged from 0 to 13 points. The disagreement was resolved by discussion between the two independent reviewers for all critical appraisal assessments. All studies, regardless of their methodological quality, were included in the review and were subjected to data extraction and synthesis, where possible.

Data extraction

Data from each study included in the review were extracted by two independent reviewers (MD and DD) using the standardised JBI data extraction tool [26, 30].

The data extracted included specific details about interventions, populations, study methods, and outcomes of significance to the review question and specific objectives. Any disagreements that arise between reviewers were resolved through discussion or with an additional reviewer (CG).

Data synthesis

Data from included trials were pooled in a statistical meta-analysis model using the "meta" package [31] of R (version 4.3.3) [32]. For individual trial reporting scores, the mean and standard deviation (SD) were extracted. If the studies reported several follow-up periods, we considered the time of the last follow-up, and when the studies had considered several long follow-ups, we considered

the 12 month as the maximum period. This was chosen because the efficacy of transitional care interventions as a form of continuity of care takes time to express its effect [33].

When the mean was not reported, the median and interquartile ranges were used to calculate the mean and SD. When SD was not available, confidence intervals (CI) or standard errors (SE) were used to calculate the SD of the reported mean. As the scale of measurement differed across trials, the standardised mean difference (SMD), along with its 95% CI, was calculated for continuous outcomes using random effect models. For individual trials that reported the number of deaths, these data were extracted for each treatment group and used to calculate the risk ratio (RR) with its 95% CI. Data were pooled using the Mantel-Haenszel method with the random effects model. The latter was used both for dichotomous and continuous outcomes as several differences in the population considered in included studies were detected due to the multifaceted nature of the interventions reported in included studies. All analyses performed included less than 10 studies and therefore publication bias was not explored. Heterogeneity was examined statistically using the standard I² test. According to the GRADE handbook [34], heterogeneity was assessed as follows: < 40% was low; 40-60% was moderate; 61-90% was substantial; 91-100% was considerable.

Considering that several studies included patients that also received palliative care consultation or interventions along with transitional care intervention, a post-hoc subgroup analysis was performed. Examples of palliative care interventions were assessment of psychological needs, specialty palliative care consultation, symptoms assessment and management or discussion of treatment preference and end-of-life issues.

A sensitivity analysis was conducted excluding studies in which mortality was composite and a study with implausible results. Additionally, a sensitivity analysis was performed by excluding studies with follow-up periods outside the ranges of 6–12 months for mortality and quality of life, and less than 6 months for symptoms and functional status. A separate sensitivity analysis was conducted for quality-of-life outcomes, excluding the study that met less than 50% of the JBI critical appraisal criteria (Appendix IV).

A subgroup analysis was performed based on whether the studies used a palliative approach within transitional care interventions, versus no palliative approach. In the case of metanalysis for symptom burden, we performed two different analysis considering depression and anxiety as three studies used the studies [35–37] used the hospital anxiety and depression scale (HADS) to measure these symptoms separately. We reported the metanalysis with depression as symptom considered for those studies as we considered this one as a more burdensome symptom than anxiety [38].

Assessing certainty in the findings

The Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) approach for grading the quality of evidence was followed and a Summary of Findings (SoF) was created using GRADEpro (McMaster University, ON, Canada). Two authors (DDA and MDN) independently evaluated the certainty of the evidence, and disagreement was resolved through discussion. The SoF presents the following information, where appropriate: a ranking of the quality of the evidence based on the risk of bias, imprecision, inconsistency, indirectness and publication bias of the review results. All primary and secondary outcomes with findings from included studies are reported in the SoF.

Results

Study inclusion

The combined search identified 2962 records from the main databases and 235 records from grey literature through the original search strategy, while four records were identified through the citation search. After the removal of duplicates, 2702 publications were examined using both titles and abstracts, after which 2672 publications were excluded. In total, 30 full-text records were retrieved and 18 were excluded, leaving 16 records. Of the four records identified through the citation search, all 4 were included. In total, 14 published studies and 2 studies with preliminary results were included. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram details the results of the search (Fig. 1).

Methodological quality

The methodological quality of the 14 completed studies was assessed by two independent reviewers (Table 1). The quality of the included studies ranged from 5/13 to 10/13 items with "yes" criteria, with no study responding positively to all items on the assessment instrument. The score assigned to each study was as follows: one study received a total quality score of 5, another received a score of 7, four studies received a score of 8, five studies received a score of 9, while the remaining studies were assigned a total quality score of 10, respectively. The most common weaknesses were the lack of blinding of participants (Q4) and those delivering the treatment (Q5), which was expected given the nature of the intervention. Furthermore, allocation concealment (Q2) was performed only in five studies (38%). The blindness of the outcome assessors (Q6) was also a common flaw that could lead to detection bias. Finally, nine studies (69%) reported adequate differences between the groups



Fig. 1 PRISMA 2020 flow diagram for new systematic reviews which included searches of databases, registers and other sources

in terms of follow-up (Q8) and only eight studies (62%) designed the RCT appropriately (Q13).

The certainty of evidence ranged from moderate (mortality) to very low (symptoms, functional status) risk of bias. The 'summary of findings' including the quality of the evidence, the reasons for limitation, and the main findings were shown in Table 2. Only 14 completed studies were evaluated using the GRADE approach.

Characteristics of included studies

(n = 14)

Studies with preliminary results included in review (n = 2)

The present systematic review provides a detailed summary of the distinctive characteristics of research studies that used transitional care interventions to influence the outcome (see Appendix III). The latter varied between studies (see Appendix IV), and it was possible to analyse only five results of the eight of interest.

Among the 14 completed studies, six were conducted in the United States [39–44], three in China [21, 45, 46], and five in various European regions [35–37, 47, 48], Germany, UK, Italy, Spain and Denmark, respectively, while the two studies with preliminary results were conducted in the United States [49, 50]. The publications considered covered a period of time from 2003 to 2024 and the overall sample size of the studies amounted to 3781 participants. The sample size of the participants showed a considerable degree of variation, ranging from 84 to 510 individuals. The average age among the participants ranged from 56 to 83.9 years. The gender was equally distributed in ten studies, while in four studies it was predominantly male and in one study it was predominantly female. Two studies included a dyadic relationship between patients and their caregivers, with both parties actively participating. This systematic review involved patients diagnosed with severe heart failure (n = 7), advanced chronic obstructive pulmonary disease (n = 3), advanced heart or lung disease (n = 1), advanced cirrhotic liver disease (n = 1) and multiple chronic critical diseases (n = 1). Two further studies were conducted on subjects diagnosed with end-stage cancer and serious dementia and one study on family caregivers of patients in palliative care.

In 15 studies, transitional care was provided from hospital to home, while in one study, patients were both inpatients and outpatients and received specialised palliative care at home. Seven studies explored transitional care interventions in patients receiving palliative care, which aimed to improve quality of life, manage symptoms, relieve pain, and support patients and their families in adapting to changing care needs [51].

Transitional care delivery

Transitional care interventions had several components such as health consultation [21, 37, 40, 43, 45, 46, 50], psychological support [21, 36, 39, 44], telemonitoring

Table 1 Methodologi	cal quality														
Citations	Q1	Q2	Q3	Q4	Q5	%	Q7	Q 8	60	Q10	Q11	Q12	Q13	Total	%
Wong, et al. 2016	~	~	>	⊃		z	>	~	≻	~	~	>		9/13	69%
Ng AYM, <i>et al. 2017</i>	≻	≻	≻	z	z	z	≻	≻	≻	≻	≻	≻	≻	10/13	77%
Wang, <i>et al. 2013</i>	≻	z	≻	z	z	z	≻	≻	≻	≻	≻	≻	≻	9/13	69%
Vianello, <i>et al. 2016</i>	≻	z	≻	z	z	z	≻	z	≻	≻	≻	≻	≻	8/13	62%
Rogers, et al. 2017	≻		≻	z	z	z	≻	≻	≻	≻	≻	≻		8/13	62%
Nordly, et al. 2018	≻	≻	≻	z	z	z	≻	≻	≻	≻	≻	≻	≻	10/13	77%
Daly, <i>et al. 2005</i>	≻	Ο	~			z	z	≻	≻	≻	≻	≻	≻	8/13	62%
Hanson, <i>et al. 2019</i>	≻	z	≻	z	z	≻	≻	z	≻	≻	≻	≻	≻	9/13	69%
Goldberg, <i>et al. 2003</i>	Ο	z	≻	z		≻	≻	≻	≻	≻	≻	≻	≻	9/13	69%
Smith, et al. 2014	≻	≻	≻		z	≻	≻		≻	≻	≻	≻		9/13	69%
Cleland, <i>et al. 2005</i>	≻	≻		z	z	z	z	≻	≻	≻	≻	≻		7/13	54%
Benzo, <i>et al. 2019</i>	≻		≻	z	z	z	≻	z	≻	≻	Ο			5/13	38%
Naylor, <i>et al. 2004</i>	~	Ο	≻	z	z	≻	≻	≻	≻	≻	≻	≻	≻	10/13	77%
Hernandez, <i>et al. 2014</i>	≻	z		z	z	z	≻	≻	~	≻	≻	≻	≻	8/13	62%
Total %	93%	38%	92%	%0	%0	28%	85%	71%	100%	100%	93%	93%	64%		
Note: two studies (Bernard	et al., 2019; G	riffin et al., 2(023) were not	included in	this evaluat	ions they ha	ive not been	published ye	t						
Y, yes; N, No; U, Unclear															
JBI critical appraisal checkli	ist for randon	ized control	led trials (RC1	<u>s):</u>											
Q1. Was true randomizatior	n used for ass	ignment of p	articipants to	treatment	groups?										
Q2. Was allocation to treatr	ment groups (concealed?													
Q3. Were treatment groups	s similar at th€	؛ baseline													
Q4. Were participants blind	to treatment	t assignment	č												
Q5. Were those delivering t	rreatment blir	ıd to treatme	ent assignmer	it?											
Q6. Were outcomes assesso	ors blind to tre	eatment assig	gnment?												
Q7. Were treatment groups	treated iden	tically other t	than the inter	vention of ir	nterest?										
Q8. Was follow up complet	e and if not, w	vere differen	ces between <u>c</u>	groups in te	rms of their	follow up ac	lequately de	scribed and a	nalyzed?						
Q9. Were participants analy	/zed in the gr	oups to whic	th they were r	andomized											
Q10. Were outcomes measu	ured in the sa	me way for tı	reatment grou	jsdr											
Q11. Were outcomes measu	ıred in a relial	ole way?													
Q12. Was appropriate statis	tical analysis	used?													
Q13. Was the trial design ap	opropriate, an	d any deviat	ions from the	standard R(CT design (ir	ndividual rar	idomization,	parallel grou	ips) accounted	for in the cor	iduct and ana	lysis of the tri	al?		

Table 2 GRADE summary of findings table

Patient or population: seriously ill patients

Intervention: transitional care interventions

Comparison: usual care

				Anticipated	absolute effects
Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Risk with usual care	Risk difference with transitional care interventions
Mortality	2856 (9 RCTs)	⊕⊕⊕⊖ Moderateª	RR 0.84 (0.70 to 1.04)	238 per 1.000	78 fewer per 1.000 (72 fewer to 10 more)
Quality of life	1727 (9 RCTs)	⊕⊕⊖⊖ Low ^{a,b}	-	-	SMD 0.2 SD higher (0.08 higher to 0.33 higher)
Functional status	972 (6 RCTs)	⊕⊕⊖⊖ Low ^{b,c}	-	-	SMD 0.21 SD higher (0.18 lower to 0.6 higher)
Symptoms	750 (6 RCTs)	⊕⊖⊖⊖ Very low ^{b,c,d}	-	-	SMD 0.39 SD lower (0.74 lower to 0.04 lower)
Caregiver Burden	133 (2 RCTs)	⊕⊕⊖⊖ Low ^{b,c,e}	-	-	SMD 0.48 SD lower (1.03 lower to 0.07 higher)

*The risk in the intervention group (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; MD: mean difference; RR: risk ratio; SMD: standardised mean difference GRADE Working Group grades of evidence

High certainty: we are very confident that the true effect lies close to that of the estimate of the effect. **Moderate certainty:** we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different. **Low certainty:** our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.

Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Explanations

a. wide confidence intervals (imprecision)

b. no blind for outcome assessors (risk of bias)

c. small sample size (imprecision)

d. variability in point estimates and no overlap in confidence interval (inconsistency)

e. unclear randomization (risk of bias)

[35, 44, 47, 48], coaching and self-management [39, 44], educational /pedagogical interventions [36, 49] and counselling [39] (Table 3). Interventions were delivered at pre-discharge and post-discharge levels and carried out in person (e.g., home visit) or by telephone calls at multiple time points with a variable duration ranging from 2 weeks to 6 months. Interventions were delivered primarily by expert nurses (e.g., palliative care nurses, advance practitioner nurse) [36, 39–41, 43, 47, 49, 50] who often were transition coordinators (e.g., nurses case manager) [21, 45].

The control groups generally consisted of routine and follow-up visits, according to disease-specific guidelines and in accordance with health policies. Patients were

Table 3 Transitional care delivery

Included	Explanation of the Transitional care interventions	WHO transitional	Description of the control group
studies		care categories	
Benzo et al., 2019	Health coaching is delivered in person for the first meeting and then by telephone calls once a week for the first three months and then once a month. The health coaching goal was to instruct patients on self-management activities.	Transition planning; Patient and family education; Timely and appropriate follow-up; Informa- tion transfer	Patients received the usual care based on the guideline
Cleland et al., 2005	Two interventions: home telemonitoring (patients were instructed on how to record daily parameters) and nurse telephone calls (consisting of monthly calls to patients by an expert nurse).	Timely and ap- propriate follow-up; Information transfer	Patients received their management plan and forwarded it to their general practitioner for implementation.
Daly et al., 2005	Case management by an advanced-practice nurse. Predis- charge hospital evaluation for establishing a care plan after disenrollment. After discharge, the nurse visited the patient in person or by telephone consisting of emotional support, coun- seling, arranging follow-up visits and monitoring the patient's	Transition planning; Patient and family education; Timely and appropriate follow-up; Informa-	By the time patients and family members in the usual care group asked the interviewers for advice or information, they were referred to their general practitioner, the staff of the extended care facility or the home care agency.
Goldbera et	condition. The intervention lasted two months. Telemonitoring intervention. Patients were instructed on how	tion transfer Medication manage-	Standard outpatient therapy for heart failure.
al., 2003	to record daily parameters (weight, heart failure symptoms). A physician checked the parameters reported and contacted the patient as necessary.	ment; Transition planning; Timely and appropriate follow- up; Information transfer	including the recommendation to use a stan- dard scale for daily weight assessment.
Hanson et al., 2019	Transitional care intervention consisted in predischarge pallia- tive care consultation, plus 2-week post-discharge transitional telephone support by a palliative care nurse practitioner. Inter- vention included the delivery of information and supportive calls at 72 h and two weeks post-discharge.	Transition planning; Patient and family education; Timely and appropriate follow-up; Informa- tion transfer	Control groups dyads received the routine of care and educational information.
Naylor et al., 2004	Nurse visits during hospitalizations, aiming at orienting and training heart failure patients during the acute phase and identifying specific care plans based on the patient's condition. Then, after discharge, the intervention consisted in nurse home visits for three months and telephone availability to address patient's needs	Transition planning; Timely and appropri- ate follow-up;	Discharge planning was a collaborative effort involving the attending physician, the primary care nurse and the discharge planner. Hospitals followed established discharge policies. Similarly, primary home care sites followed standardized procedures, including facilitation of referrals, availability of comprehensive home care and 24/7 nursing access.
Ng AYM et al., 2017	Post-discharge home visits and telephone calls delivered by palliative care nurses case managers and consisting of physical and psychological symptoms assessment and management, social support, spiritual and existential aspects of care, setting goals of care, and discussion of treatment preference at end- of-life stage.	Transition planning; Timely and ap- propriate follow-up; Information transfer	Both the intervention and control group received standard discharge planning. If neces- sary, episodic, unstructured home care was organized for patients at the time of discharge. The comparison group received two social calls.
Nordly et al., 2018	A psychological intervention based on existential-phenom- enological therapy targeted towards the dyad. Patients and informal caregivers had two sessions at home after discharge with a psychologist within the first month followed by needs- based interventions.	Transition planning; Patient and family education; Timely and appropriate follow-up; Patient and family participa- tion; Information transfer	Patients could be referred, at the discretion of the oncologist or another physician, to special- ized palliative care. Standard care includes inpatient and outpatient care, access to a general practitioner, out-of-hours GP service, psychological counseling and access to 24- hour home care.
Rogers et al., 2017	The intervention was performed by a nurse practitioner and focused on shared goal-setting amelioration and palliative care goals. Following hospital discharge, the nurse practitioner ac- tively participated in the ongoing management of the patients in the outpatient environment.	Transition planning; Timely and ap- propriate follow-up; Information transfer	Patients were managed by a team of cardiolo- gists experienced in HF.
Smith et al., 2014	A pedagogical educational intervention consisting of group appointments where patients were educated on how to record daily parameters (weight, fluid/sodium intake, physical activity, emotions and moods, and heart failure symptoms).	Transition planning; Timely and ap- propriate follow-up; Information transfer	Patients received both standard care and HF self-management videos on DVD.

Table 3 (continued)

Included studies	Explanation of the Transitional care interventions	WHO transitional care categories	Description of the control group
Vianello et al., 2016	Telemonitoring with a finger pulse oximeter	Transition planning; Timely and appropri- ate follow-up;	Participants in the two groups received the same clinical care and had access to the same health services.
Wang et al., 2013	Predischarge nursing education was put in place until the conditions were stable. After discharge, telephone follow-up for four weeks followed by home follow-ups at three and six months consisting of interventions based on the health belief model (HBM) were delivered.	Transition planning; Timely and ap- propriate follow-up; Information transfer	On the day of discharge, both intervention and control group patients received an educational manual and a follow-up sheet with additional materials.
Wong et al., 2016	Predischarge assessment followed by telephone or home visit follow-up. The follow-ups were delivered weekly for the first month, then monthly for the following 12 weeks.	Transition planning; Timely and ap- propriate follow-up; Information transfer	The control group received placebo calls, which consisted of light conversations unrelated
Hernandez- Quiles et al., 2024	In the TELECARE arm, patients received the same care as UCARE but with the addition of synchronous monitoring technology. This allowed for real-time data submission and continuous monitoring by the healthcare team. Automated alerts for data variations were sent to Salud Responde, mirroring the UCARE response. Automatic alerts for data changes were sent to Salud Responde, following UCARE's response. Both arms maintained regular medical follow-ups with additional trial-specific visits to monitor progress and adjust care.	Transition planning; Timely and ap- propriate follow-up; Information transfer	In the UCARE arm, patients adhered to a standard care protocol that emphasized self-care and included manual tracking of key bio-parameters like blood pressure and blood glucose in a paper notebook. They were taught to recognize exacerbation signs through clini- cal questionnaires and received educational materials. The Salud Responde call-center was available on demand to manage clinical incidents or bio-parameter changes, providing necessary interventions or activating emer- gency services based on the assessed severity.
Bernard et al., 2019*	During hospitalization, patients in the intervention arm receive information material and comprehensive palliative care con- sultations by a palliative care physician or nurse, in addition to standard liver care. Telephone contact takes place according to a flexible schedule tailored to the patient's needs (at least once a month).	Transition planning; Timely and ap- propriate follow-up; Information transfer	Patients in the usual care arm do not receive consultations with the palliative care service, but the consultation may be requested by the patient, the family or the attending physician. These consultations include the same palliative care services as the intervention arm, except for patient information material and telephone consultations.
Griffin et al., 2023*	Every day the study nurse meets the caregiver until the patient is discharged from the hospital. The caregiver receives an iPad upon discharge and has an initial video call with the study nurse within 24–48 h of discharge from the hospital and then weekly for 8 weeks.	Transition planning; Patient and family education; Timely and appropriate follow-up; Patient and family participa- tion; Information transfer	In the patient's usual arm of care, the physician and nursing staff, with input from the palliative care service, help the caregiver to develop a plan for the patient's discharge and to care for the patient upon discharge. After discharge from hospital, a member of the study team calls the caregiver once a month for the dura- tion of the study.

Notes: *unpublished study, preliminary results available.

subjected to a post-discharge disease management plan that was provided by medical specialists or nurses who could be contacted as needed or as determined by the routinary follow-up programmes.

Mortality

Ten studies [35–37, 39–42, 47, 48, 50] evaluated mortality, including 2856 patients (Fig. 2). In general, studies did not show differences in mortality between transitional care versus standard of care (RR 0.84, 95% CI 0.70–1.01; I2 = 24%, p = 0.22; moderate certainty of evidence). Metaanalyses of the subgroup showed a statistically significant reduction in mortality for studies considering transitional care interventions without including a palliative care approach (RR, 0.74 [95% CI, 0.62–0.87]; I², 0%, p = 0.70). Two sensitivity analyses were performed (Appendix IV). The first sensitivity analysis was performed excluding the two studies with composite outcome (i.e., mortality plus readmissions as a single outcome) [39, 40]. The second sensitivity analysis was performed removing one study [39] with short follow-up periods (less than 6 months). Both sensitivity analysis had no impact on the pooled results.

Functional status

Six studies [21, 36, 40, 45, 46, 48] including 972 patients evaluated the effectiveness of transitional care versus standard of care for functional status (Fig. 3). The studies did not show differences in functional status between transitional care versus standard of care (SMD=0.21,

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Tansitional Care	e interve	ention	Usua	care				
Study	Events	Total	Events	Total	Risk Ratio	RR	95%-CI	Weight
subgroup = Transitional	care							
Cleland (HTM) (2005)	28	168	10	42		0.70	[0.37; 1.32]	6.5%
Cleland (NTS) (2005)	27	173	10	43		0.67	[0.35; 1.28]	6.4%
Daly (2005)	22	231	12	103		0.82	[0.42; 1.59]	6.1%
Goldberg (2003)	11	138	26	142		0.44	[0.22; 0.85]	6.1%
Hernandez-Quiles (2024)	32	255	48	255		0.67	[0.44; 1.01]	12.5%
Naylor (2004)	56	118	74	121		0.78	[0.61; 0.98]	22.3%
Smith (2014)	2	92	2	106		- 1.15	[0.17: 8.02]	0.8%
Vianello (2016)	23	230	9	104		1.16	[0.55: 2.41]	5.1%
Random effects model		1405		916	•	0.74	[0.62: 0.87]	66.0%
Heterogeneity: $I^2 = 0\%$, $\tau^2 =$	0, p = 0.7	70						
	0, 10 0.							
subgroup = Transitional	care ar	nd pall	iative ca	re				
Bernard, G (2019)	9	31	7	32		1.33	[0.56; 3.12]	3.9%
Nordly (2018)	70	162	64	160		1.08	[0.83: 1.40]	20.7%
Rogers (2017)	23	75	20	75	<u> </u>	1.15	[0.69: 1.91]	9.4%
Random effects model		268		267	•	1.11	[0.89: 1.39]	34.0%
Heterogeneity: $I^2 = 0\% \pi^2 =$	0 p = 0	89					L,	/ •
i i e te e general j. i e i e i e i e i e	0, 10 0.							
Random effects model		1673		1183		0.84	[0.70: 1.01]	100.0%
Heterogeneity: $I^2 = 24\%$, τ^2	= 0.0231	p = 0.2	22	[
Test for subgroup difference	s: $\gamma_{4}^{2} = 8$	24. df =	= 1 (p < 0)	01) 0.	1 0.2 0.5 1 2 5	10		
		,,			favours TC favours UC			

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Fig. 2 Meta-analysis for mortality of the intervention group with a subgroup analysis for palliative approach compared with the control group

	Tansitio	onal C	are int	ervention		U	sual care	Stan	dardised Me	ean		
Study		Total	Mean	SD	Total	Mean	SD	I	Difference	SM	D 95%-CI	Weight
subgroup = Tran	sitional	care										
Hernandez-Quiles	(2024)	160	75.41	24.8700	172	70.93	24.9800	-		0.1	8 [-0.04; 0.40]	18.3%
Naylor (2004)		118	3.30	1.3000	121	3.00	1.5000	-		0.2	1 [-0.04; 0.47]	17.9%
Wang (2014)		42	96.55	6.5800	46	77.07	20.4600			- 1.2	5 [0.79; 1.71]	15.3%
Random effects	model	320			339			_		0.5	2 [-0.14; 1.18]	51.5%
Heterogeneity: $I^2 =$	89% , τ ² =	= 0.312	29, p < 0	0.01								
subgroup = Tran	sitional	care	and pa	alliative ca	re							
Ng Aym (2018)		43	6.57	0.7700	41	6.69	0.7700			-0.1	5 [-0.58; 0.27]	15.7%
Nordly (2018)		79	53.20	20.0000	66	58.20	46.9000		—	-0.1	4 [-0.47; 0.18]	17.1%
Wong (2016)		43	66.85	121.9700	41	66.80	121.0200		-	0.0	0 [-0.43; 0.43]	15.7%
Random effects	model	165			148			-	•	-0.1	1 [-0.33; 0.12]	48.5%
Heterogeneity: $I^2 =$	0%, $\tau^2 =$	0, p =	0.85									
Random effects	model	485			487					0.2	1 [-0.18; 0.60]	100.0%
Heterogeneity: $I^2 =$	82%, τ ² =	= 0.205	59, p < 0	0.01								
Test for subgroup d	ifference	s: $\chi_1^2 =$	3.12, dt	f = 1 (p = 0.	08)			1 -0.5 0	0.5 1	1.5 2		
							f	avours UC	favours TC			

Fig. 3 Meta-analysis for functional status of the intervention group with a subgroup analysis for palliative approach compared with the control group

95% CI -0.18 to 0.60; $I^2 = 82\%$; p = < 0.01; low certainty of evidence). Subgroup analysis did not show any significant variation.

In this analysis, one study [45] was excluded from a subsequent sensitivity analysis, due to the implausibility of the results with respect to this outcome. However, sensitivity analysis confirmed that there were no differences in functional status between transitional care versus standard of care (SMD = 0.26, 95% CI -0.22 to 0.73; $I^2 = 85\%$; p < 0.01) (Appendix IV). With regard to followup, the sensitivity analysis excluding the single study with a long follow-up period did not affect the overall results (Appendix IV).

Quality of life

Nine studies [21, 35–37, 40, 41, 44, 45, 48] including 1727 patients assessed quality of life to assess the effectiveness of transitional care versus standard of care (Fig. 4). Three studies [21, 37, 45] used two instruments to measure quality of life, referred to general or disease-specific quality of life. In this case, only disease-specific instruments were considered. Studies showed a significant improvement in quality of life for patients receiving transitional care intervention, with a small effect size and moderate heterogeneity (SMD = 0.20, 95% CI 0.08 to 0.33; $I^2 = 42\%$; p = 0.09, low certainty of evidence). The subgroup analysis showed a significantly improved quality of life in the transitional care group plus the palliative care approach (a specialised team that managed the multiple domains of quality of life including physical symptoms, psychosocial and spiritual concerns, and advanced care planning) compared to standard of care (SMD = 0.36, 95% CI 0.15 to 0.56; $I^2 = 18\%$; p = 0.15). However, no differences were found considering studies that used only the transitional care intervention (SMD=0.14, 95% CI -0.01 to 0.28; $I^2 = 42\%$; p = 0.14). Two sensitivity analyses were performed (Appendix IV). The first sensitivity analysis was performed excluding the two studies [21, 45] with short follow-up periods (less than 6 months), with no impact on the pooled results. The second sensitivity analysis was performed removing one study [44] with poor quality, with no impact on the pooled results.

Symptoms

Additionally, the sensitivity analysis excluding the only study with a long follow-up period (6-12 months) did not

affect the pooled results (Appendix IV).Six studies [21, 35-37, 45, 46] including 750 patients assessed symptom intensity (Fig. 5). Three studies [35-37] used the hospital anxiety and depression scale (HADS), which measures two dimensions (i.e., anxiety and depression) and two different metanalyses were performed for depression and anxiety. The results of the metanalysis that included depression are reported in Fig. 5, while metanalysis that considered anxiety is reported in Appendix IV. Studies showed a significant reduction in symptomatology for patients receiving transitional care intervention, with a small effect size and substantial heterogeneity (SMD = -0.39, 95% CI -0.74 to -0.04; $I^2 = 77.5\%$; p < 0.01, very low certainty of evidence). Considering subgroup analysis, a significant reduction in symptomatology could be found when the intervention consisted of transitional care and palliative care (SMD = -0.24, 95% CI -0.46 to -0.02; I2 = 17.1%; p = 0.30). On the contrary, no difference with a considerable heterogeneity was found for the articles that used only the transitional care intervention without a palliative approach (SMD = -0.68, 95% CI -1.78 to 0.42; I2 = 94%; p < 0.01). The analysis performed considering anxiety instead of depression did not significantly alter the overall effect of transitional interventions on burden of symptoms (Appendix IV).

Caregiver burden

Two studies [21, 43] including 133 patients, addressed the caregiver's burden of individuals with serious illnesses (Fig. 6). The included studies used the Family Distress in Advanced Dementia tool [43], and the Zarit Burden Interview [21]. All studies considered a transitional care

Tansiti	onal Ca	are inte	rvention		Us	ual care	St	andardised M	ean			
Study	Total	Mean	SD	Total	Mean	SD		Difference		SMD	95%-CI	Weight
subgroup = Transition	al care											
Benzo (2019)	108	32.00	1.2900	107	32.00	1.1400		<u> </u>		0.00	[-0.27; 0.27]	12.8%
Goldberg (2003)	138	-40.10	23.8000	142	-42.00	26.9000				0.07	[-0.16; 0.31]	14.7%
Hernandez-Quiles (2024) 160	64.00	19.9000	173	56.30	21.6000				0.37	[0.15; 0.59]	15.8%
Naylor (2004)	118	2.90	1.6000	121	2.60	1.5000	-			0.19	[-0.06; 0.45]	13.5%
Vianello (2016)	181	36.69	8.3400	81	36.67	8.7400	_			0.00	[-0.26; 0.26]	13.1%
Random effects model	705			624				\frown		0.14	[-0.01; 0.28]	69.9%
Heterogeneity: $I^2 = 41.7\%$,	$\tau^2 = 0.0^{\circ}$	116, p =	0.1432									
subgroup = Transition	al care	and pa	lliative ca	are								
Ng Aym (2017)	43	5.31	1.1400	41	5.27	0.8500				0.04	[-0.39; 0.47]	6.8%
Nordly (2018)	79	48.30	23.2000	66	39.80	27.9000				0.33	[0.00; 0.66]	9.9%
Rogers (2017)	41	63.10	20.4000	44	52.10	25.0000		-		0.48	[0.04; 0.91]	6.7%
Wong (2016)	43	5.26	1.1100	41	4.47	1.4700		-	_	0.60	[0.17; 1.04]	6.6%
Random effects model	206			192						0.36	[0.15; 0.56]	30.1%
Heterogeneity: $I^2 = 17.7\%$,	$\tau^2 = 0.00$	036, p =	0.3026									
Random effects model	911			816						0.20	[0.08; 0.33]	100.0%
Heterogeneity: $I^2 = 41.9\%$,	$\tau^2 = 0.0^{\circ}$	147, p =	0.0883				1 1		L L			
Test for subgroup difference	es: $\chi_1^2 =$	2.84, df	= 1 (p = 0	.0921)		-(0.5 0	0.5	1 1.5			
						favo	ours UC	favours TC				

Fig. 4 Meta-analysis for QoL of the intervention group with a subgroup analysis for palliative approach compared with the control group



Fig. 5 Meta-analysis for symptoms of the intervention group with a subgroup analysis for palliative approach compared with the control group

Tansitio Study	onal Care Total	e interv Mean	vention SD	Total	Us Mean	ual care SD	Standardised Mean Difference	SMD	95%-CI	Weight
Hanson (2019) NG AYM (2017)	30 36	2.30 12.61	0.5000 8.9000	32 35	2.40 23.69	0.5000 18.5050		-0.20 -0.76	[-0.70; 0.30] [-1.24; -0.28]	49.3% 50.7%
Random effects mod Heterogeneity: $l^2 = 60\%$,	el 66 $\tau^2 = 0.09$	44, p =	0.11	67		-	2 -1.5 -1 -0.5 0 0.5 favours TC favours	- 0.48 1 1.5 UC	[-1.03; 0.07]	100.0%

Fig. 6 Meta-analysis for caregiver burden of the intervention group (transitional care plus palliative approach) compared with the control group

intervention plus the palliative approach. One preliminary study [49] was not considered for metanalysis as complete data on the outcome was missing. The studies showed moderate heterogeneity and no difference in caregiver burden between transitional care plus palliative care versus standard of care (SMD = -0.48, 95% CI -1.03 to 0.07; I2 = 60%; p = 0.11, low certainty of evidence).

Discussion

This systematic review provides a comprehensive synthesis of the literature to evaluate the effectiveness of transitional care interventions on seriously ill patients and their caregivers. The RCTs in this review selected patients based on their illness severity (e.g., advanced, end/late stage), which are those patients that benefit most from interventions that focus on improving continuity of care in a time of great vulnerability [52].

This review included 16 studies that investigated transitional care interventions. Most of the proposed interventions were multi-component: health education, telemonitoring, coaching, discharge planning and/or post-discharge communication, and self-management. The interventions were provided before and after hospital discharge and addressed mainly tailored care based on individual patient needs. The multicomponent nature of the interventions varied significantly in their approaches, complicating the identification of which specific components influenced the assessed outcomes. Nonetheless, home visits (56%), telephone follow-ups (50%), and telemonitoring (37%) were the most used interventions across the included studies. These three interventions were used simultaneously in 8 out of 16 studies (50%) and were provided both pre- and post-discharge in 5 studies.

Unfortunately, the timeframe of the interventions was not well described, including the amount of time spent on each visit and the availability of on-call providers. Although there are still gaps in the operationalization of interventions, from our studies a quite common strategy consisting of a 4-week intervention with weekly structured events for the first months followed by monthly follow-ups. We recognize that while our aim was to study the effectiveness of transitional care interventions across different populations and to conduct subgroup analyses by condition or diagnosis, the heterogeneity of the included studies limited our ability to differentiate the findings. The studies encompassed a wide range of health conditions, which made meaningful subgroup analyses infeasible. Seven studies [21, 36, 37, 43, 45, 49, 50] incorporated the palliative care approach in transitional care support in line with evidence of the beneficial effects of home palliative care reported in a recent Cochrane review [53] and the necessity to integrate the palliative care approach into the continuum of care. A subgroup analysis was warranted regarding such studies.

The results of the review showed that there is limited research that examines the impact of both transitions between different care settings/sectors (hospice, hospital and home/community) and the participation of family, as most studies focused on hospital-to-home transitions and only two studies focused on caregivers [21, 43]. These findings are quite surprising considering that the patient's journey through the health care system goes beyond post-hospital care transitions and involves several interfaces between different settings with a huge burden on caregivers [25]. Non-significant findings of meta-analysis on caregiver burden may reflect the small number of studies with included sample size included and warrant further exploration. The lack of data on caregiver burden is of particular concern as caregivers represent a reference point for healthcare. Their participation is one of the best strategies for managing high-quality improvement in transitional care [53]. Interestingly, while our review included all serious illnesses, the absence of cancer-related studies in the final selection may stem from the existence of a well-developed cancer care network. This network encompasses a wide range of transitional care interventions under the overarching term 'cancer care continuum,' which has been extensively studied and integrated into standard care practices [54, 55]. This suggests that while interventions for cancer patients may already be well-researched and systematically implemented, there remains a need to extend similar focus and resources to non-cancer serious illnesses, which may lack comparable networks and comprehensive care frameworks.

Our results showed that the interventions were primarily delivered mainly by a nurse case manager or advanced practice nurses, with support from trained volunteers. Members of the multidisciplinary team were consulted as needed during the programme. Indeed, nurses are uniquely positioned to engage staff in implementing tailored care strategies based on individual patient needs, while case managers combine planning and coordination with a therapeutic and supportive role. Numerous studies have documented the multifaceted role of case managers and described their role in managing long-term conditions [56], providing in-home care for older adults [57], working in public health screening programs [58], supporting those with mental health problems [59], and assisting elderly individuals with complex needs [60], highlighting their competences in collaborating with different organisations and specialties.

It is worth noting that although in this review a variety of instruments were used, study outcomes were measured with validated scales to determine the statistical significance of quality of life (HF-specific scale, SF36, Facit Pal, EORTC, Kansas City Cardiomyopathy Questionnaire, The Minnesota Living with Heart Failure questionnaire, Chronic Respiratory Disease questionnaire) symptoms (Edmonton Symptom Assessment Scale, Hospital Anxiety and Depression Scale, The Modified Medical Research Council Dyspnea Scale), functional status (Palliative Performance Scale, Barthel index, Enforced Social Dependency Scale), and caregiver burden (Zarit Caregiver Burden Interviews, Family Distress in Advanced Dementia).

Regarding the quality, none of the included studies implemented a double-blind procedure, as blinding participants and those assigning treatments was likely infeasible due to the nature of the interventions (e.g., home visits, telemonitoring, or telephone follow-ups). These types of interventions inherently require participant awareness and interaction, making blinding impractical. We are aware that without participant blinding, individuals may alter their behaviour or responses based on their knowledge of receiving the intervention (e.g., heightened adherence to recommendations or altered expectations of outcomes). Similarly, healthcare providers aware of the intervention group assignments may unconsciously treat participants differently, potentially influencing the outcomes. These factors could have influenced the reported outcomes, potentially overestimating or underestimating the effectiveness of the interventions.

In this systematic review, there emerged expected variability in providing transitional care interventions (components, duration, and providers) across studies that certainly impacts the strength of recommendations that can be drawn. However, sufficient homogeneity allowed meta-analysis even though only 5 of the 8 outcomes of interest were evaluated from included studies. Specifically, the impact of transitional care programs on mortality and quality of life was the most measured in all studies, followed by symptoms and functional status. None of the studies addressed the burden of the patients and the preparedness and awareness of caregivers. In addition, to minimize variability in the follow-up periods, we conducted sensitivity analyses, which did not result in any significant changes to the pooled estimates.

The meta-analyses of this systematic review suggest that transitional care interventions may have a small to moderate positive effect on quality of life and symptoms, though the clinical meaningfulness of these findings is uncertain given the low to very low certainty of the evidence, while having a small, non-significant effect

on mortality, functional status, and caregiver burden. These results align with the research findings of an old systematic review that included a wider type of intervention (transitional care, continuity, coordination) [20]. It is noteworthy that in terms of outcome mortality, the subgroup analysis showed a significant reduction in mortality in the transitional care group without a palliative care approach, conversely, the palliative care approach was associated with better quality of life and symptoms. This fact could be due to the different severity, marked reductions in health-related quality of life [21], refractory symptoms, psychological distress [45] risk of death [37], depression [37], and awareness of the end-of-life [37, 45] that patients in the palliative care approach experienced. For them, outcomes such as quality of life and symptom distress are of primary concern [61-64]. Indeed, the reactions to transitions may differ from those of other populations, demonstrating that it is not merely the intervention itself that generates the outcome, but rather the way in which the context shapes and the person responds to the intervention [8, 65].

These results can have an implication for nursing practice. Expert nurses, such as advanced practice nurses or case managers, can be the key in delivering effective transitional care. Expanding the role of specialized nurses in transitional care programs could ensure continuity of care, enhance symptom management, and improve patient outcomes. Nurses should advocate for and actively participate in multidisciplinary teams to ensure comprehensive care delivery and personalised care plan based on patients' needs.

Limitations

The included studies comprised multicomponent interventions that differed substantially in their approach; thus, it was nearly impossible to analyse which components of these made a difference in any of the outcomes assessed. In an attempt to reduce variability and consider the longitudinal nature of the intervention analysed, we chose the last follow-up per study, although analysing the shorter follow-ups would have been useful to provide a broader picture of the impact on transitional interventions. Therefore, results of metanalyses should be interpreted with caution. From the included studies methodological bias arose since, given the intervention's interactive nature, none of the included studies was blind to the study population and personnel to treatment allocation.

Due to the challenging care issues associated with the management of complex physical, emotional and social needs of seriously ill patients and their caregivers, the list of outcomes might be incomplete. To improve data comparability and pooling, this article would have benefited from a comprehensive core set of outcomes to better capture the impacts on the patient / caregiver experience.

Conclusions

The results of the meta-analyses suggest that transitional care interventions have a small to moderate positive effect on reducing symptoms and improving quality of life, though the clinical meaningfulness of these findings is uncertain given the low to very low certainty of the evidence. Meanwhile, no significant differences were observed in functional decline, mortality, or caregiver burden compared to conventional care.

The findings of the present systematic review suggest that components such as health consultation, telemonitoring, coaching, counselling, educating, and promoting self-management seem to have an important role in improving quality of life and reducing symptoms. In addition to the multi-component nature of the intervention, the number of discharge stages (before and after discharge) at which the components are implemented may increase the possibility of obtaining positive outcomes. These findings should be taken into account to strengthen healthcare in seriously ill patients. It is recommended to perform high-quality studies that describe in detail the timeframe of the interventions including the amount of time spent on each visit and the availability of on-call providers.

Recommendations for practice

This review provides evidence to recommend transitional care interventions to improve quality of life and symptoms among seriously ill patients. Since transitional care interventions operate through the integration of separate services in complex health and social care systems, it is reasonable to think that high intensity transitional care interventions (with a greater number of components and longer duration) are associated with better outcomes. Therefore, during the development and implementation of such interventions, careful consideration of the constraints and availability of infrastructure and technology is recommended to keep a feasible approach. Additionally, based on the uniqueness of the seriously ill patient, organizational and national policy measures are needed to promote and ease transitions by recognizing the importance of identity, clarifying accountability, and providing emotional and practical support within structured and humanized care in the defence of human dignity.

Recommendations for research

Comparison of different components of the interventions was limited by the relatively small number of studies for each component and outcome. Considering the different steps in the care transition and its multicomponent nature, focusing on a wider range of interventions is likely to have significant benefits on different outcomes. Future studies should provide detailed reporting on transitional care intervention components to understand the impact of individual components within the complexity of multilevel interventions and therefore to define clear recommendations for practice. The short-term effect of transitional care interventions on healthcare outcomes, especially its effect on patient-related outcomes, needs to be further studied. Finally, due to the promising results of our subgroup analyses, more studies are needed to investigate the effects of the palliative approach on seriously ill patients and their caregivers during the illness trajectory.

Supplementary Information

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Supplementary Material 1

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Author contributions

D.D. and M.D.: designed the study, developed the data extraction strategy, extracted the data, performed the analysis, interpreted the results, drafted the manuscript, and approved the final version.A.D., G.C., J.F., S.S., K.P., R.A., and D.I.: contributed to the study design and interpretation of the data, processed and prepared the figures, conducted the literature search and study selection, and critically reviewed the manuscript.All authors reviewed and approved the final manuscript.

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Data availability

All data generated or analyzed during this study are included in this published article [and its supplementary information files].

Declarations

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Consent for publication

Not applicable.

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Competing interests

The authors declare no competing interests.

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