

Effectiveness and costs of transitional care models in home care: integrative review

Efetividade e custos de modelos de cuidados transitórios em atenção domiciliar: revisão integrativa

Eficacia y costes de los modelos de cuidados transitorios en la atención domiciliar: revisión integradora

ABSTRACT

Objective: to analyze the effectiveness and costs of transitional care models in home care of patients with acute and chronic conditions compared with other modalities. **Method:** integrative review of a sample of 18 articles among the 278 searched in seven databases. **Results:** among 15 transitional care models, the following stood out: rehabilitation; parenteral therapies; chronic disease follow-up; postoperative care; and home hospitalization. They were effective in treating acute or chronic conditions; simplifying access to hospital; preventing readmissions; reducing length of stay; increasing adherence to outpatient rehabilitation, reducing mortality, and improving emotional status/caregiver burden. The main cost component was per diem rates. In nine studies, the models meant decreases in overall hospitalization costs. **Conclusion:** transitional care in home care enables effective and cost-efficient continuity of care for providers and health systems. **Keywords:** Transitional Care, Home Care, Health Care Costs, Effectiveness, Cost-effectiveness.

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RESUMO

Objetivo: analisar efetividade e custos de modelos de cuidados transitórios em atenção domiciliar de pacientes com condições agudas e crônicas comparados a outras modalidades. **Método:** revisão integrativa de uma amostra de 18 artigos dentre os 278 pesquisados em sete bases de dados. **Resultados:** Destacaram-se, em 15 modelos de cuidados transitórios, os de: reabilitação; terapêuticas parenterais; acompanhamento de doenças crônicas; pós-operatórios e internação domiciliar. Foram efetivos para tratar condições agudas ou crônicas agudizadas; simplificar acesso a hospital; prevenir readmissões; reduzir tempo de internação; ampliar adesão em reabilitação ambulatorial, reduzir mortalidade e melhorar estado emocional/sobrecarga do cuidador. O principal componente de custo foi os valores de diárias. Em nove estudos, os modelos significaram quedas no custo geral com internação. **Conclusão:** Cuidados transitórios em Atenção Domiciliar possibilitam a continuidade do tratamento com efetividade e economia para provedores e sistemas de saúde. **Descritores:** Cuidado Transicional, Assistência Domiciliar, Custos de Cuidados de Saúde, Efetividade, Custo-efetividade.

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RESUMEN

Objetivo: analizar la efectividad y los costes de los modelos de cuidados transitorios en la atención domiciliar de pacientes con patologías agudas y crónicas en comparación con otras modalidades. **Método:** revisión integradora en una muestra de 18 artículos, entre 278 encontrados en siete bases de datos. **Resultados:** Entre los 15 modelos de cuidados transitorios destacaron los siguientes: rehabilitación; terapias parenterales; seguimiento de enfermedades crónicas; cuidados postoperatorios; y hospitalización a domicilio. Los modelos fueron eficaces para tratar enfermedades agudas o crónicas; simplificar el acceso al hospital; prevenir los reingresos; reducir la duración de la estancia; aumentar la adherencia a la rehabilitación ambulatoria; reducir la mortalidad; y mejorar el estado emocional/la carga para los cuidadores. El principal componente de coste fueron las tarifas diarias. En nueve estudios, los modelos resultaron en una disminución de los costes generales de hospitalización. **Conclusión:** Los cuidados de transición en la atención domiciliar permiten una continuidad asistencial eficaz y rentable para los proveedores y los sistemas sanitarios. **Palabras clave:** Atención transitoria, Atención domiciliar, Costos de la Atención en Salud, Efectividad, Coste-efectividad.

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INTRODUCTION

Health systems and services have invested in increasingly integrated care and management models, seeking to improve care and achieve savings, which has been challenging⁽¹⁾. The aim is for the services to be effective, low-cost, high-quality, safe and capable of guaranteeing comprehensiveness in order to achieve the users' health goals⁽²⁾. In this context, Home Nursing (HN) has been considered a viable strategy.

HN services include innovative care modalities, including Transitional Care (TC). They gained a more significant global dimension after the 2000s, stimulating the creation of specific institutions to support the modalities, studies, protocols and policy formulation⁽³⁻⁵⁾.

Transitional or transition care is conceived as a set of planned, coordinated and temporary actions offered by a team or program, or as a specific type of care after hospital discharge or procedure. TC is considered complementary, intended for the care transition through safe and timely transfer of patients from one care level or type of care environment to another⁽⁶⁾. It includes care to enable dehospitalization or early discharge with teams that maintain interventions at home, for a certain period of time until definitive discharge, transition to family or follow-up in other services. They are mainly aimed at patients with chronic conditions in acute stages, rehabilitation and restorative care, with a view to care continuity and prevention of complications and readmissions⁽⁷⁾.

In the United States (US), the Transitional Care Model adopts a protocol for referring aged patients to home care by nurses, who play an important role in developing TC⁽⁸⁾. In Latin America, TC is recognized as a strategy mainly for reducing the cost of health services due to complications⁽⁹⁾. In Brazil, TC is encouraged within the Health Care Network (HCN) to provide care continuity and reduce hospitalizations⁽⁷⁾, boosting the role of PHC and HN services⁽¹⁰⁾.

In other countries, TC represents an important strategy for health systems, encompassing

actions that have been considered specific to HN, although there is no evidence as to their effectiveness and costs. Revealing the expenditures and results of TC in HN can help qualify the decision-making process, adapt and support its expansion, as "knowing the costs of public services is fundamental to achieving an efficient allocation of resources"⁽¹¹⁾.

In view of the above, this review aimed at analyzing the effectiveness and costs of transitional care models in the home care of patients with acute and chronic conditions, when compared to other care modalities.

METHODS

An Integrative Review (IR) was carried out on the following question: Which are the effectiveness and costs of transitional care models in the home care of patients with acute and chronic conditions, when compared to other care modalities? The question was designed with the Population, Intervention, Control and Outcomes acronym, where P (Population): patients with acute and/or chronic conditions after hospital discharge; I (Intervention): transitional care, C (Comparison): other types of care and O (Outcomes): effectiveness and costs.

The IR structure was chosen because it allows us to study broad issues, considered to be of major importance, as well as to create subsets of the multiple and different aspects of the problem, such as effectiveness and cost in the same study, finding current knowledge on these two independent or allied issues, which are essential in justifying HN programs or services within health system networks. In addition to that, the IR provides an up-to-date overview of the studies carried out and explains new questions for specific systematic studies to support policies, protocols and procedures⁽¹²⁾.

A search was carried out in the LILACS and IBICS databases via Biblioteca Virtual da Saúde, Medline via PubMed, Scopus, Web of Science, CINAHL and Cochrane, using the

following descriptors in Health Sciences: Home Nursing; Hospital Home Care Services; Health Care Costs; Cost-Effectiveness Assessment; Costs and Cost Analysis; Health Expenditures; Cost-Benefit Analysis; Cost-Efficiency Analysis; Health Care Costs and Hospitalization time.

The search strategy for each database was prepared with the support of a librarian and the following search strategy was used for BVS: tw:(tw:(tw:(tw: ("Assistência Domiciliar" OR "Home Nursing" OR "Atención Domiciliar de Salud" OR "Assistência Domiciliária" OR "Cuidados Domiciliares de Saúde" OR "Serviços de Assistência Domiciliar" OR "Home Care Services" OR "Servicios de Atención de Salud a Domicilio" OR "Cuidado Domiciliar" OR "Serviços de Cuidados Domiciliares" OR "Serviços Residenciais Terapêuticos" OR "Serviços Hospitalares de Assistência Domiciliar" OR "Home Care Services, Hospital-Based" OR "Servicios de Atención a Domicilio Provisto por Hospital" OR "Serviços de Assistência Hospitalar no Domicílio" OR "Assistência Domiciliar Oferecida por Hospital" OR "Serviços de Assistência Domiciliar Oferecida por Hospital" OR "Internação Domiciliar") AND (tw: ("Custos de Cuidados de Saúde" OR "Health Care Costs" OR "Costos de la Atención en Salud" OR "Custos de Cuidados Médicos" OR "Custos de Tratamento" OR "Cost-Effectiveness Evaluation" OR "Evaluación de Costo-Efectividad" OR "Avaliação de Custo-Efetividade" OR "Costs and Cost Analysis" OR "Costos y Análisis de Costo" OR "Custos e Análise de Custo" OR "Gastos em Saúde" OR "Health Expenditures" OR "Gastos em Salud" OR "Custeio" OR "Despesas" OR "Gastos" OR "Análise Custo-Benefício" OR "Cost-Benefit Analysis" OR "Análisis Costo-Beneficio" OR "Análise de Custo-Benefício" OR "Análise de Custo-Efetividade" OR "Custo-Efetividade" OR "Dados de Custo-Benefício"

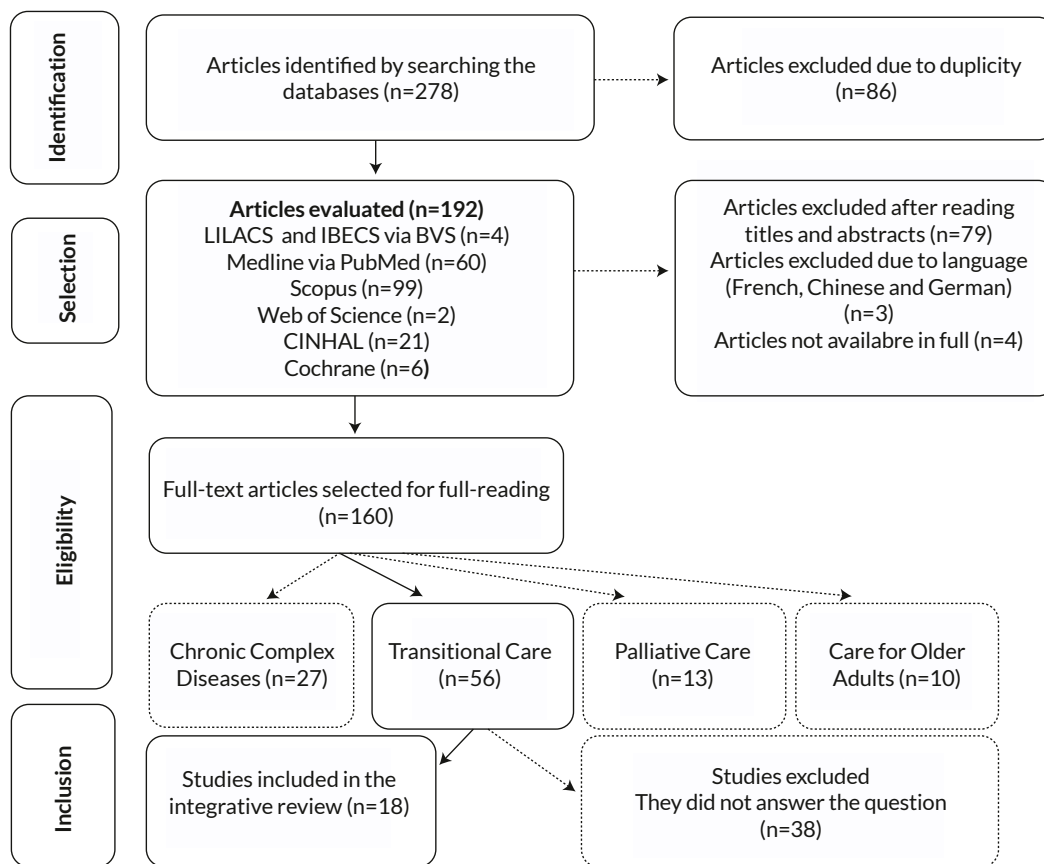
OR "Cost Efficiency Analysis" OR "Análisis Costo-Eficiencia" OR "Análise Custo-Eficiência" OR "Custos de Cuidados de Saúde" OR "Health Care Costs" OR "Costos de la Atención en Salud") AND (tw: ("Tempo de Internação" OR "Length of Stay" OR "Tiempo de Internación")) AND (instance:"regional") AND (year_cluster:(("2009" OR "2010" OR "2011" OR "2012" OR "2014" OR "2016" OR "2015" OR "2013" OR "2017" OR "2018" OR "2019" OR "2020" OR "2021")))) AND (instance:"regional") AND (instance:"regional").

Equivalent strategies were adopted in the Medline, Scopus, Web of Science, CINAHL and Cochrane databases, including studies on the cost and hospitalization time in HN or other transition services published in the last 13 years in Portuguese, English and Spanish. The studies that did not present cost and effectiveness analyses in the HN context were excluded.

The search was carried out in August and September 2018 and updated between July and September 2021. After applying the search strategies and excluding duplicate records, the articles found were examined based on their titles and abstracts. Two reviewers independently analyzed the eligibility of the studies. A third evaluator decided any and all disagreements between the independent evaluators.

Of the 278 articles found, 86 were excluded because they were duplicated in other databases. The titles and abstracts of the remaining 192 articles were read and, of these, 79 did not answer the initial question. Of the 106 articles read in full, 18 studied a transitional care model and answered the research question objectively, making up the final sample. Figure 1 shows the flowchart of the strategy adopted for the selection and inclusion of articles⁽¹³⁾. We subjected the final sample to exhaustive re-reading in order to analyze the level of evidence⁽¹⁴⁾.

Figure 1 – Flowchart of the integrative review on the effectiveness and costs of transitional care models in Home Nursing, Belo Horizonte, MG, Brazil, 2023.



Source: Research data: prepared by the authors according to PRISMA⁽¹³⁾

A matrix was created to analyze and extract the following information: characteristics of the participants; study locus; study type, data collection and analysis techniques; HN modality; cost components, outcome/effectiveness; analysis perspective and main study findings.

It is noted that this review is part of a larger research project, which deals with the costs inherent to patients in HN for health services, the family and hospitalization time, when compared to other types of care.

RESULTS

The methodological characteristics of the studies included are shown in Chart 1(13-31). They were from ten countries: five were published in Canada, three in the USA, two in the United Kingdom, two in Australia and one in each of the following countries: Korea, France,

the Netherlands, New Zealand, Singapore and Sweden. All of them compared conventional (hospital) models with the TC modality after hospital discharge, using the home as a reference, showing significant results.

As for the quality of the studies included, four were classified as of high methodological quality(20,26,27,29); seven were of moderate quality(18,21,22,23,24,25,28) and another seven were of low quality for the following reasons: they included a small sample(15-17,22,31,32); the results were not generalizable(19-22,30,31,32); having data collected at a time much earlier than the publication date(17; and inaccuracies in the estimates presented in review studies(30). The study samples varied from 10 to 43,471 participants(18,31).

After reading the 18 articles in full, 15 TC models were identified and a brief summary of them is shown in Chart 2.

Chart 1 - Methodological characteristics of the studies included in the Integrative Review. Belo Horizonte, MG, Brazil, 2023

Author - Year - Country - Reference	Population Group	Type of Health Conditions	Type of Study	Type of Treatment	Participants (n)	Level of Evidence*
Mahomed <i>et al.</i> (2008), Canada ⁽²⁴⁾	Adults and/or Aged People	Acute	Epidemiological Experimental	Orthopedic Surgery	234	Moderate
Parsons <i>et al.</i> (2020), New Zealand ⁽²⁹⁾	Adults and/or Aged People	Acute	Randomized Controlled Trial	Home rehabilitation for older adults after fall injuries	403	High
Higgins <i>et al.</i> (2020), Canada ⁽³²⁾	Adults and/or Aged People	Acute	Randomized Clinical Trial	Orthopedic Surgery: (anterior cruciate ligament reconstruction)	60	Low
Shepperd <i>et al.</i> (2014), United Kingdom ⁽²⁷⁾	Adults and/or Aged People	Acute	Systematic Review	Elective Surgeries	3,967	High
Polinski <i>et al.</i> (2017), USA ⁽²⁰⁾	Adults and/or Aged People	Acute	Systematic Review	Various Conditions	4,222	High
Nabagiez <i>et al.</i> (2017), USA ⁽²¹⁾	Adults and/or Aged People	Acute	Epidemiological Observational Analytical	Cardiac Surgery	726	Moderate
Kameshwar <i>et al.</i> (2016), Australia ⁽¹⁹⁾	Adults and/or Aged People	Acute	Epidemiological Observational Analytical	Cellulitis in LLs	328	Low
Southey <i>et al.</i> (2015) United Kingdom ⁽²²⁾	Adults and/or Aged People	Acute	Epidemiological Observational Analytical	Thoracic Surgery	50	Moderate
Lacroix <i>et al.</i> (2014), France ⁽¹⁵⁾	Adults and/or Aged People	Acute	Epidemiological Observational Analytical	Infective Endocarditis	39	Low
Tistad and Von Koch. (2015), Sweden ⁽²⁵⁾	Adults and/or Aged People	Chronic	Epidemiological Observational Analytical	Stroke	150	Moderate
Armstrong <i>et al.</i> (2018), Canada ⁽²⁸⁾	Adults and/or Aged People	Chronic	Epidemiological Observational Analytical	Stroke, COPD, CHF, Nephritis	400	Moderate
Munce SE <i>et al.</i> (2013), Canada ⁽²³⁾	Adults and/or Aged People	Chronic	Epidemiological Observational Analytical	Traumatic Spinal Cord Injury	936	Moderate
Chen <i>et al.</i> (2012), Canada ⁽¹⁸⁾	Adults and/or Aged People	Chronic	Epidemiological Observational Analytical	Acquired Brain Injury	43,471	Moderate
Oh EG, Kim JH, Lee HJ (2019), Korea ⁽³⁰⁾	Adults and/or Aged People	Chronic	Non-equivalent Control Group pre-test-post-test design	Patients with COPD, rectal cancer; ostomies and knee arthroplasty	83	Low
Leong <i>et al.</i> (2021), Singapore ⁽³¹⁾	Neonates, Infants, Children and Adolescents	Chronic	Systematic Review of reviews	Stroke, COPD, elective surgery PO period	10	Low

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Author - Year - Country - Reference	Population Group	Type of Health Conditions	Type of Study	Type of Treatment	Participants (n)	Level of Evidence*
Scheerder <i>et al</i> (2007), Netherlands ⁽¹⁷⁾	Neonates, Infants, Children and Adolescents	Acute	Epidemiological Observational Analytical	Orthopedic Surgery	54	Low
Baker <i>et al.</i> (2016) ⁽¹⁶⁾ USA	Neonates, Infants, Children and Adolescents	Acute	Epidemiological Observational Analytical	Chronic Diseases	48	Low
Parab <i>et al.</i> (2013), Australia ⁽²⁶⁾	Neonates, Infants, Children and Adolescents	Chronic	Systematic Review	Acute and Chronic Diseases	840	High

Source: Prepared by the authors based on the research database. * GRADE system⁽¹⁴⁾.

*Acronyms: COPD (Chronic Obstructive Pulmonary Disease); CHF (Chronic Heart Failure); LLs (Lower Limbs); PO (Postoperative).

Chart 2 – Transitional care models in Home Nursing extracted from the studies included in the review. Belo Horizonte, MG, Brazil, 2023.

Transitional Care Models in Home Nursing
Early Discharge: Standardized discharge and multiprofessional home monitoring of mechanically ventilated children (USA) ⁽¹⁶⁾ .
Early orthopedic hospital discharge: Children using Bryant Traction due to femur fractures (Netherlands) ⁽¹⁷⁾ .
Early Supported Discharge Program with support for patients after acute stroke treatment to continue multidisciplinary care and rehabilitation at home (Sweden) ⁽²⁵⁾ .
Early discharge (Supported Discharge Team) Interventions for early discharge following functional rehabilitation principles, carried out with four visits a day, seven days a week, by specialist nurses, occupational therapists, physiotherapists and geriatric consultants (New Zealand) ⁽²⁹⁾ .
Dehospitalization (Hospital at Home): Home hospitalization accompanied by HV after acute treatment for adults recovering from strokes or after elective surgery; for older adults with various conditions such as COPD, recovery from fractures or surgery (United Kingdom) ⁽²⁷⁾ .
Drug administration at home: Outpatient Parenteral Antimicrobial Therapy/other medications at home for patients with acute or chronic conditions (France, Australia, USA) ^(15,19,20) .
Home monitoring via mobile device apps: Follow-up of patients after anterior cruciate ligament reconstruction surgery (Canada) ⁽³²⁾ .
Home-based rehabilitation in anticipation of discharge for adults and older adults with osteoarthritis who have undergone knee and total hip joint replacement surgery (Canada) ⁽²³⁾ .
Home and hospital care rehabilitation (combined): follow-up of patients with traumatic or non-traumatic brain injury ¹⁸ and Traumatic Spinal Cord Injury after discharge from acute treatment (Canada) ⁽²⁴⁾ .
Telemonitoring (Physician Assistant Home Care): Home health care program for surgical patients monitored by means of Telemonitoring for 30 days and home visits by the attending physician on the second and fifth days after discharge (USA) ⁽²¹⁾ .
Intermediate Home Care Program: Home care with Nursing professionals 9 hours a day on weekdays and 4 hours during the weekends; daily HV by the clinical nurse; Telemonitoring and HVs by attending physicians when necessary (Canada) ⁽²⁸⁾ .
Specialist Home-based Nursing Services: Care for children with acute or chronic conditions with clinical assistance, support, education and home care management (Australia) ⁽²⁶⁾ .
Transitional care management after discharge (Patient-Oriented Safe Transition Programme): Nurse-led program to establish links between hospital and community home care Nursing (Korea) ⁽³⁰⁾ .
Direct admission to HN (Admission Avoidance): Program to prevent hospital admissions by directly admitting patients to HN for a fixed period of time (Hospital at Home) with referrals from clinical outpatient clinics or emergency services (Singapore) ⁽³¹⁾ .
Home monitoring during the chest surgery postoperative period (articulation of strategies): Telemonitoring; home visits by a primary care nurse (dressings); outpatient reviews by a specialist nurse and return assessment to the surgeon after removal of the drainage system (United Kingdom) ⁽²²⁾ .

Source: Prepared by the authors.

The cost components most used by the articles included were the following: daily hospitalization rates or total cost (general, intensive care or complex chronic disease [CCD] beds)^(15,18,21,25,27,28,29); hospitalization time^(15,17,23,24,29,31), per diem or total cost of readmission to general or intensive care or emergency room^(18,22,29,30); expenses for medication use, hospital medical supplies and laboratory tests^(15,19,20,25,30). In home care, they considered transportation costs^(15,17,19,20,30,32); parking costs⁽³²⁾; professional fees and home care nurse hours^(15,19,20,21,32); visits by the nurse and/or other specialized professionals at home^(15,17,19,20,21,22,27,29,32); visits to specialized outpatient clinics^(17,21,24,25,32); mobile app costs for the health system and for patients;

lost wages for the patient and their caregivers; and emergency service use fees⁽³²⁾.

Table 1 shows results related to effectiveness, inferring that TC was effective for acute or chronic conditions, with reduced hospitalization times and optimization of beds^(15,16,21,22,23,27,29); prevention of readmissions^(16,21); reduced mortality^(16,31); better adherence to outpatient rehabilitation; less burden on the caregiver and shorter hospitalization periods^(25,30); improved quality of life^(20,26,27,30); functional improvement and psychological well-being⁽²⁷⁾; parental satisfaction^(15,16,17,26); reduced anxiety; improved ability to cope with the situation and family functioning; improved school attendance for children and simplified access to hospital services⁽²⁶⁾; and absence of adverse events^(15,20) and side effects⁽¹⁵⁾.

Table 1 – Effectiveness Results of Transitional Care Models in Home Nursing, Belo Horizonte, MG, Brazil, 2023.

Ref.	Mean hospitalization time in days (SD)		p	Clinical results	Others
	TC/HN	Control			
15	23.5	34.7	0.014	298 hospitalization days saved. Better prognosis and clinical results; lower risk of infection.	Satisfaction; significant improvement in sleep quality, diet and private life as a whole.
16	143.4 (97)	249 (117)	0.002	Reduction in tracheostomy time	Reduction in ICU use, emergency room visits, mortality and readmissions.
17	7	22	0.012	Achieving goals (leg length)	Reduced hospitalization time; greater parental satisfaction
19*	7.5	5.8	<0.001	Clinically effective home antibiotics	Patient safety and satisfaction
21	6.2 (8.5)	5.7 (5.2)	0.093	Fewer transfusions	Fewer readmissions
23	6.3	7	0.06	Similar effectiveness to control	No infection
25*	17.6	21	0.02	Control-like rehabilitation	Less caregiver burden; better adherence.
28*	9.7	7.1	0.003	-	Increase in readmissions
29	20.9	26.6	0.002	Hospitalization does not speed up rehabilitation	
30*	8.6	7.1	0.001	-	Improved quality of life; reduced medical costs and caregivers' burden
Effectiveness in observational and review studies					
18	Patients after brain injury require more services, hospital rehabilitation and readmission to intensive care.				
20	Administration of parenteral medication at home: effective between 86.3% and 94.6%. Absence of side effects in between 63% and 90% of the events analyzed. Better quality of life.				

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Effectiveness in observational and review studies	
22	20 adults with indication for a digital chest tube in TC saved 772 bed-days, whereas 30 hospitalized patients spent 353 bed-days. Better adaptation to home use of digital drain; quality of life, faster recovery.
24	Spinal cord injury patients in the 2 nd and 3 rd year after hospital discharge for home rehabilitation require more health services and long-term care.
26	Clinical results similar to the controls. Reduced anxiety; increased school attendance; improved quality of life and parental satisfaction. Two studies show statistically significant data in TC groups: less time in hospital beds than the standard treatment group.
27	A total of 19 studies found a reduction in hospitalization time (from 1.44 to 20 days). Improved functional capacity. Mental well-being; better quality of life
31	In 1 review, the hospitalization times varied from -8 to 17 days; 2 reviews found longer times in HN, between 3 and 9.1 days. This characteristic was a general trend among the other studies. In 5 reviews, it ranged from 4.2% to 9.7%. The other two reviews were inconclusive. There was a reduction in the mortality rates.
32	85% fewer post-operative visits in 6 weeks. There were no significant differences for satisfaction and convenience, pain, physiotherapy treatment results and complications.

Source: Prepared by the authors

Notes: * (19) after adjusting for variables, the intervention resulted in a 1.63 times longer hospitalization time; (25) as a result of the acute hospitalization phase, in subsequent periods (from 3 to 6 months and from 6 to 12 months) the hospitalization time had no significant difference; (28) and (30) did not evaluate clinical results.

Four studies found that the mean time in TC was longer than the hospitalization time. In a home-based parenteral antibiotic therapy program⁽¹⁹⁾ there were 7.5 days/household versus 5.8 days/hospital; in home-based hospitalization of adults and older adults with chronic diseases, 3.3 days more⁽²⁸⁾; in home-based rehabilitation for orthopedic surgery, 6.3 days versus 7 days⁽²³⁾; in a “safe transition to home” program, the patients in the Transition Group were hospitalized for 8.6 days, when compared to 7.1 days in the hospital-based Control Group⁽³⁰⁾.

Studies of patients after brain injury⁽¹⁸⁾ and spinal cord injury⁽²³⁾ found that they continue to use various types of services, increasing the costs of medical and home care services and long-term institutional assistance in the second and third year after the event⁽¹⁸⁾. Inpatient rehabilitation, admission to intensive care and readmission to intensive care in the year following discharge

were respectively the largest cost components for the system⁽²³⁾.

In the cost results shown in Chart 3, it can be seen that the general hospitalization costs, reported in ten studies^(15,16,17,18,20,22,23,24,25,30), showed a reduction in expenses. A study conducted with patients after brain injury showed a progressive reduction in costs over three years, with acute care hospitalization expenses as the highest⁽¹⁸⁾. Another study concluded that, despite a slight reduction in the mean cost per patient in home monitoring, there was an increase in the use of community services⁽²⁸⁾. Another study showed an increase in the cost of administering intravenous medications at home⁽¹⁹⁾. However, from a multifactorial perspective, when demographic aspects, comorbidities, readmissions and caregiver support were taken into account, the HN program showed better cost-effectiveness results compared to hospital care⁽¹⁹⁾.

Chart 3 – Cost results extracted from the integrative review on the effectiveness and costs of transitional care models in Home Nursing. Belo Horizonte, MG, Brazil, 2023.

Reference No.	Cost Results
15	Home administration of antibiotics: The savings per patient with antibiotic therapy at home were € 14,850.00 and € 267,307.00 overall, when compared to the hospitalization expenses.
19	Home administration of antibiotics: Antibiotic therapy at home cost 1.14 times ($p>0.05$) more; however, it was cost-effective after adjusting for confounding variables.
20	Home infusion treatment: It cost US\$ 1,928.00 compared to hospital treatment (US\$ 2,974.00), representing a significant reduction in costs.
16	Standardized discharge: US\$ 336,000 ($\pm 284,000$) in savings after a standardized discharge program compared to US\$ 590,000 ($\pm 371,000$) ($p<0.001$).
29	Early discharge and rehabilitation: Considering admission and readmission expenses, after the START intervention (early discharge and rehabilitation), the total mean per START patient was NZ\$ 24,166.00, when compared to the non-START group (NZ\$ 37,167.00): there was no significant difference.
28	Transitional care: Transitional home care costs presented a coefficient of CAN\$ 729.00 three months after discharge, and the difference was not significant.
30	Transitional care: There was a reduction in total expenses from WON\$ 322,895.00 (463,994.00) to WON\$ 21,369.00 (97,769.00) after the intervention (safe transition program), and the difference was statistically significant.
31	Post-acute care: Three studies identified cost savings for acute episodes; 1 review detected mean savings of GBP 304.72 per episode; 1 review found cost savings from GBP 447.89 to GBP 1,112.35; 1 review indicated cost savings from € 295,97 to € 2691; and there were 2 reviews with a trend towards total cost savings. Another 2 reviews showed undetermined results.
17	Postoperative home care in pediatric orthopedics: Spending on Bryant's traction at home was € 8,359 compared to € 25,313 in hospital, resulting in a reduction of € 16,500 per child.
21	Home care after cardiac surgery: Home medical care after cardiac surgery represented a reduction of \$ 997,500 in readmission costs.
22	Postoperative thoracic surgery at home (Early discharge): Using the Thopaz system at home represented savings of GBP 270,200 when compared to the cost of the same patient if they were hospitalized. In addition to that, the greater availability of beds represented inputs of between GBP 579,000 and GBP 865,000 in new procedures.
18	Home rehabilitation: Spending on home care for brain-injured patients was CAD\$ 6,086.00 while the in-patient rehabilitation cost CAD\$ 8,870.00*.
23	Home rehabilitation: Home care for spinal cord injuries accounted for 1.9% of the total cost, and hospital care represented 58% over a one-year period*.
24	Home rehabilitation: In 12 months, home rehabilitation cost US\$ 11,082 compared to inpatient rehabilitation: US\$ 14.532 ($p<0.01$).
25	Home rehabilitation and early discharge for stroke patients: They cost SEK\$ 260,425.00 (mean of SEK\$ 171,540.00) and the inpatient Control Group, SEK\$ 287,964.00 (mean of SEK\$ 193,088.00). The difference was not significant ($p=0.52$).
26	Family costs: Three articles identified savings for family members of pediatric patients (acute diseases, diabetes and hemophilia) when treatment was home-based, and 1 study reported that there was no significant difference ($p=0.79$) between family costs for home-based and hospital-based chemotherapy.
32	Home monitoring by app: At 6 weeks, the use of home monitoring by app represented lower expenses for the health system (CAD\$ 157.50 compared to CAD\$ 202.20 with the conventional group [$p<0.0001$]), lower expenses per patient (CAD\$ 46.40 compared to CAD\$ 257.4 with conventional care [$p<0.0001$]) and lower social costs (CAD\$ 208.9 compared to CAD\$ 459.50 [$p<0.0001$]).
27	Various HN models: A total of 15 studies mentioned or surveyed costs; 6 of them had significant results: 3 indicated an increase in mean costs (GBP 2.39; GBP 1,132.00; GBP 22.75) and 3 indicated a reduction in mean costs (CAD\$ 3,280.95; AU\$ 4,678.00; GBP 1,727.00). Four studies found no significant differences and 5 provided diverse information on estimated costs but did not present any statistical analysis.

Source: Prepared by the authors.

Notes: (*) – Studies 18 and 23 described home care and inpatient rehabilitation as cost components. CAD\$ – Canadian dollars, WON\$ – Korean currency, NZ\$ – New Zealand currency, SEK\$ – Swedish currency, AUS\$ – Australian currency, US\$ – US dollars, GBP – British currency.

DISCUSSION

Effectiveness of transitional care in Home Nursing

Mean hospitalization time and bed turnover were indicators widely used to measure the effectiveness of programs and services considered to be transitional care models, coupled with the concern to improve the use of hospital beds and shorten hospitalization times. They have been challenges for health systems with aging of the population, the increase in the number of people with chronic diseases^(33,34) and subsequent hospitalizations, exposing the risk that care models for acute cases in hospitals will become impractical⁽³⁵⁾.

Models with early discharge/anticipated discharge strategies (dehospitalization) proved to be predominant and, when compared to hospital care, they have the potential to: improve functionality in adults and older adults, with safety and quality⁽³⁶⁾; promote self-care; free up beds; increase patient and family satisfaction; prevent readmissions^(31,37); promote quality of life and targeting of financial management by health services^(38,39); and reduce gaps in the transition process from hospital to the patients' homes⁽³⁴⁾.

The interventions adopted in the transitional care process portrayed in the studies included in this review, especially for hospital discharge, have proved to be effective in reducing hospital readmissions and, significantly, those of aged patients⁽⁴⁰⁾ and young adults⁽³²⁾, especially Telemonitoring or app-based monitoring, which qualifies transitional care and maintains follow-up⁽¹⁰⁾. Patients monitored by means of mobile apps in the first six weeks after an Anterior Cruciate Ligament (ACL) injury attended 85% fewer in-person orthopedic follow-up appointments than the conventional outpatient group⁽³²⁾. An Australian study showed its relevance by achieving a 29% reduction in the incidence of readmissions, with a consequent reduction in health costs when adopted after the discharge of patients with chronic diseases⁽⁴¹⁾.

However, there is limited evidence on the use of Telehealth and electronic systems in studies of patients discharged in acute conditions⁽⁴²⁾.

The review of 90 articles covering interventions before and after hospital discharge reported positive results for early discharge when: there was prior planning; it focused on the patient and their early rehabilitation; outpatient follow-up was focused on assessment; educational programs were adopted; it was based on interdisciplinary teamwork and was combined with primary care interventions⁽⁴²⁾.

The administration of parenteral medications is a TC model that is highly rated by patients and their families for reducing hospitalization time safely and with clinical efficacy. In many countries, the Outpatient Parenteral Antimicrobial Therapy is a TC modality established to maintain safe care, improve quality of life, avoid or shorten hospitalization of clinically stable patients with serious infections, prevent new infections, and reduce hospital costs and those related to secondary infections and medical assistance^(15,20,43).

Home rehabilitation for older adults^(25,27) and for people with chronic conditions⁽²⁵⁾ after brain⁽¹⁸⁾ or spinal cord⁽²⁴⁾ injuries or orthopedic conditions^(17,23) has been justified by the frail degree due to functional losses or disabilities that prolong hospital bed occupancy beyond the critical period of the disease. A Canadian study recommended rehabilitation programs in transitional care to the home because they reduce emergency room visits and readmissions⁽²⁴⁾. A clinical trial conducted in New Zealand showed that individualized follow-up by an interdisciplinary clinical team, with a focus on rehabilitation and continued coordination with the treating physician, was able to reduce the mean hospitalization time by six days, as well as to avoid readmissions and reduce the length of subsequent hospitalizations over the six months of the study⁽²⁹⁾.

Exacerbations of chronic diseases remain among the main reasons for hospitalization, causing mortality, use of technological resources, health costs, increased demand for emergency

services and, consequently, general hospitalization or intensive care, increasing costs. Even with clinical stabilization of the exacerbations, physical, social and emotional impairments can persist for long periods of time⁽³⁴⁾. In home hospitalization models for people with CCDs, transitional care may require the use of permanent or temporary invasive technology, demanding family preparation and time to adapt at home⁽²⁷⁾. An American retrospective cohort compared the number of visits and hospitalizations in an emergency department, concluding that patients with a focus on CCD self-management included in a TC intervention by nurses had fewer emergency visits and fewer hospitalizations⁽⁴⁴⁾.

Studies on TC in children, whether for the follow-up of chronic conditions^(16,26) or for post-fracture rehabilitation⁽¹⁷⁾, have shown similar results to those found for adults and older adults, in terms of reducing costs, hospitalization time, ICU use, emergency room visits and mortality⁽¹⁶⁾. Possibilities of improving family functionality; supporting them in organizing care and developing caregiving skills; improving mothers' mental health, satisfaction with care and school attendance are additional advantages^(25,32).

The potential for TC models to promote quality of life for users and their families is therefore increased^(17,30) when they are applied in a coordinated manner, integrated into the HCN and guided by the users' health needs⁽⁴⁵⁾.

Cost results of transitional care in Home Nursing

The daily rates related to hospitalization time were the cost components most commonly used by the articles included, comparing the number of hospitalizations of patients on TC to the usual treatment.

Out of 18 studies, 14 showed lower cost results in the TC model than the mean hospitalization costs^(15-18,20-25,28-30,32), of which three studies had significant results^(16,23,24). Only one study found costs 1.14 times higher in home care, after adjusting for confounding variables⁽¹⁹⁾, and

the difference was significant. The systematic reviews analyzed found various results, such as savings reported by the families of pediatric patients when they were treated at home; a non-significant difference in family costs when the treatment was home-based chemotherapy; studies with an increase in mean costs and others with a reduction in costs for home-based treatment; as well as studies on estimated costs and some that did not present any statistical analysis^(26,27,31). The authors were unable to determine whether transitional home care models represent savings for the health system or for the family members.

The potential savings from TC were attributed to the increase in bed turnover after early discharges or discharge anticipation (dehospitalizations), and a United Kingdom model yielded GBP 1,232,000.00 (British Pound Sterling)⁽²²⁾. Nabagiez et al. found that the reduction was significant and that the potential savings from TC were due to the reduction in spending on the hours worked by specialized professionals⁽²¹⁾. Tristad and von Koch found that supported discharge contributed to a reduction of SEK\$ 27,539 (Swedish currency) in the overall care cost⁽²⁵⁾ and Parsons et al., that there was a reduction in hospitalization time with the active search for patients eligible for home monitoring⁽²⁹⁾.

Of three studies on the use of home venous antibiotics, two showed a better cost-effectiveness result when compared to hospitalization, with evidence of cost savings^(15,20). The case study by Kameshwar et al. compared home and hospital antibiotic therapy specifically for the treatment of cellulitis in the lower limbs, finding that the mean care cost/day in hospitals was AU\$ 761, when compared to AU\$ 431 in HN; however, challenging studies on home TC with other health conditions, they found that the overall cost of TC in HN was higher than the hospital expenses (AU\$ 5,873 compared to AU\$ 5,196; or 1.4%)⁽¹⁹⁾.

The systematic review carried out in the USA identified a significant reduction in the overall costs of various conditions, especially acute ones, with drug administration at home⁽²⁰⁾.

The study by Ramalho et al. found that the TC modality was effective in 91.5% of the patients treated, resulting in cure or improvement at the end of the intravenous therapy, with the mean total cost of treatment for each infectious episode representing 81% in savings when compared to hospitalization⁽⁴⁶⁻⁴⁸⁾.

TC models for patients with greater dependence levels (requiring rehabilitation) can represent lower costs for the health system by preventing readmissions, emergency room visits, and the use of long-term care or other services. The study conducted with brain injury patients found that 91% of those with a traumatic injury, and 88% with a non-traumatic injury, used health services in the second year, which represented 46% of the total annual cost for the system⁽¹⁸⁾.

Hospital at Home (HaH) has been a subject of interest for managers and politicians, proving to be a safe option for some health conditions. Part of the expectation is that the costs for the health system will be reduced by transferring treatments to the homes; however, to the present day, the cost analyses have not proved any significant advantages or disadvantages in this respect, although the psychological and quality of life advantages for the patients and families are clear^(27,28,31).

Three systematic reviews analyzed HaH costs. One of them, which analyzed the direct and indirect costs of a home-based intermediate care program, found a slight reduction in the mean cost per patient in home monitoring and an increase in the use of community medical services⁽²⁸⁾. Another study, in which adults or aged people were followed-up by HaH after acute stroke treatments; in the post-operative period of elective surgeries; or various conditions such as COPD, recovery from fractures or surgery, highlighted the inconclusiveness of the mean cost reduction, as half of the studies included did not achieve significant results⁽²⁷⁾. The third one, which reviewed two HaH models, found that the direct costs were comparable to the hospital model or lower, especially in acute

conditions when the patients were admitted directly (without prior hospitalization)⁽³¹⁾.

It is known that hospitalization exerts a strong impact on the cost estimates of resource allocation methods. Per diems group together different cost components that weigh on health services and the analysis made with these data has been called “gross costing”, as it assumes that all patients have the same indirect costs per hospitalization day, regardless of diagnosis and type of treatment. Allocation of resources by the number of hospitalization days is defined by a mean value and may underestimate the share of indirect costs in the services, especially those with short-term hospitalizations. Costs are equally allocated to the treatment time of all patients, without distinguishing between identical services performed at different times of the day or during weekends. In addition to that, the method no longer tracks costs directly to the patients that incur the total⁽⁴⁶⁾.

Cost management by health systems has sought to be based on an analysis method grounded on activities and time, highlighting micro-costing models that aim at identifying and evaluating cost components from the top down, identifying all cost components from broader sources such as annual invoices, reaching the patient level through a disaggregation process; or from the bottom up, by collecting the cost of each individual patient⁽⁴⁷⁾.

This latter has been considered the gold standard for health economic assessments, as the cost components are defined at the most detailed level, based on individual treatment data. However, this methodology is time-consuming and can be more expensive, and it is possible that institutions hinder access to the data for ethical reasons or because of deficiencies in the systems for recording consumption and relevant expense information⁽⁴⁶⁾.

Thus, it should be noted that the indirect costs involved in HN TC can be higher than the direct costs. The reduction in TC costs in HN in this review was expressed both in the general costs of the services or program and in the

overall care cost for the health system. Studies that used global service costs reduced the power to evidence individualized costs per patient, which might be considered a limitation in the cost analysis^(15,16,17,21-25,28). However, they are important in the discussion about costs in management, which needs to demonstrate rational use of resources and allocation of resources in the macro- and micro-economic dimension of each organization⁽⁴⁶⁾.

CONCLUSION

This review made it possible to conclude that transitional care in Home Nursing is effective for acute or chronic conditions with effects on hospitalization times; bed rationalization; readmission; mortality; adherence to outpatient rehabilitation; family caregivers' burden; quality of life; functionality; mental health and patient satisfaction; family functioning; and adverse and side effects.

The findings indicate that, when systematized, planned and well understood by patients and caregivers; carried out by trained teams/professionals; using various technologies such as education, protocols, Telemonitoring, transitional care and supported by PHC, TC models make it possible to anticipate discharge and are effective and capable of preventing readmissions, visits to emergency services and reducing costs for health services.

The limitations of this study were the search in seven databases, the inclusion of articles published in the last 13 years and in only three languages (Portuguese, English and Spanish), which may have influenced the results achieved. More comprehensive reviews on the effectiveness and costs of HN should be developed. Despite these limitations, this research is innovative in systematizing findings on TC in HN, considering a period of time in which there has been progress and worldwide expansion of this type of care. Consequently, the review contributes to producing diverse evidence on an important care strategy and can guide decision-making by health services and systems.

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Conflict of interests: All the authors state having no type of conflict of interests.

Authors' contributions:

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Data collection: KLS, EABC, MSLVK, CSV, STT, JSG, AMA

Data analysis and interpretation: KLS, EABC, MSLVK, CSV, STT, JSG, AMA

Funding Acquisition: KLS .

Writing of the manuscript: KLS, EABC, MSLVK, CSV, STT, JSG, AMA

Critical review of the manuscript regarding its intellectual content: KLS, EABC, MSLVK, CSV, STT, JSG, AMA

Editors in charge:

Patrícia Pinto Braga – Editor in Chief

Deise Moura de Oliveira – Scientific Editor

Note: This review study is part of the first phase of the research entitled “Cost-Effectiveness in Home Nursing: Analysis of the production of care guided by different protocols”, which was granted Financial Support by the Minas Gerais State Research Support Foundation, Brazil (Process APQ-04032-17).

Received on: 07/05/2023

Approved on: 01/05/2024

How to cite this article:

Castro EAB, Van Keulen MSL, Vieira CS, et al. Effectiveness and costs of transitional care models in Home Nursing: An integrative review. *Revista de Enfermagem do Centro-Oeste Mineiro*. 2024;14:e5114. [Access _____]; Available in: _____. DOI: <http://doi.org/10.19175/recom.v14i0.5114>