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Early Mobilization and Ambulation in Hospitalized Heart Failure Patients: A Rapid Review

G Pron

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Conflict of Interest Statement

All reports prepared by the Division of Evidence Development and Standards at Health Quality Ontario are impartial. There are no competing interests or conflicts of interest to declare.

Rapid Review Methodology

Clinical questions are developed by the Division of Evidence Development and Standards at Health Quality Ontario in consultation with experts, end-users, and/or applicants in the topic area. A systematic literature search is then conducted to identify relevant systematic reviews, health technology assessments, and meta-analyses; if none are located, the search is expanded to include randomized controlled trials (RCTs), and guidelines. Systematic reviews are evaluated using a rating scale developed for this purpose. If the systematic review has evaluated the included primary studies using the GRADE Working Group criteria (http://www.gradeworkinggroup.org/index.htm), the results are reported and the rapid review process is complete. If the systematic review has not evaluated the primary studies using GRADE, the primary studies included in the systematic review are retrieved and a maximum of two outcomes are graded. If no well-conducted systematic reviews are available, RCTs and/or guidelines are evaluated. Because rapid reviews are completed in very short timeframes, other publication types are not included. All rapid reviews are developed and finalized in consultation with experts.

Disclaimer

This rapid review is the work of the Division of Evidence Development and Standards at Health Quality Ontario, and is developed from analysis, interpretation, and comparison of published scientific research. It also incorporates, when available, Ontario data and information provided by experts. As this is a rapid review, it may not reflect all the available scientific research and is not intended as an exhaustive analysis. Health Quality Ontario assumes no responsibility for omissions or incomplete analysis resulting from its rapid reviews. In addition, it is possible that other relevant scientific findings may have been reported since completion of the review. This report is current to the date of the literature search specified in the Research Methods section, as appropriate. This rapid review may be superseded by an updated publication on the same topic. Please check the Health Quality Ontario website for a list of all publications: http://www.hqontario.ca/evidence/publications-and-ohtac-recommendations.

About Health Quality Ontario

Health Quality Ontario is an arms-length agency of the Ontario government. It is a partner and leader in transforming Ontario's health care system so that it can deliver a better experience of care, better outcomes for Ontarians, and better value for money.

Health Quality Ontario strives to promote health care that is supported by the best available scientific evidence. Health Quality Ontario works with clinical experts, scientific collaborators, and field evaluation partners to develop and publish research that evaluates the effectiveness and cost-effectiveness of health technologies and services in Ontario.

Based on the research conducted by Health Quality Ontario and its partners, the Ontario Health Technology Advisory Committee (OHTAC)—a standing advisory subcommittee of the Health Quality Ontario Board—makes recommendations about the uptake, diffusion, distribution, or removal of health interventions to Ontario's Ministry of Health and Long-Term Care, clinicians, health system leaders, and policy makers.

Rapid reviews, evidence-based analyses and their corresponding OHTAC recommendations, and other associated reports are published on the Health Quality Ontario website. Visit http://www.hqontario.ca for more information.

About Health Quality Ontario Publications

To conduct its rapid reviews, Health Quality Ontario and/or its research partners reviews the available scientific literature, making every effort to consider all relevant national and international research; collaborates with partners across relevant government branches; consults with clinical and other external experts and developers of new health technologies; and solicits any necessary supplemental information.

In addition, Health Quality Ontario collects and analyzes information about how a health intervention fits within current practice and existing treatment alternatives. Details about the diffusion of the intervention into current health care practices in Ontario can add an important dimension to the review. Information concerning the health benefits, economic and human resources, and ethical, regulatory, social, and legal issues relating to the intervention may be included to assist in making timely and relevant decisions to optimize patient outcomes.

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Table of Contents

List of Abbreviations

EMAA	Early mobilization and ambulation
HF	Heart failure
IQR	Interquartile range
RCT	Randomized controlled trial

Background

As legislated in Ontario's *Excellent Care for All Act*, Health Quality Ontario's mandate includes the provision of objective, evidence-informed advice about health care funding mechanisms, incentives, and opportunities to improve quality and efficiency in the health care system. As part of its Quality-Based Funding (QBF) initiative, Health Quality Ontario works with multidisciplinary expert panels (composed of leading clinicians, scientists, and administrators) to develop evidence-based practice recommendations and define episodes of care for selected disease areas or procedures. Health Quality Ontario's recommendations are intended to inform the Ministry of Health and Long-Term Care's Health System Funding Strategy.

For more information on Health Quality Ontario's Quality-Based Funding initiative, visit www.hqontario.ca.

Objective of Analysis

The objective of this analysis was to evaluate the safety and effectiveness of early mobilization and ambulation (EMAA) in patients hospitalized with acute heart failure (HF).

Clinical Need and Target Population

Acute heart failure is the rapid development of signs and symptoms of HF requiring treatment. (1) Symptoms are often the result of severe pulmonary congestion due to elevated left ventricular pressures (with or without low cardiac output). Hospitalizations for acute heart failure have been proposed to consist of 3 distinct groups: de novo HF (25%); worsening chronic HF with reduced or preserved left ventricular ejection fraction (70%); and advanced HF refractory to treatment with severe left ventricular systolic dysfunction, associated with a continuing worsening low-output state (5%). (1) For those over 60 years of age, HF is the most common cause of hospitalization; the main reasons for hospitalization are fluid overload and pulmonary congestion. (2)

Patients being hospitalized for acute HF have a high rate of in-hospital mortality. Canada's average annual in-hospital mortality rate for HF patients is 9.5 deaths per 100 hospitalized patients over age 65, and 12.5 deaths per 100 hospitalized patients over age 75. (3) Heart failure patients are older (mean age 75) and have a significantly shorter life expectancy than the general population. (4) After their first hospitalization, HF patients have 1- and 5-year mortality rates of 33.1% and 68.7%, respectively, and a median survival of 2.4 years. (4) Hospital readmission rates for HF are high, and the 30-day all-cause risk of readmission (23% for United States Medicare beneficiaries) has remained largely unchanged over time. (5)

Heart failure patients also generally have a lengthy hospital stay (intensive or critical care and general medical wards). The median length of stay for hospitalized Canadians with HF is 8 days (interquartile range [IQR] 4–16) for their first admission and 15 days (IQR 7–32) in the following year. (6) Lengthy hospital stays can often result in prolonged periods of bed rest and inactivity: (7;8) 1 study that prospectively evaluated the time spent in various stages of mobility in a hospitalized cohort of medical patients aged 65 and older reported that patients spent more than 80% of their time in bed. This occurred despite the fact that patients were able to ambulate prior to admission and had out-of-bed medical orders. Ambulation in hospital medical wards has been reported to occur infrequently; only 27% of patients even walk in the hallways during hospitalization. (9)

Although there are some clinical indications for which periods of prescribed limited bed rest have benefit, in many cases such inactivity has been shown to have additional adverse impacts on the functional status and recovery of patients. (10) Increasingly, there are efforts to introduce EMAA in hospitalized patients, even in the intensive care setting. (11-15) A recent systematic review on EMAA in intensive care reported that there were limited studies, but that the existing literature supported EMAA and physical therapy as safe and effective interventions with significant impact on functional outcomes. (11)

Nevertheless, the hospitalized cardiac patient—and in particular the HF patient—may present additional challenges. The primary indication for hospitalization is often fluid overload with respiratory compromise, and the immediate objective for acute HF management is the expeditious management of fluid overload. Diuretics—particularly non–potassium-sparing diuretics given intravenously—have been first-line treatment for fluid overload, and they can have an initial favourable effect on symptoms, but they are also associated with limitations and risks attributed to adverse effects on electrolyte balance, neurohormonal stimulation, and worsening of renal function. (16-18) Given that hospitalized acute decompensated HF patients present with a high prevalence of renal dysfunction at baseline (64% having at least moderate dysfunction), (19) any intervention that potentially decreases further renal function could result in significant clinical decline.

Several reports (2;16) have also indicated that therapeutic goals involving fluid management with diuretics are often not achieved when hospitalized acute HF patients are discharged. Heart failure patients are often discharged with persistent symptoms and minimal or no weight loss, or even with weight gain. In the IMPACT-HF trial, patients admitted with signs and symptoms of congestion were not adequately treated, and approximately 60% were discharged with symptoms of dyspnea or fatigue. (16) Readmissions can also be caused by further exacerbations of the disease, thought to be triggered by nonadherence to dietary recommendations (i.e., sodium and fluid restrictions); delayed recognition of signs and symptoms of congestion; worsening underlying renal insufficiency; and diuretic resistance. (20)

The overall management of the hospitalized HF patient is complex. Simultaneously managing volume overload with diuretics and maintaining or improving functional capacity with EMAA in hospitalized HF patients may involve competing processes. Neurohormonal responses initiated by postural changes are known to play a role in the increased heart rate and systemic vascular resistance needed to maintain arterial pressure in the upright position. (21) However, postural changes involving increased circulating norepinephrine level and plasma renin activity might add to the already heightened renin-angiotensin-aldosterone axis and sympathetic nervous system activity in HF patients. (22) These changes may lead to further progression of HF and interfere with renal responsiveness to diuretics.

Technology/Technique

EMAA is a common component of patient care in the intensive care unit and emphasizes early physical medicine and rehabilitation. “Early mobilization is initiated when patients are first physiologically stable and includes progressive therapeutic activities such as bed mobility exercises, sitting on the edge of the bed, standing, transferring to a chair and ambulation.” (23)

Rapid Review

Research Question

What is the safety and effectiveness of EMAA in hospitalized acute HF patients?

Research Methods

Literature Search

A literature search was performed on October 4, 2012, using OVID MEDLINE, OVID MEDLINE In-Process and Other Non-Indexed Citations, OVID EMBASE, the Wiley Cochrane Library, and the Centre for Reviews and Dissemination database, for studies published from January 1, 2000, until October 4, 2012. Abstracts were reviewed by a single reviewer and, for those studies meeting the eligibility criteria, full-text articles were obtained. Reference lists were also examined for any additional relevant studies not identified through the search.

Inclusion Criteria

- English language full-reports
- published between January 1, 2000, and October 4, 2012
- systematic reviews, meta-analyses, health technology assessment reports, and randomized controlled trials (RCTs)
- studies evaluating EMAA in HF patients

Exclusion Criteria

- abstracts
- expert reviews, commentaries, editorials

Outcomes of Interest

- feasibility
- patient tolerance
- safety
- diuresis, natriuresis responsiveness
- hospital length of stay
- readmissions
- mortality

Expert Panel

In August 2012, an Expert Advisory Panel on Episode of Care for Congestive Heart Failure was struck. Members of the panel included physicians, personnel from the Ministry of Health and Long-Term Care, and representation from the community laboratories.

The role of the Expert Advisory Panel on Episode of Care for Congestive Heart Failure was to contextualize the evidence produced by Health Quality Ontario and provide advice on the components of a high-quality episode of care for HF patients presenting to an acute care hospital. However, the statements, conclusions, and views expressed in this report do not necessarily represent the views of Expert Advisory Panel members.

Quality of Evidence

The quality of the body of evidence for each outcome is examined according to the GRADE Working Group criteria. (24) The overall quality is determined to be very low, low, moderate, or high using a step-wise, structural methodology.

Study design was the first consideration; the starting assumption was that RCTs are high quality, whereas observational studies are low quality. Five additional factors—risk of bias, inconsistency, indirectness, imprecision, and publication bias—were then taken into account. Limitations in these areas resulted in downgrading the quality of evidence. Finally, 3 main factors that may raise the quality of evidence were considered: large magnitude of effect, dose response gradient, and accounting for all residual confounding factors. (24) For more detailed information, please refer to the latest series of GRADE articles. (24)

As stated by the GRADE Working Group, the final quality score can be interpreted using the following definitions:

High	Very confident that the true effect lies close to that of the estimate of the effect
Moderate	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	Confidence in the effect estimate is limited—the true effect may be substantially different from the estimate of the effect
Very Low	Very little confidence in the effect estimate—the true effect is likely to be substantially different from the estimate of effect

Results of Literature Search

The database search yielded 293 citations published between January 1, 2000, and October 4, 2012 (with duplicates removed). Articles were excluded based on information in the title and abstract. The full texts of potentially relevant articles were obtained for further assessment.

No studies were identified that examined the safety and effectiveness of EMAA in hospitalized acute HF patients.

Guidelines

In general, there are no therapeutic guidelines related to EMAA for adults hospitalized for acute illness. (7;25) Practices of prolonged bed rest for hospitalized patients are generally not supported by professional societies, and since 1970 there has been a trend to replace prolonged bed rest for symptomatic HF patients with EMAA followed by encouragement of physical exercise. (26) Nevertheless, professional societies have not issued guidelines or recommendations specifically commenting on protocols of EMAA, or on their safety or effectiveness in the hospitalized HF patient.

Conclusions

No studies were identified that examined the safety and effectiveness of EMAA in hospitalized acute HF patients.

Acknowledgements

Editorial Staff
Pierre Lachaine
Jeanne McKane, CPE, ELS(D)

Medical Information Services
Kaitryn Campbell, BA(H), BEd, MLIS
Corinne Holubowich, Bed, MLIS
Kellee Kaulback, BA(H), MISt

Episode of Care for Congestive Heart Failure Expert Panel

Name	Title	Organization
Dr. David Alter	Senior Scientist	Institute for Clinical Evaluative Sciences Research Program Director and Associate Staff, The Cardiac and Secondary Prevention Program at the Toronto Rehabilitation Institute-UHN Associate Professor of Medicine, University of Toronto
Dr. Douglas Lee	Scientist	Institute for Clinical Evaluative Sciences
Dr. Catherine Demers	Associate Professor	Division of Cardiology, Department of Medicine McMaster University
Dr. Susanna Mak	Cardiologist	University of Toronto, Department of Medicine, Division of Cardiology, Mount Sinai Hospital
Dr. Lisa Mielniczuk	Medical Director, Pulmonary Hypertension Clinic	University of Ottawa Heart Institute
Dr. Peter Liu	President, International Society of Cardiomyopathy and Heart Failure of the World Heart Federation Director, National C-CHANGE Program Scientific Director/VP Research, University of Ottawa Heart Institute Professor of Medicine	University of Ottawa Heart Institute
Dr. Robert McKelvie	Professor of Medicine, Cardiologist	McMaster University, Hamilton Health Sciences
Dr. Malcolm Arnold	Professor of Medicine	University of Western Ontario, London Health Sciences Centre
Dr. Stuart Smith	Chief of Cardiovascular Services Director, Heart Failure Program	St. Mary's General Hospital
Dr. Atilio Costa Vitali	Assistant Professor of Medicine Division of Clinical Science	Sudbury Regional Hospital

Dr. Jennifer Everson	Physician Lead	Hamilton Niagara Haldimand Brant Local Health Integration Network
Dr. Lee Donohue	Family Physician	Ottawa
Linda Belford	Nurse Practitioner, Practice Leader PMCC	University Health Network
Jane MacIver	Nurse Practitioner Heart Failure/Heart Transplant	University Health Network
Sharon Yamashita	Clinical Coordinator, Critical Care	Sunnybrook Health Sciences Centre
Claudia Bucci	Clinical Coordinator, Cardiovascular Diseases	Sunnybrook Health Sciences Centre
Andrea Rawn	Evidence Based Care Program Coordinator	Grey Bruce Health Network
Darlene Wilson	Registered Nurse	Heart Function Clinic, Trillium Health Centre
Kari Kostiw	Clinical Coordinator	Health Sciences North Ramsey Lake Health Centre
Janet Parr	CHF Patient	
Heather Sherrard	Vice President, Clinical Services	University of Ottawa Heart Institute
Sue Wojdylo	Manager, Case Costing	Lakeridge Health
Jane Chen	Manager of Case Costing	University Health Network
Nancy Hunter	LHIN Liaison & Business Development	Cardiac Care Network of Ontario
Ministry Representatives		
Gary Coleridge	Senior Program Consultant	Ministry of Health and Long-Term Care
Louie Luo	Senior Methodologist	Ministry of Health and Long-Term Care

Appendices

Appendix 1: Literature Search Strategies

Search date: October 08, 2012
Databases searched: OVID MEDLINE, MEDLINE In-Process and Other Non-Indexed Citations, EMBASE; Cochrane Library; CRD; CINAHL

Q: Early ambulation for Heart Failure patients
Limits: 2000-current; English
Filters: none

Database: Ovid MEDLINE(R) <1946 to September Week 4 2012>, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations <October 05, 2012>, Embase <1980 to 2012 Week 40>
Search Strategy:

#	Searches	Results
1	exp Heart Failure/	326098
2	(((cardia? or heart) adj (decompensation or failure or incompetence or insufficiency)) or cardiac stand still or ((coronary or myocardial) adj (failure or insufficiency))).ti,ab.	257301
3	or/1-2	415834
4	Early Ambulation/ use mesz	1794
5	Mobilization/ use emez	14664
6	((accelerat* or earl*) adj (ambulation or mobilisation or mobilization or recover*)).ti,ab.	13747
7	or/4-6	28155
8	3 and 7	487
9	limit 8 to english language	412
10	limit 9 to yr="2000 -Current"	320
11	remove duplicates from 10	291

Cochrane Library

Line #	Terms	Results
#1	MeSH descriptor: [Heart Failure] explode all trees	4860
#2	((cardia? or heart) next (decompensation or failure or incompetence or insufficiency)) or cardiac stand still or ((coronary or myocardial) next (failure or insufficiency)):ti,ab,kw (Word variations have been searched)	9323
#3	Enter terms for search #1 or #2	9328
#4	MeSH descriptor: [Early Ambulation] this term only	258
#5	(accelerat* or earl*) next (ambulation or mobilisation or mobilization or recover*):ti,ab,kw (Word variations have been searched)	1107
#6	#4 or #5	1107
#7	#3 and #6	1 from 2000 to 2012

Result=1 CENTRAL (duplicate, already have)

CRD

Line	Search	Hits
1	MeSH DESCRIPTOR Heart Failure EXPLODE ALL TREES IN DARE,HTA	345
2	(((cardia? OR heart) ADJ (decompensation OR failure OR incompetence OR insufficiency)) OR cardiac stand still OR ((coronary OR myocardial) ADJ (failure OR insufficiency))):TI IN DARE, HTA FROM 2000 TO 2012	203
3	#1 OR #2	375
4	MeSH DESCRIPTOR Early Ambulation IN DARE,HTA	9
5	((accelerat* OR earl*) ADJ (ambulation OR mobilisation OR mobilization OR recover*)):TI IN DARE, HTA FROM 2000 TO 2012	11
6	#4 OR #5	15
7	#3 AND #6	0

CINAHL

#	Query	Limiters/Expanders	Results
S8	(S4 or S5) AND (S3 and S6)	Limiters - Published Date from: 20000101-20121231; English Language Search modes - Boolean/Phrase	9
S7	(S4 or S5) AND (S3 and S6)	Search modes - Boolean/Phrase	14
S6	S4 or S5	Search modes - Boolean/Phrase	1277
S5	(accelerat* OR earl*) N1 (ambulation OR mobilisation OR mobilization OR recover*)	Search modes - Boolean/Phrase	1277
S4	(MH "Early Ambulation")	Search modes - Boolean/Phrase	281
S3	S1 or S2	Search modes - Boolean/Phrase	20235
S2	((cardia? OR heart) N1 (decompensation OR failure OR incompetence OR insufficiency)) OR cardiac stand still OR ((coronary OR myocardial) N1 (failure OR insufficiency))	Search modes - Boolean/Phrase	20222
S1	(MH "Heart Failure+")	Search modes - Boolean/Phrase	15453

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Health Quality Ontario
130 Bloor Street West, 10th Floor
Toronto, Ontario
M5S 1N5
Tel: 416-323-6868
Toll Free: 1-866-623-6868
Fax: 416-323-9261
Email: EvidenceInfo@hqontario.ca
www.hqontario.ca