Appendices

Appendix III: Rapid Reviews

Ontario
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Clinical Utility of Echocardiography for Patients with Hip Fracture: A Rapid Review

M Nikitovic

April 2013

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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

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Table of Contents

List of Abbreviations

AAGBI	Association of Anaesthetists of Great Britain and Ireland
ACC	American College of Cardiology
AHA	American Heart Association
ESA	European Society of Anaesthesiology
ESC	European Society of Cardiology
SIGN	Scottish Intercollegiate Guidelines Network

Background

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Objective of Analysis

The objective of this analysis was to evaluate the clinical utility of preoperative echocardiography for the diagnosis and evaluation of aortic stenosis in patients with hip fractures.

Clinical Need and Target Population

Valvular heart disease, particularly aortic stenosis, has been independently associated with an increased risk of perioperative cardiovascular complications. (1;2) The prevalence of aortic stenosis increases with age, and approximately 3% of adults aged 75 to 86 years are estimated to have critical aortic stenosis (defined as a valve area ≤ 0.8 cm^2). (3;4) One study found that 8% of patients presenting with hip fracture had moderate to severe aortic stenosis (peak gradient > 36 mmHg) (5)

Technology/Technique

Echocardiography is considered the primary technique for the diagnosis of valvular heart disease and for assessing the severity and prognosis of aortic diseases. (1;6) An assessment of the severity of aortic stenosis should combine measurement of the valve area with flow-dependent indices to improve prognostic value. (1;6) Echocardiographic criteria for severe aortic stenosis is defined by a valve area less than 1.0 cm^2 and a mean pressure gradient greater than 40 mmHg. (1;6)

The specific role of echocardiography in identifying valvular heart disease prior to hip fracture surgery remains unclear. In particular, its impact on perioperative management, clinical outcomes, and potential delay of surgery is uncertain.

Rapid Review

Research Question

What is the clinical utility of echocardiography for the diagnosis of aortic stenosis among patients with hip fractures?

Research Methods

Literature Search

A literature search was performed on January 31, 2013, using OVID MEDLINE, OVID MEDLINE In-Process and Other Non-Indexed Citations, OVID EMBASE, EBSCO Cumulative Index to Nursing & Allied Health Literature (CINAHL), the Wiley Cochrane Library, and the Centre for Reviews and Dissemination database, for studies published from January 1, 2008, until January 30, 2013. 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-text reports
- published between January 1, 2008, and January 30, 2013
- health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, and guidelines
- adult hip fracture population or noncardiac, presurgical population
- studies evaluating the use of echocardiography for identification of valvular heart disease prior to surgery

Exclusion Criteria

- observational studies, case reports, editorials
- studies where outcomes of interest could not be abstracted

Outcomes of Interest

- mortality
- change in clinical management

Expert Panel

In December 2012, an Expert Advisory Panel on Episodes of Care for Hip Fractures was struck. Members of the panel included physicians, personnel from the Ministry of Health and Long-Term Care, and representation from the community.

The role of the Expert Advisory Panel on Episodes of Care for Hip Fractures was to contextualize the evidence produced by Health Quality Ontario and provide advice on the appropriate clinical pathway for

a hip fracture in the Ontario health care setting. However, the statements, conclusions and views expressed in this report do not necessarily represent the views of Advisory Panel members.

Results of Literature Search

The database search yielded 464 citations published between January 1, 2008, and January 30, 2013 (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 systematic reviews, meta-analyses, health technology assessments or randomized controlled trails evaluating the clinical utility of preoperative echocardiography for the identification of aortic stenosis in the hip fracture population or in a general noncardiac surgical population were identified.

Clinical Guidelines

Four clinical guidelines on the use of preoperative echocardiography in a hip fracture population (7;8) or in a general noncardiac surgical population (2;9) were identified.

Preoperative Cardiac Assessment Guidelines

The American College of Cardiology (ACC) / American Heart Association (AHA) (2) and the European Society of Cardiology (ESC) / European Society of Anaesthesiology (ESA) (9) recommend clinical and echocardiographic evaluation and, if needed, treatment before nonurgent surgery in patients with confirmed or presumed severe valvular heart disease. Neither recommend additional cardiac assessment of patients with no active cardiac conditions or clinical risk factors. (2;9)

In cases of urgent noncardiac surgery, the ESC/ESA recommend hemodynamic monitoring of procedures in patients with severe aortic stenosis and the ACC/AHA recommend perioperative surveillance in the operating room. (2;9) The ACC/AHA state the need for the consultant to identify the type, significance, and origin of the murmur in order to determine which patients require further quantification of severity.

Recommendations in both guidelines were based primarily on expert consensus or small observational studies. Apart from the limited evidence supporting these recommendations, these guidelines focus either on urgent or elective surgery and do not consider nonemergent ("semiurgent") surgical patients with moderate cardiac risk that make up the hip fracture population.

Hip Fracture Guidelines

Two hip fracture guidelines that discuss the use of preoperative echocardiography were identified: the 2011 guidelines of the Association of Anaesthetists of Great Britain and Ireland (AAGBI) on management of proximal femoral fractures (7) and the 2009 Scottish Intercollegiate Guidelines Network (SIGN) national clinical guideline on management of hip fracture in older people. (8) Table 1 shows a summary of these recommendations**.**

Neither of the guidelines recommends the routine use of preoperative echocardiography. However, both suggest that echocardiography or cardiac assessment be considered in those with suspected significant aortic stenosis or perioperative risk after clinical examination. Both guidelines note that echocardiography should not delay time to surgery, with SIGN recommending rapid access to echocardiography when appropriate. Recommendations from both guidelines were primarily based upon expert consensus.

Table 1. Summary of Clinical Guidelines for Preoperative Echocardiography for Hip Fracture Patients

Guideline, Year	Recommendations or Suggestions for Preoperative Echocardiography Assessment	Level of Evidence
AAGBI, 2011 (7)	A majority of clinicians favour proceeding to surgery with modification of technique towards general anesthesia and invasive blood pressure monitoring, with echocardiography in the early postoperative period	Expert Opinion
	Echocardiography may be indicated: • to establish left ventricular function if the patient is breathless at rest or low level exertion; or • to investigate the severity of an ejection systolic murmur heard in the aortic area, particularly if significant AS is suggested[a]	
	Awaiting echocardiography is not an acceptable reason for delaying surgery for hip fracture	
SIGN, 2009 (8)	Do not require routine additional cardiac investigation such as echocardiography before surgery	Grade C[b]
	Additional cardiac investigation may be considered in patients with clinical suspicion of perioperative cardiac risk	Grade C[b]
	Recommended best practices:	Expert Opinion
	• Echocardiography should be performed if AS is suspected, to allow confirmation of diagnosis, risk stratification, and any future cardiac management	
	• Need for echocardiography, based on clinical history, physical examination and ECG findings should not delay surgery unduly	
	• Rapid access to an echocardiography is recommended for appropriate patients to avoid unnecessary delay to surgery	
	• Systems should be established to ensure additional cardiac investigations, when required, do not delay surgery	

Abbreviations: AAGBI, Association of Anaesthetists of Great Britain and Ireland; AS, aortic stenosis; ECG, electrocardiogram; SIGN, Scottish Intercollegiate Guidelines Network.

[a] Significant as suggested by the presence of 2 or more of the following: a history of angina on exertion; unexplained syncope or near syncope; a slow rising pulse; an absent second heart sound; or left ventricular hypertrophy on the ECG without hypertension (although clinical signs of AS can be difficult to elicit).

[b] Grade C represents a body of evidence including studies that are directly applicable to the target population, demonstrating overall consistency of results, and rated as 2+ (i.e., well-conducted case control or cohort studies with a low risk of confounding or bias and a high probability that the relationship is causal).

Conclusions

- No systematic reviews, meta-analyses, health technology assessments, or randomized controlled trails that evaluated the clinical utility of echocardiography in a hip fracture or noncardiac presurgical population were identified.
- Four guidelines that provided recommendations for the use of echocardiography or cardiac assessment prior to noncardiac surgery were identified. Of these, 2 applied to the hip fracture population.
- Based primarily on expert opinion, the Association of Anaesthetists of Great Britain and Ireland (AAGBI) and Scottish Intercollegiate Guidelines Network (SIGN) hip fracture guidelines do not recommend routine echocardiography in this population. Both guidelines recommend echocardiography be used to investigate the severity of a systolic murmur. However, they state that echocardiography for appropriate patients should not delay surgery.

Acknowledgements

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Expert Panel for Health Quality Ontario: Episode of Care for Hip Fracture

Name	Role	Organization
Chair		
Dr. James Waddell	Orthopedic surgeon	St. Michael's Hospital, Toronto
Orthopedic Surgery		
Dr. John P. Harrington	Orthopedic surgeon	William Osler Health System, Toronto
Dr. Mark Harrison	Orthopedic surgeon	Queen's University, Kingston
Dr. Hans J. Kreder	Professor	Division of Orthopaedics, Department of Surgery, University of Toronto
Dr. Allan Liew	Orthopedic surgeon	Department of Surgery, University of Ottawa
Dr. Mark MacLeod	Orthopedic surgeon	London Health Sciences Centre
Dr. Aaron Nauth	Orthopedic surgeon	St. Michael's Hospital/University of Toronto
Dr. David Sanders	Orthopedic surgeon	London Health Sciences Centre
Dr. Andrew Van Houwelingen	Orthopedic surgeon	St. Thomas Elgin General Hospital
Anesthesiology		
Dr. Nick Lo	Staff anesthesiologist	St. Michael's Hospital, Toronto
Emergency Medicine		
Dr. Michael O'Connor	Emergency medicine	Kingston General Hospital
Dr. Lisa Shepherd	Emergency medicine	South West Local Health Integration Network (LHIN), London
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Dr. Christopher Jyu	Physician lead, primary care	Central East LHIN, Ajax
Geriatrics		
Dr. Anna Byszewski	Geriatrician	The Ottawa Hospital
Dr. Maria Zorzitto	Chief of geriatric medicine	St. Michael's Hospital, Toronto
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Ruth Vallis	Physiotherapist	University Health Network, Toronto
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Charissa Levy	Executive director	GTA Rehab Network
Dr. Peter Nord	Vice president, chief medical officer and chief of staff	Providence Healthcare, Toronto
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Dr. Susan Jaglal	Chair	Toronto Rehabilitation Institute, University of Toronto
Dr. Valerie Palda	Associate professor	Department of Medicine and Institute of Health Policy, Management and Evaluation, University of Toronto
Administration		
Jane de Lacy	Executive director, patient services	William Osler Health System, Toronto

Name	Role	Organization
Brenda Flaherty	Executive vice president and chief operating officer	Hamilton Health Sciences
Jo-anne Marr	Executive vice president and chief operating officer	Mackenzie Health, Richmond Hill
Malcolm Moffat	Executive vice president, programs	Sunnybrook Health Sciences Centre, Toronto
Kathy Sabo	Senior vice president, clinical programs/operations	University Health Network, Toronto
Community Care Access Centres		
Patricia (Tricia) Khan	Senior director, client services	Erie St. Clair Community Care Access Centre, Chatham
Janet McMullan	Project director, consultant	Bone and Joint Canada
Professional Organizations		
Ravi Jain	Director, Ontario osteoporosis strategy	Osteoporosis Canada
Rhona McGlasson	Executive director	Bone and Joint Canada

Appendices

Appendix 1: Literature Search Strategies

Database: Ovid MEDLINE(R) <1946 to January Week 4 2013>, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations <January 30, 2013>, Embase <1980 to 2013 Week 04>
Search Strategy:

#	Searches	Results
1	exp Hip Fractures/ use mesz	16212
2	exp Hip Fracture/ use emez	26440
3	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*).ti,ab.	55691
4	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*).ti,ab.	38480
5	or/1-4	69132
6	exp Echocardiography/	270782
7	(echocardiogram* or echocardiograph* or cardioechograph* or (cardia* adj echograph*) or (heart adj echo*) or ((ultrasound or echo*) adj cardiogra*)).ti,ab.	232971
8	or/6-7	330718
9	5 and 8	224
10	exp Preoperative Care/ or exp Preoperative Period/ or Perioperative Period/	258999
11	exp Perioperative Care/ use mesz	116676
12	(pre?surg* or pre?operat* or peri?operat*).ti,ab.	478656
13	or/10-12	674115
14	8 and 13	17218
15	9 or 14	17378
16	Meta Analysis.pt.	36886
17	Meta Analysis/ use emez	68653
18	Systematic Review/ use emez	56872
19	exp Technology Assessment, Biomedical/ use mesz	8789
20	Biomedical Technology Assessment/ use emez	11433
21	(meta analy* or metaanaly* or pooled analysis or (systematic* adj2 review*) or published studies or published literature or medline or embase or data synthesis or data extraction or cochrane).ti,ab.	300870
22	((health technolog* or biomedical technolog*) adj2 assess*).ti,ab.	3931
23	exp Random Allocation/ use mesz	76043
24	exp Double-Blind Method/ use mesz	117246
25	exp Control Groups/ use mesz	1361
26	exp Placebos/ use mesz	31188
27	Randomized Controlled Trial/ use emez	336292
28	exp Randomization/ use emez	60635
29	exp Random Sample/ use emez	4544
30	Double Blind Procedure/ use emez	112873
31	exp Triple Blind Procedure/ use emez	37
32	exp Control Group/ use emez	41603
33	exp Placebo/ use emez	212295
34	(random* or RCT).ti,ab.	1408059
35	(placebo* or sham*).ti,ab.	453656

36	(control* adj2 clinical trial*).ti,ab.	38941
37	exp Practice Guideline/ use emez	285040
38	exp Professional Standard/ use emez	274892
39	exp Standard of Care/ use mesz	616
40	exp Guideline/ use mesz	23107
41	exp Guidelines as Topic/ use mesz	102236
42	(guideline* or guidance or consensus statement* or standard or standards).ti.	221929
43	(controlled clinical trial or meta analysis or randomized controlled trial).pt.	455375
44	or/16-43	3025432
45	15 and 44	1486
46	limit 45 to english language	1362
47	limit 46 to yr="2008 -Current"	585
48	exp Case Reports/ use mesz or exp case report/ use emez	3474878
49	47 not 48	569
50	remove duplicates from 49	466

Cochrane Library

	Search	Hits
#1	MeSH descriptor: [Hip Fractures] explode all trees	968
#2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) near/4 fracture*):ti (Word variations have been searched)	1418
#3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) near/4 fracture*):ti (Word variations have been searched)	801
#4	#1 or #2 or #3	1712
#5	MeSH descriptor: [Echocardiography] explode all trees	3101
#6	echocardiogram* or echocardiograph* or cardioechograph* or (cardia* near echograph*) or (heart near echo*) or ((ultrasound or echo*) near cardiogra*):ti (Word variations have been searched)	1074
#7	#5 or #6	3360
#8	#4 and #7	5
#9	MeSH descriptor: [Preoperative Care] explode all trees	4732
#10	MeSH descriptor: [Preoperative Period] explode all trees	50
#11	MeSH descriptor: [Perioperative Period] explode all trees	4989
#12	MeSH descriptor: [Perioperative Care] explode all trees	9328
#13	pre?surg* or pre?operat* or peri?operat*:ti (Word variations have been searched)	4
#14	#9 or #10 or #11 or #12 or #13	13713
#15	#7 and #14	113
#16	#8 or #15 from 2008 to 2013	23

CRD

Line	Search	Hits
1	MeSH DESCRIPTOR hip fractures EXPLODE ALL TREES	161
2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*)):TI	125
3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*)):TI	103
4	#1 OR #2 OR #3	205

5	MeSH DESCRIPTOR echocardiography EXPLODE ALL TREES	155
6	(echocardiogram* or echocardiograph* or cardioechograph* or (cardia* adj echograph*) or (heart adj echo*) or ((ultrasound or echo*) adj cardiogra*)):TI	87
7	#5 OR #6	166
8	#4 AND #7	0
9	MeSH DESCRIPTOR preoperative care EXPLODE ALL TREES	252
10	MeSH DESCRIPTOR preoperative period EXPLODE ALL TREES	13
11	MeSH DESCRIPTOR perioperative period EXPLODE ALL TREES	215
12	MeSH DESCRIPTOR perioperative care EXPLODE ALL TREES	630
13	(pre?surg* or pre?operat* or peri?operat*):TI	385
14	#9 OR #10 OR #11 OR #12 OR #13	1016
15	#7 AND #14	9
16	(#15) FROM 2008 TO 2013	3

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(1) Vahanian A, Alfieri O, Andreotti F, Antunes MJ, Baron-Esquivias G, Baumgartner H, et al. Guidelines on the management of valvular heart disease (version 2012). Eur Heart J. 2012;33(19):2451-96.

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(9) Poldermans D, Bax JJ, Boersma E, De Hert S., Eeckhout E, Fowkes G, et al. Guidelines for pre-operative cardiac risk assessment and perioperative cardiac management in non-cardiac surgery: The task force for preoperative cardiac risk assessment and perioperative cardiac management in non-cardiac surgery of the European society of Cardiology (ESC) and endorsed by the European society of anaesthesiology (ESA). Eur J Anaesthesiol. 2010;27(2):92-137.

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Nerve Blocks for Pain Management in Patients With Hip Fractures: A Rapid Review

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April 2013

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List of Abbreviations

AMSTAR	Assessment of Multiple Systematic Reviews
CI	Confidence interval(s)
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HQO	Health Quality Ontario
OR	Odds ratio
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 rapid review is to identify the effectiveness of nerve blocks versus systemic analgesic for pain management when administered prior to hip fracture surgery.

Clinical Need and Target Population

Pain management for patients with a hip fracture is a key concern as pain associated with a hip fracture is typically significant, may lead to exacerbations of delirium or depression, and may extend postsurgical lengths of stay. (1-3) Hip fracture patients are often elderly with multiple chronic conditions, raising potential concerns about using high doses of systemic analgesics in patients already taking multiple medications. (4) As a result, local analgesics, or nerve blocks, are being prescribed for pain management before, during, and after surgery. (5) How nerve blocks compare with systemic analgesics in this context is an important consideration because patients who receive nerve blocks sometimes also require pharmaceutical analgesics to help control their pain.

Rapid Review

Research Question

Is there evidence of the benefits and effectiveness of nerve blocks compared with systemic analgesics for pain control when administered prior to hip fracture surgery?

Research Methods

Literature Search

A literature search was performed on January 29, 2013, 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 (CRD) database, for studies published up to January 29, 2013 (no start-date limit applied). Appendix 1 provides details of the search strategies used. 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 up to January 29, 2013
- systematic reviews, meta-analyses, and health technology assessments
- hip fracture population

Exclusion Criteria

- studies where outcomes of interest cannot be abstracted

Outcomes of Interest

- pain
- use of additional pain medication

Expert Panel

In December 2012, an Expert Advisory Panel on Episodes of Care for Hip Fractures was struck. The panel was comprised of physicians, personnel from the Ministry of Health and Long-Term Care, and representation from the community.

The role of the Expert Advisory Panel on Episode of Care for Hip Fractures was to contextualize the evidence produced by Health Quality Ontario and provide advice on the appropriate clinical pathway for a hip fracture in the Ontario health care setting. However, the statements, conclusions, and views expressed in this report do not necessarily represent the views of Expert Advisory Panel members.

Statistical Analysis

Where appropriate, a meta-analysis was performed using Review Manager Version 5. (6) A fixed-effect model was used, unless significant heterogeneity was observed ($P \leq 0.10$); then, a random-effects model was used to address significant heterogeneity. A P value of < 0.05 was considered statistically significant.

Quality of Evidence

The Assessment of Multiple Systematic Reviews (AMSTAR) tool was used to assess the quality of the final selection of the systematic reviews. (7) Details on the outcomes of interest were abstracted from the selected review and primary studies were reviewed as needed.

The quality of the body of evidence for each outcome was examined according to the GRADE Working Group criteria. (8) The overall quality was 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 randomized controlled trials 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. (8) For more detailed information, please refer to the latest series of GRADE articles. (8)

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 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 275 citations published up to January 29, 2013 (no start-date limit applied, 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.

Three systematic reviews met the inclusion criteria. (9-11) One of the identified reviews was updated in 2008 and this version was used for this rapid review. (9)

Quality Assessment of Reviews

As assessed by the AMSTAR scoring of reviews, (7), the quality of the reviews ranged from 2 to 11 out of a possible 11 (Appendix 2, Table A1). The Abou-Setta et al (11) paper received the highest possible AMSTAR score, was recently published, and included all studies referenced in the other two reviews identified. Therefore, for the purposes of this analysis, the Abou-Setta et al paper is examined.

Summary of Review

The systematic review by Abou-Setta et al was conducted to identify and synthesize the evidence on pain management for non-pathological hip fracture patients across 13 different interventions. (11) A total of 83 studies were included (69 RCTs) with a majority being comprised of older (> 75 years) women without cognitive impairment. The authors determined that, due to the sparseness of the available data, they could not draw firm conclusions to support the selection of one pain management approach over others. (11)

Pain

Abou-Setta et al identified 13 RCTs that examined the impact of nerve blocks versus systemic analgesics on acute pain post-treatment. (11) They found significant heterogeneity among the studies and therefore did not provide a summary estimate of the impact on pain among patients who received a nerve block versus no nerve block. The authors comment that the heterogeneity is largely related to the timing of administration of the nerve blocks and that limiting the meta-analysis to only those studies that randomized the pre-operative administration of pain medications (versus administration during or after surgery) minimizes some of the observed heterogeneity ($I^2 = 92\%$ becomes $I^2 = 53\%$). However, they do not report the effect estimate of this sensitivity analysis. (11) Because the analysis of pre-operatively administered pain management is of interest for this rapid review, the individual effect estimates as published by Abou-Setta et al (11) were applied to a meta-analysis of studies that administered the nerve blocks pre-operatively (Figure 1).

The random-effects model comparing the standardized mean difference of nerve blocks versus systemic analgesics administered pre-operatively identified a statistically significant decrease in postoperative pain among patients who received nerve blocks (standardized mean difference, -0.90; 95% confidence interval [CI], -1.18 to -0.62).

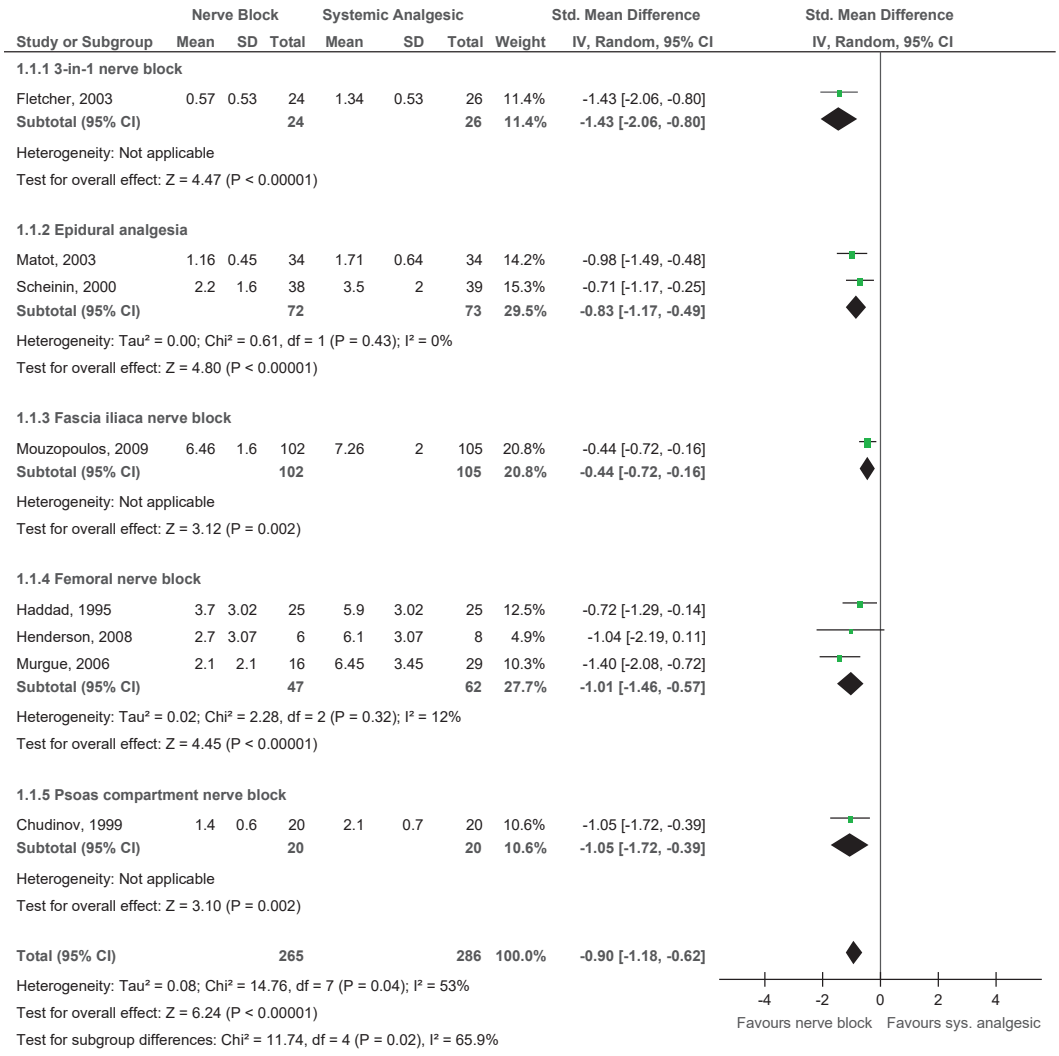

Figure 1: Comparison of Postoperative Pain in Groups Receiving Nerve Blocks Versus Systemic Analgesics Pre-operatively

Abbreviations: CI, confidence interval; df, degrees of freedom; IV, inverse variance; Random, random effects model; SD, standard deviation; Std, standardized; sys, systemic.

Quality Assessment

The quality assessment was conducted based on details published in the Abou-Setta et al systematic review. (11) A number of sources of risk of bias were identified; notably, 7 of the 8 included studies did not report details on their methods of allocation concealment, while the eighth study reported that patients were not blinded. Given the subjectivity of pain as an outcome, this risk of bias contributed to our assessment that the effect estimate for the outcome of pain is based on low quality of evidence (Appendix 2, Table A2).

Use of Additional Pain Medication

Abou-Setta et al conducted a meta-analysis of the 7 RCTs that reported an evaluation of additional pain medication required. (11) This meta-analysis concluded that patients who received nerve blocks requested additional pain medication less frequently than patients who did not receive nerve blocks (odds ratio [OR], 0.32; 95% CI, 0.14–0.72). (11) However, this analysis did not differentiate the timing of the administration of nerve blocks, and so a sensitivity analysis was conducted of the 4 studies that administered nerve blocks pre-operatively, based on the effect estimates published in Abou-Setta et al (11) (Figure 2).

The comparison of nerve blocks versus systemic analgesics administered pre-operatively identified no statistically significant difference in the need for additional pain medications between the two study groups (OR, 0.63; 95% CI, 0.29–1.38).

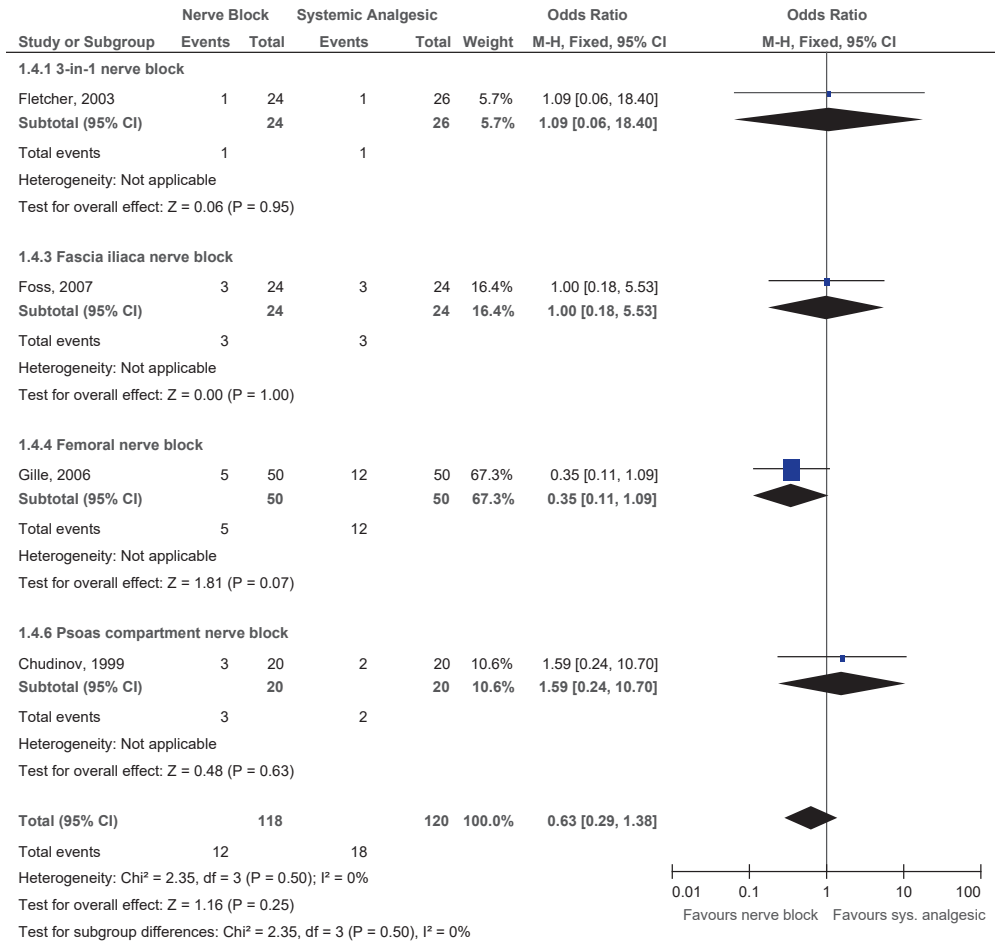

Figure 2: Comparison of Need for Postoperative Analgesics in Groups Receiving Nerve Blocks Versus Systemic Analgesics Pre-operatively

Abbreviations: CI, confidence interval; df, degrees of freedom; Fixed, fixed effects model; M-H, Mantel–Haenszel; sys, systemic.

Quality Assessment

The quality assessment was conducted based on details published in the Abou-Setta et al systematic review. (11) A number of sources of risk of bias were identified: notably, 5 of the 7 included studies did not report details on the methods of allocation concealment, while 5 had other limitations including no source of funding declared. In addition, the need for additional pain medication is reported as a count of the number of times a patient required it, and no details are provided regarding the doses or total intake of additional analgesics. These limitations contributed to our assessment that the effect estimate for the outcome of additional pain medications is based on very low quality of evidence (Appendix 2, Table A2).

Delirium

At a meeting of the Expert Advisory Panel on Episodes of Care for Hip Fractures, it was determined that the addition of a third outcome, delirium, would be important to add to the examination of nerve blocks and pain management. The Abou-Setta et al systematic review identified 4 RCTs and 2 cohort studies that looked at mental status. (11) A statistically significant improvement in mental status was observed among patients who received a nerve block versus the control groups (RCT meta-analysis: OR, 0.33; 95% CI, 0.16–0.66; cohort study meta-analysis: OR, 0.24; 95% CI, 0.08–0.72). (11) However, this analysis included studies that administered nerve blocks before, during, and after surgery, and a sensitivity analysis limited to studies that used nerve blocks pre-operatively is not possible for this outcome based on the data provided in the Abou-Setta et al paper.

Quality Assessment

The quality of evidence for the outcome of delirium was assessed as moderate, as evaluated by Abou-Setta et al. (11) The authors state there is a medium risk of bias. They identified 1 study as having limitations with allocation concealment, 3 with blinding, and 2 with the complete accounting of patients and outcome events. No study had limitations with the selective reporting bias, 3 had other limitations including unclear declarations of the funding source, and 1 had limitations with the outcome of interest and comparability of cohorts. (11) No limitations were detected with respect to the consistency, directness, precision or other considerations identified. (11)

Conclusions

- Based on low quality of evidence, there was a significant reduction in postoperative pain among hip fracture patients who pre-operatively received a nerve block versus systemic analgesic.

- Based on very low quality of evidence, there was no significant difference in the use of additional pain medications by hip fracture patients who received nerve block pre-operatively compared to patients who did not.

- Based on moderate quality of evidence, there was a statistically significant difference in mental status in favour of patients who received nerve blocks at any point in their hip fracture care (pre- or postoperatively) versus comparator groups.

Acknowledgements

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Expert Panel for Health Quality Ontario: Episode of Care for Hip Fracture

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Dr. John P. Harrington	Orthopedic surgeon	William Osler Health System, Toronto
Dr. Mark Harrison	Orthopedic surgeon	Queen's University, Kingston
Dr. Hans J. Kreder	Professor	Division of Orthopaedics, Department of Surgery, University of Toronto
Dr. Allan Liew	Orthopedic surgeon	Department of Surgery, University of Ottawa
Dr. Mark MacLeod	Orthopedic surgeon	London Health Sciences Centre
Dr. Aaron Nauth	Orthopedic surgeon	St. Michael's Hospital/University of Toronto
Dr. David Sanders	Orthopedic surgeon	London Health Sciences Centre
Dr. Andrew Van Houwelingen	Orthopedic surgeon	St. Thomas Elgin General Hospital
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Jo-anne Marr	Executive vice president and chief operating officer	Mackenzie Health, Richmond Hill
Malcolm Moffat	Executive vice president, programs	Sunnybrook Health Sciences Centre, Toronto
Kathy Sabo	Senior vice president, clinical programs/operations	University Health Network, Toronto
Community Care Access Centres		
Patricia (Tricia) Khan	Senior director, client services	Erie St. Clair Community Care Access Centre, Chatham
Janet McMullan	Project director, consultant	Bone and Joint Canada
Professional Organizations		
Ravi Jain	Director, Ontario osteoporosis strategy	Osteoporosis Canada
Rhona McGlasson	Executive director	Bone and Joint Canada

Appendices

Appendix 1: Literature Search Strategies

Search date: January 29, 2013
Databases searched: Ovid MEDLINE, Ovid MEDLINE In-Process and Other Non-Indexed Citations, EMBASE; Cochrane Library; Centre for Reviews and Dissemination database (CRD)

Database: Ovid MEDLINE(R) <1946 to January Week 3 2013>, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations <January 28, 2013>, EMBASE <1980 to 2013 Week 04>
Search Strategy:

#	Searches	Results
1	exp Hip Fractures/ use mesz	16201
2	exp Hip Fracture/ use emez	26440
3	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*).ti,ab.	55669
4	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*).ti,ab.	38463
5	or/1-4	69110
6	exp nerve block/	38259
7	exp femoral nerve/	5061
8	block*.ti,ab.	1185299
9	7 and 8	1595
10	(block* adj4 (ascia iliaca* or compartment* or epidural* or fascia iliaca* or femoral* or iliofascial* or lateral* or lumbar plexus or nerve* or neural* or peripheral* or psoas or sacral* or sciatic* or subcostal* or triple* or local an?esthe* or local analges*)).ti,ab.	37358
11	or/6,9-10	60669
12	5 and 11	489
13	limit 12 to english language	402
14	remove duplicates from 13	274

Cochrane Library

ID	Search	Hits
#1	MeSH descriptor: [Hip Fractures] explode all trees	955
#2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) near/4 fracture*):ti (Word variations have been searched)	1407
#3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) near/4 fracture*):ti (Word variations have been searched)	792
#4	#1 or #2 or #3	1699
#5	MeSH descriptor: [Nerve Block] explode all trees	2334
#6	MeSH descriptor: [Femoral Nerve] explode all trees	202
#7	block*:ti (Word variations have been searched)	9538
#8	#6 and #7	160
#9	(block* near/4 (ascia iliaca* or compartment* or epidural* or fascia iliaca* or femoral* or iliofascial* or lateral* or lumbar plexus or nerve* or neural* or peripheral* or psoas or sacral* or sciatic* or subcostal* or triple* or local an?esthe* or local analges*)):ti (Word variations have been searched)	1474
#10	#5 or #8 or #9	2953
#11	#4 and #8	13

CRD

Line	Search	Hits
1	MeSH DESCRIPTOR hip fractures EXPLODE ALL TREES	161
2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*)):TI	125
3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*)):TI	103
4	#1 OR #2 OR #3	205
5	MeSH DESCRIPTOR nerve block EXPLODE ALL TREES	85
6	MeSH DESCRIPTOR femoral nerve EXPLODE ALL TREES	9
7	(block*):TI	375
8	#6 AND #7	9
9	(block* adj4 (ascia iliaca* or compartment* or epidural* or fascia iliaca* or femoral* or iliofascial* or lateral* or lumbar plexus or nerve* or neural* or peripheral* or psoas or sacral* or sciatic* or subcostal* or triple* or local an?esthe* or local analges*)):TI	8
10	#5 OR #8 OR #9	91
11	#4 AND #10	1

Appendix 2: Quality Assessment Tables

Table A1: AMSTAR Score of Reviews[a]

Author, Year	AMSTAR score[a]	1) Provided Study Design	2) Duplicate Study Selection	3) Broad Literature Search	4) Considered Status of Publication	5) Listed Excluded Studies	6) Provided Characteristics of Studies	7) Assessed Scientific Quality	8) Considered Quality in Report	9) Methods to Combine Appropriate	10) Assessed Publication Bias	11) Stated Conflict of Interest
Parker, 2009 (9)	9	✓	✓	✓		✓	✓	✓	✓	✓		✓
Abou-Setta, 2011 (11)	11	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
O'Malley, 2011 (10)	2			✓			✓					

[a] Details of AMSTAR method are described in Shea et al. (7)

Table A2: GRADE Evidence Profile for Comparison of Nerve Blocks and Systemic Analgesics

No. of Studies (Design)	Risk of Bias[a]	Inconsistency	Indirectness	Imprecision	Publication Bias	Upgrade Considerations	Quality
Pain (postoperative)							
8 (RCTs)	Very serious limitations (-2)[b]	No serious limitations	No serious limitations	No serious limitations	Undetected	None detected	⊕⊕ Low
Additional pain medications required							
7 (RCTs)	Very serious limitations (-2)[c]	No serious limitations	Serious limitations (-1)[d]	No serious limitations	Undetected	None detected	⊕ Very low

Abbreviations: No., number; RCT, randomized controlled trial.

[a]Assessment based on details provided in Abou-Setta et al review. (11)

[b]Of the 8 studies included in the analysis on pain, 7 had limitations with allocation concealment, 6 with blinding, 1 with the complete accounting of patients and outcomes, 1 with selective reporting bias, and all 8 had other limitations including not reporting the source of funding or unbalanced baseline characteristics. (11)

[c]Of the 7 studies included in the analysis on additional pain medications required, 5 had limitations with allocations concealment, 4 with blinding, 1 with the complete accounting of all patients and outcomes, 2 with selective reporting bias, and 5 had other limitations including not reporting the source of funding. (11)

[d]Assessment of additional pain medication is reported as a count of the number of times a patient required pain medications, and no details are provided regarding dose or total intake of additional systemic analgesics.

References

(1) Arinzon Z, Gepstein R, Shabat S, Berner Y. Pain perception during the rehabilitation phase following traumatic hip fracture in the elderly is an important prognostic factor and treatment tool. Disabil Rehabil. 2007 Apr 30;29(8):651-8.

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(5) Griffiths R, Alper J, Beckingsale A, Goldhill D, Heyburn G, Holloway J, et al. Management of proximal femoral fractures 2011. Anaesthesia. 2012;67:85-98.

(6) Review Manager (RevMan) [Computer program]. Version 5.1. Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2011.

(7) Shea BJ, Grimshaw JM, Wells GA, Boers M, Andersson N, Hamel C, et al. Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. BMC Med Res Methodol. 2007;7:10.

(8) Guyatt GH, Oxman AD, Schunemann HJ, Tugwell P, Knottnerus A. GRADE guidelines: a new series of articles in the Journal of Clinical Epidemiology. J Clin Epidemiol. 2011 Apr;64(4):380-2.

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(11) Abou-Setta AM, Beaupre LA, Rashiq S, Dryden DM, Hamm MP, Sadowski CA, et al. Comparative effectiveness of pain management interventions for hip fracture: a systematic review. Ann Intern Med. 2011;155(4):234-45.

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Optimal Timing of Hip Fracture Surgery: A Rapid Review

S Brener

April 2013

Suggested Citation

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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.

Permission Requests

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http://www.hqontario.ca/evidence/publications-and-ohtac-recommendations/rapid-reviews.

Table of Contents

List of Abbreviations

AMSTAR	Assessment of Multiple Systematic Reviews
CI	Confidence interval(s)
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HQO	Health Quality Ontario
OHTAC	Ontario Health Technology Advisory Committee
OR	Odds ratio
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 rapid review is to identify the evidence around the optimal timing to surgery after a patient's presentation to a hospital with a hip fracture.

Clinical Need and Target Population

Delayed surgery following hip fracture has been associated with increased risks for developing urinary tract infections, pressure ulcers, pneumonia, venous thromboembolism, nonunion (failure of the bone to heal normally), necrosis of the femoral head, and death. (1) Patients may experience delays in surgery upon presentation to the hospital with a hip fracture for a variety of different reasons. Some patients may be appropriately delayed for surgery due to confounding acute illnesses such as pneumonia or acute myocardial infarction, (2) while others will be delayed due to limitations in access to care related to the diagnostic imaging, physician, or the operating room. (3)

Timely surgery has been associated with improved patient outcomes, and this has led to a number of international guidelines recommending surgery within 2 days of a hip fracture. (4-7) In 2005 Ontario's Ministry of Health and Long-Term Care set a benchmark of surgery within 48 hours of a patient's presentation to the emergency department with a hip fracture, an objective designed to align with the pan-Canadian initiative on wait times for hip fracture surgery.(8) An estimated 70% to 90% of patients in Ontario have met the 48-hour target. (3;9;10) However, this benchmark is longer than England's target of surgery within 36 hours. (11) It remains unclear if 48 hours is the ideal benchmark or if this should be reduced, for example to 24 hours.

Rapid Review

Research Question

What is the impact on mortality and hospital length of stay of surgery within 24 hours compared to 48 hours of presentation to the hospital with a hip fracture?

Research Methods

Literature Search

A literature search was performed on December 10, 2012, using Ovid MEDLINE, Ovid MEDLINE In-Process & Other Non-Indexed Citations (PREM), Ovid EMBASE, the Wiley Cochrane Library, and the Centre for Reviews and Dissemination (CRD) database, for studies published from January 1, 2008, to December 10, 2012. Appendix 1 provides details of the search strategies used. 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 to identify any additional relevant studies not identified through the search.

Inclusion Criteria

- English language (full reports)
- published between January 1, 2008, and December 12, 2012
- meta-analyses, systematic reviews, and health technology assessments
- in-hospital setting

Exclusion Criteria

- studies where outcomes of interest cannot be abstracted

Outcomes of Interest

- mortality
- hospital length of stay

Expert Panel

In December 2012, an Expert Advisory Panel on Episodes of Care for Hip Fractures was struck. The panel was comprised of physicians, personnel from the Ministry of Health and Long-Term Care, and representation from the community.

The role of the Expert Advisory Panel on Episode of Care for Hip Fractures was to contextualize the evidence produced by Health Quality Ontario and provide advice on the appropriate clinical pathway for a hip fracture in the Ontario health care setting. 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 Assessment of Multiple Systematic Reviews (AMSTAR) tool was used to assess the quality of the final selection of the systematic reviews. (12) Primary studies were abstracted from the selected reviews and referenced for assessment of the 2 outcomes of interest.

The quality of the body of evidence for each outcome was examined according to the GRADE Working Group criteria. (13) The overall quality was 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 randomized controlled trials 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. (13) For more detailed information, please refer to the latest series of GRADE articles. (13)

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 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 109 citations published between January 1, 2008, and December 11, 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.

Four reviews met the inclusion criteria. The reference lists of the included citations and health technology assessment websites were hand searched to identify any additional potentially relevant studies, and 2 additional citations were included for a total of 6 included reviews.

Quality Assessment

As assessed by the AMSTAR tool, the reviews ranged in quality with scores from 1 to 10 out of a possible 11 (Appendix 4, Table A1).

Summary of Reviews

All 6 systematic reviews evaluated the impact of delay of hip fracture surgery on mortality, and 4 examined the impact on length of hospital stay (Table 1). No review, however, directly compared outcomes for surgery within 24 hours versus 24 to 48 hours, and so the primary research studies included in the systematic reviews were examined.

All primary studies were observational in design, as randomized controlled trials on timing are highly unlikely due to ethical considerations with delaying surgery. Among the 67 original research studies across the 6 reviews, no studies were identified that directly compared delays in surgery at the desired time periods.

Mortality

All of the reviews used different methodological and statistical approaches to meta-analyze mortality following early versus delayed surgery. Nonetheless, the reviews agreed overall that shorter delays to surgery are associated with decreased risk of mortality (Table 1).

Length of Stay

None of the 4 reviews that examined hospital length of stay as an outcome of delay to hip fracture surgery conducted a meta-analysis (Table 1). Overall, patients who had a longer delay to surgery were consistently shown to have a longer hospital length of stay than patients who received surgery earlier. However, it remains uncertain if the observed differences are statistically or clinically meaningful.

Table 1: Summary of Systematic Review Results for the Outcomes of Mortality and Length of Stay

Author, Year (Search Dates)	Number of Studies Included (Patients, N)	Inclusion/Exclusion Criteria	Results for Early Versus Delayed Surgery				Other Outcomes Reported	Comments
			30-Day Mortality	**90-Day Mortality**	**1-Year Mortality**	**Mean Hospital Length of Stay (LOS)**		
Shiga, 2008 (1990–2007)[a] (14)	16 (257,367)	• Prospective or retrospective • Cut-off for delay at 24, 48, or 72 hrs • Mortality as an outcome	OR, 0.69 (95% CI, 0.65–0.75) [12 studies compared < 48 hrs to > 48 hrs; 1 study compared at 72 hrs]	NR	OR, 0.75 (95% CI, 0.69–0.82) [7 studies compared < 48 hrs to > 48 hrs; 1 study compared at 24 hrs; and 1 compared at 72 hrs]	NR	NR	Meta-regression analysis conducted[b]
Khan, 2009 (up to 2007) (15)	52 (291,413)	• None listed; detailed stratification identified a priori	No meta-analysis conducted; 50 studies included mortality as an outcome. Overall result from the review was that mortality increased with delay.			No meta-analysis; 19 studies included LOS. Overall result from the review was that LOS increased with delay.	• Medical complications • Failure to return home	Lack of inclusion criteria may be why this review identified more studies than the other reviews
Simunovic, 2010 (up to 2008) (16)	16 (13,478)	• > 60 yrs • Prospective design • Low-energy hip fracture • Mortality as outcome	RR, 0.90 (95% CI, 0.71–1.13) [3 studies compared < 24 hrs to > 24 hrs; 3 studies compared at 48 hrs]	At 3–6 months: RR, 0.87 (95% CI, 0.44–1.72) [3 studies compared < 24 hrs to > 24 hrs; 1 study compared at 48 hrs]	RR, 0.55 (95% CI, 0.40–0.75) [3 studies compared < 24 hrs to > 24 hrs; 1 study compared at 48 hrs; 1 at 72 hrs; and 1 at 5 days]	NR	• Postoperative complications	None
Leung, 2010 (1980–2010) (17)	43 (NR)	• None stated	Short-term mortality: No meta-analysis conducted; 16 studies summarized with mixed results	NR	Long-term mortality: No meta-analysis conducted; 13 studies summarized with mixed results	No meta-analysis conducted; 9 studies summarized with mixed results	• Morbidity • Pressure sores • Duration of pain • Dependency	This review did not consider quality of individual studies.
NCGC/NICE, 2011[a, c] (up to 2010) (6)	10 (193,793)	• Fractures of proximal femur • Mortality and complications are reported • Cohort studies with logistic regression modeling	< 24 hrs vs > 24 hrs: aOR, 0.80 (95% CI ,0.76–0.84) [2 studies] < 48 hrs vs > 48 hrs: *Not meta-analyzed* aOR, 0.77 (95% CI, 0.70–0.78) *and* aOR, 1.41 (95% CI, 0.91–2.22) [2 studies]	< 24 hrs vs > 24 hrs: aOR, 0.90 (95% CI, 0.85–0.95) [1 study] < 48 hrs vs > 48 hrs: aOR, 0.71 (95% CI, 0.65–0.78) [1 study]	< 24 hrs vs > 24 hrs: aOR, 0.88 (95% CI, 0.82–0.95) [1 study] < 48 hrs vs > 48 hrs: aOR, 0.63 (95% CI, 0.50–0.79) [1 study]	< 48 hrs vs > 48hr: 18 vs 28 days [1 study] *When no comorbidity was present:* 16 vs 20 days	• Mortality in-hospital and at 4 months • Length of time to community resettlement/discharge • Place of residence 1 yr after discharge • Functional status • Quality of life • Complications (major/minor)	All outcomes reported in this table are low to very low quality of evidence based on evaluation with GRADE.
Moja, 2012 (1948–2011) (18)	35 (191,873)	• > 65yrs • Prospective, retrospective or RCT • Mortality reported adequately for meta-analysis • Patients with operated hip fractures	Mortality at end of follow-up: Early vs delayed surgery when cut-point is: 12 hrs: OR, 0.84 (95% CI, 0.57–1.23) [2 studies] 24 hrs: OR, 0.74 (95% CI, 0.62–0.87) [16 studies] 48 hrs: OR, 0.75 (95% CI, 0.68–0.81) [13 studies] > 48 hr: OR, 0.67 (95% CI, 0.39–1.13) [3 studies] OVERALL early versus delayed surgery: OR, 0.74 (95% CI, 0.67–0.81) [34 studies]			Ranged from 7 to 46 days[d] [26 studies]	• Pressure sores • Postoperative complications	None

Abbreviations: aOR, adjusted odds ratio; CI, confidence interval; hr, hour; LOS, length of stay; NR, not reported; OR, odds ratio; RCT, randomized controlled trial; RR, relative risk; yr, year.
[a]Effect estimates were recalculated to represent a comparison of early versus delayed surgery; original calculations in the review had reported the reverse.
[b]No covariate could account for all observed heterogeneity except for underlying risk and age for 1-yr mortality.
[c]aOR is combined odds ratios which were independently adjusted for various confounding factors using logistic regression in the original observational studies.
[d]Meta-analysis not conducted due to assessed heterogeneity.

Conclusions

This rapid review identified 6 systematic reviews, none of which directly compared outcomes for hip fracture patients receiving surgery within 24 hours versus 24 to 48 hours. However, findings were consistent among the reviews for the outcomes of interest:

- Shorter wait time for surgery is associated with decreased risk of mortality.
- No statistically or clinically meaningful differences were observed in hospital length of stay among patients who received surgery earlier versus delayed.

Evidence available at this time does not give us the precision to determine if surgery performed within 24 hours results in significantly different outcomes than surgery between 24 and 48 hours. Given that the current median wait time for hip fracture surgery in Ontario is 26 hours and 78% of patients receive surgery within 48 hours of admission, (3) the evidence supports Ontario's current standard of care and the benchmark of surgery within 48 hours.

Acknowledgements

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Expert Panel for Health Quality Ontario: Episode of Care for Hip Fracture

Name	Role	Organization
Chair		
Dr. James Waddell	Orthopedic surgeon	St. Michael's Hospital, Toronto
Orthopedic Surgery		
Dr. John P. Harrington	Orthopedic surgeon	William Osler Health System, Toronto
Dr. Mark Harrison	Orthopedic surgeon	Queen's University, Kingston
Dr. Hans J. Kreder	Professor	Division of Orthopaedics, Department of Surgery, University of Toronto
Dr. Allan Liew	Orthopedic surgeon	Department of Surgery, University of Ottawa
Dr. Mark MacLeod	Orthopedic surgeon	London Health Sciences Centre
Dr. Aaron Nauth	Orthopedic surgeon	St. Michael's Hospital/University of Toronto
Dr. David Sanders	Orthopedic surgeon	London Health Sciences Centre
Dr. Andrew Van Houwelingen	Orthopedic surgeon	St. Thomas Elgin General Hospital
Anesthesiology		
Dr. Nick Lo	Staff anesthesiologist	St. Michael's Hospital, Toronto
Emergency Medicine		
Dr. Michael O'Connor	Emergency medicine	Kingston General Hospital
Dr. Lisa Shepherd	Emergency medicine	South West Local Health Integration Network (LHIN), London
Family Medicine		
Dr. Christopher Jyu	Physician lead, primary care	Central East LHIN, Ajax
Geriatrics		
Dr. Anna Byszewski	Geriatrician	The Ottawa Hospital
Dr. Maria Zorzitto	Chief of geriatric medicine	St. Michael's Hospital, Toronto
Physiotherapy		
Ruth Vallis	Physiotherapist	University Health Network, Toronto
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Charissa Levy	Executive director	GTA Rehab Network
Dr. Peter Nord	Vice president, chief medical officer and chief of staff	Providence Healthcare, Toronto
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Dr. Susan Jaglal	Chair	Toronto Rehabilitation Institute, University of Toronto
Dr. Valerie Palda	Associate professor	Department of Medicine and Institute of Health Policy, Management and Evaluation, University of Toronto
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Brenda Flaherty	Executive vice president and chief operating officer	Hamilton Health Sciences
Jo-anne Marr	Executive vice president and chief operating officer	Mackenzie Health, Richmond Hill

Name	Role	Organization
Malcolm Moffat	Executive vice president, programs	Sunnybrook Health Sciences Centre, Toronto
Kathy Sabo	Senior vice president, clinical programs/operations	University Health Network, Toronto
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Patricia (Tricia) Khan	Senior director, client services	Erie St. Clair Community Care Access Centre, Chatham
Janet McMullan	Project director, consultant	Bone and Joint Canada
Professional Organizations		
Ravi Jain	Director, Ontario osteoporosis strategy	Osteoporosis Canada
Rhona McGlasson	Executive director	Bone and Joint Canada

Appendices

Appendix 3: Literature Search Strategies

Search date: December 10, 2012
Databases searched: Ovid MEDLINE, Ovid MEDLINE In-Process and Other Non-Indexed Citations, EMBASE; Cochrane Library; Centre for Reviews and Dissemination database (CRD)
Limits: 2008-current; English
Filters: health technology assessments, systematic reviews, meta-analyses

Database: Ovid MEDLINE(R) <1946 to November Week 3 2012>, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations <December 6, 2012>, EMBASE <1980 to 2012 Week 49>
Search Strategy:

#	Searches	Results
1	exp Hip Fractures/ use mesz	16801
2	exp Hip Fracture/ use emez	26238
3	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*).ti,ab.	56278
4	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*).ti,ab.	38861
5	or/1-4	69802
6	exp Surgical Procedures, Operative/ use mesz	2254175
7	Orthopedics/ use mesz	15519
8	exp surgery/ use emez	2960653
9	(surgical* or surger*).ti,ab.	2577189
10	or/6-9	6250789
11	5 and 10	36968
12	exp Hip Fractures/su use mesz	7947
13	exp Hip Fracture/su use emez	9227
14	or/11-13	39147
15	exp Time Factors/ use mesz	956583
16	Waiting Lists/ use mesz	7817
17	exp early intervention/ use emez	7035
18	(time* or timing or delay* or late* or earl* or wait* or queu*).ti,ab.	8389221
19	or/15-18	8953526
20	14 and 19	15177
21	Meta Analysis.pt.	37949
22	Meta Analysis/ use emez	67610
23	Systematic Review/ use emez	55424
24	exp Technology Assessment, Biomedical/ use mesz	8944
25	Biomedical Technology Assessment/ use emez	11419
26	(meta analy* or metaanaly* or pooled analysis or (systematic* adj2 review*) or published studies or published literature or medline or embase or data synthesis or data extraction or cochrane).ti,ab.	300528
27	((health technolog* or biomedical technolog*) adj2 assess*).ti,ab.	3997
28	or/21-27	361006
29	20 and 28	378
30	limit 29 to english language	354
31	limit 30 to yr="2008-Current"	173
32	remove duplicates from 31	112

Cochrane Library

ID	Search	Hits
#1	MeSH descriptor: [Hip Fractures] explode all trees	955
#2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) near/4 fracture*):ti (Word variations have been searched)	1407
#3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) near/4 fracture*):ti (Word variations have been searched)	792
#4	#1 or #2 or #3	1699
#5	MeSH descriptor: [Surgical Procedures, Operative] explode all trees	85989
#6	MeSH descriptor: [Orthopedics] explode all trees	297
#7	(surgical* or surger*):ti (Word variations have been searched)	27507
#8	#5 or #6 or #7	99816
#9	#4 and #8	653
#10	MeSH descriptor: [Time Factors] explode all trees	44876
#11	MeSH descriptor: [Waiting Lists] explode all trees	265
#12	(time* or timing or delay* or late* or earl* or wait* or queu*):ti (Word variations have been searched)	26975
#13	#10 or #11 or #12	67235
#14	#9 and #13 from 2008 to 2012, in Cochrane Reviews (Reviews and Protocols), Other Reviews, Methods Studies, Technology Assessments, Economic Evaluations and Cochrane Groups	7

CRD

Search	Hits	
1	MeSH DESCRIPTOR hip fractures EXPLODE ALL TREES	161
2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*)):TI	117
3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*)):TI	97
4	#1 OR #2 OR #3	197
5	MeSH DESCRIPTOR surgical procedures, operative EXPLODE ALL TREES	9849
6	MeSH DESCRIPTOR orthopedics EXPLODE ALL TREES	41
7	((surgical* or surger*)):TI	2738
8	#5 OR #6 OR #7	10854
9	#4 AND #8	81
10	MeSH DESCRIPTOR time factors EXPLODE ALL TREES	1821
11	MeSH DESCRIPTOR waiting lists EXPLODE ALL TREES	71
12	((time* or timing or delay* or late* or earl* or wait* or queu*)):TI	1754
13	#10 OR #11 OR #12	3305
14	#9 AND #13	10
15	(#14):TI FROM 2008 TO 2012	6

Appendix 4: Quality Assessment Table

Table A3: AMSTAR Score of Reviews[a]

Author, Year	Amstar Score[a]	1) Provided Study Design	2) Duplicate Study Selection	3) Broad Literature Search	4) Considered Status of Publication	5) Listed Excluded Studies	6) Provided Characteristics of Studies	7) Assessed Scientific Quality	8) Considered Quality in Report	9) Methods to Combine Appropriate	10) Assessed Publication Bias	11) Stated Conflict of Interest
Shiga, 2008 (14)	8	✓	✓	✓			✓	✓	✓	✓	✓	
Khan, 2009 (15)	7	✓	✓				✓	✓	✓	✓		✓
Simunovic, 2010 (16)	10	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Leung, 2010 (17)	1											✓
NCGC/NICE, 2011 (6)	8	✓		✓		✓	✓	✓	✓	✓		✓
Moja, 2012 (18)	10	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓

[a]Details of AMSTAR method are described in Shea et al. (12)

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Rapid Review, January 2013; pp. 1–15.

Total Hip Arthroplasty Versus Hemiarthroplasty for Displaced Femoral Neck Fractures: A Rapid Review

M Nikitovic

April 2013

Rapid Review, January 2013; pp. 1–15.

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Conflict of Interest Statement

All reports prepared by Health Quality Ontario (HQO) 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 HQO 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 (HTAs), 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 HQO, 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 HQO website for a list of all publications: http://www.hqontario.ca/evidence/publications-and-ohtac-recommendations.

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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 HQO and its partners, the Ontario Health Technology Advisory Committee (OHTAC) — a standing advisory sub-committee of the HQO 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, as well as evidence-based analyses and their corresponding OHTAC recommendations, and other associated reports are published on the HQO website. Visit http://www.hqontario.ca for more information.

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In addition, HQO 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

AMSTAR	Assessment of Multiple Systematic Reviews
CI	Confidence interval(s)
HA	Hemiarthroplasty
HHS	Harris Hip Score
HQO	Health Quality Ontario
HTA	Health Technology Assessment
OHTAC	Ontario Health Technology Advisory Committee
RCT	Randomized controlled trial
RR	Relative risk
THA	Total hip arthroplasty
SD	Standard deviation

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

This analysis aimed to evaluate the effectiveness of total hip arthroplasty (THA) in comparison to hemiarthroplasty (HA) for the treatment of displaced femoral neck fractures.

Clinical Need and Target Population

Displaced femoral neck fractures are defined as unstable fractures that can impair blood supply to the femoral head. (1) These fractures account for approximately half of all hip fractures and are associated with substantial fracture-related mortality and morbidity. (3) The optimal surgical management of displaced femoral neck fractures is unclear.

Technology/Technique

Hip arthroplasty refers to replacement of all or part of the hip joint with a prosthetic implant. (2) Arthroplasty that involves replacement of the femoral head can be divided into two groups: THA and HA. Total hip arthroplasty involves replacement of both the femoral head and the acetabular articular surface. In contrast to THA, HA replaces only the femoral head with an artificial implant, while retaining the patient's own acetabulum. Two groups of HA exist, unipolar and bipolar arthroplasty. With unipolar HA, hip movement occurs between the prosthesis and the acetabulum; whereas bipolar HA has an additional acetabular cup that is not attached to the pelvis and allows movement to occur between the acetabulum and the prosthesis and at the joint within the prosthesis itself. The objective of the smaller inside head is to reduce acetabular erosion. (1;2)

Rapid Review

Research Question

What is the effectiveness of THA versus HA among patients with displaced femoral neck fractures?

Research Methods

Literature Search

A literature search was performed on December 15, 2011, 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, 2008, until December 6, 2011. 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, 2008, and December 6, 2012
- HTAs, systematic reviews, and meta-analyses
- adult population with displaced femoral neck fractures
- studies comparing THA to HA

Exclusion Criteria

- individual RCTs, observational studies, case reports, editorials
- studies where outcomes of interest cannot be abstracted

Outcomes of Interest

- revisions
- functional status (using a validated hip score)

Expert Panel

In December 2012, an Expert Advisory Panel on Episodes of Care for Hip Fractures was struck. Members of the panel included physicians, personnel from the Ministry of Health and Long-Term Care, and representation from the community.

The role of the Advisory Panel was to place the evidence produced by HQO in context and provide advice on the appropriate clinical pathway for a hip fracture in the Ontario health care setting. However, the statements, conclusions, and views expressed in this report do not necessarily represent the views of Advisory Panel members.

Quality of Evidence

The Assessment of Multiple Systematic Reviews (AMSTAR) measurement tool is used to assess the methodologic quality of systematic reviews. (4)

The quality of the body of evidence for each outcome is examined according to the GRADE Working Group criteria. (5) The overall quality is determined to be very low, low, moderate, or high using a step-wise, structural method.

Study design is the first consideration; the starting assumption is that RCTs are high quality, whereas observational studies are low quality. (5) Five additional factors—risk of bias, inconsistency, indirectness, imprecision, and publication bias—are then taken into account. Limitations or serious limitations in these areas result in downgrading the quality of evidence. Finally, 3 factors that can raise the quality of evidence were considered: large magnitude of effect, dose-response gradient, and accounting for all residual factors. For more detailed information, please refer to the latest series of GRADE articles.

As stated by the GRADE Working Group (5) , 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 141 citations published between January 1, 2008, and December 28, 2012 (with duplicates removed). Articles were excluded on the basis of information in the title and abstract. The full texts of potentially relevant articles were obtained for further assessment.

Ten systematic reviews or HTAs were identified that evaluated the safety and effectiveness of THA in comparison to HA, with AMSTAR ratings ranging from 6 to 9. (1;2;6-12) Four of these reviews captured the largest and most recent RCT (6;7;11;12) and were inclusive of English RCTs captured by the earlier systematic reviews. Of these, 2 specifically reported on revision rates, rather than an aggregate outcome of reoperations. (6;7) These 2 reviews by Carroll et al and Burgers et al were thus selected for inclusion in the present analysis, both with an AMSTAR rating of 9 (Appendix 2, Table A1). (6;7)

A summary of the systematic reviews by Carroll et al and Burgers et al is provided in Table 1. Both reviews included the same 8 RCTs, of which 5 evaluated bipolar HA, 1 used either unipolar or bipolar HA (surgeon's choice), and 2 used unipolar HA. Among individual RCTs, sample sizes ranged from 40 to 252 patients, with mean age ranging from 69 to 82 years. Individual study follow-up ranged from 1 to 5 years, with one study publishing a 13-year follow-up in addition to their original 1-year data. Nearly all trials included required patients to be cognitively intact and independent or ambulatory at the time of hip fracture.

Table 1. Summary of Systematic Reviews Included

Author, Year	Review Type	Search Dates	Inclusion Criteria	No. of RCTs	AMSTAR Score
Burgers et al, 2012 (6)	MA	Up to March 2011	• RCTs • aged ≥ 50 years with displaced femoral neck fracture • any form of THA versus HA • reported revision surgery	8	9
Carroll et al, 2011 (7)	HTA, MA	Up to December 2010	• RCTs • Eligible for hip replacement as a result of intracapsular fracture • THA versus HA • able to give consent and independently mobile before fracture	8	9

Abbreviations: AMSTAR, Assessment of Multiple Systematic Reviews; HA, hemiarthroplasty; HTA, health technology assessment; MA, meta-analysis; No., number; RCT, randomized controlled trial; THA, total hip arthroplasty

Results for Outcomes of Interest

The review by Burgers et al (6) provided the GRADE level of evidence for revision rates and is reported as assessed by the authors. Carroll et al (7) did not assess the GRADE quality of evidence for revision rates, and neither study provided the GRADE for functional status outcomes. Where no GRADE was provided, the primary RCTs included in the review were pulled and the GRADE assessed.

Revision Surgery

The results from each meta-analysis of revision surgery are summarized in Table 2. Both reviews identified a reduction in the risk of revision rates with THA compared with HA. This decrease was found to be non-significant in the review by Burgers et al (relative risk [RR] 0.59, 95% confidence interval [CI] 0.32–1.09) based on very low GRADE quality of evidence. Carroll et al found a statistically significant reduction in revision rates (RR 0.31; 95% CI 0.17–0.59), which was assessed as low GRADE quality of evidence.

Table 2. Results from Meta-Analyses of Revision Surgery after Total Hip Arthroplasty Versus Hemiarthroplasty

Author, Year	No. of RCTs	THA		HA		RR (95% CI)[a]	P [a]	I^2 [a]	GRADE
		No. of Events	Total	No. of Events	Total				
Burgers et al, 2012 (6)	8	19	472	36	514	0.59 (0.32–1.09)	0.09	9%	Very low[b]
Carroll et al, 2011 (7)	7	12	399	42	440	0.31 (0.17–0.59)	0.003	0%	Low[c]

Abbreviations: CI, confidence interval; HA, hemiarthroplasty; No, Number; RCTs, randomized controlled trials; RR, relative risk; THA, total hip arthroplasty
[a] Both reviews used a Mantel-Haenzel statistical method with a random effects analysis
[b] GRADE assessed directly by Burgers et al (6); Authors downgraded for study quality, inconsistency, and imprecision
[c] GRADE not assessed by review authors and based on review of primary RCTs included in the meta-analysis (Appendix 1, Table 2, and Table 3)

The variations in the number of events and studies included in the meta-analyses of the two reviews appear to be subject to alternative interpretation of revision rates as well as length of study follow-up data. The review by Burgers et al (6) did not describe their definition of a revision surgery, but did include

nonrevision reoperations under a separate outcome of major complications. The review by Carroll et al (7) more stringently defined revision surgeries as a result of all causes, including dislocations, explicitly excluding studies reporting an aggregate outcome of "reoperations." As such, an RCT describing an outcome of "additional hip surgeries" was excluded from the meta-analysis by Carroll et al, yet was included in the Burgers et al analysis, largely weighting the meta-analysis towards a non-significant increase in surgeries for THA. Additionally, Burgers et al included 1-year follow-up data from the RCT by Skinner et al, whereas Carroll et al included updated 13-year follow-up data. This RCT had the greatest weight in both meta-analyses and likely attributed to the variation in final estimates. Other inconsistencies in number of events were minor, but appear to reflect differences in the interpretation of revision rate data. On the basis of the description provided by each review, greater confidence in the appropriate inclusion of revisions can be placed the review by Carroll et al review, and therefore conclusions were drawn from this assessment.

Carroll et al conducted subgroup analyses to identify possible differences in revision rates on the basis of study quality, cementing of the prosthesis, or type of HA prosthesis. Statistically significant reductions in revision rates were observed with lower-quality studies (RR 0.30, 95% CI 0.15 – 0.58; $P < 0.001$) and unipolar HA studies (RR 0.26, 95% CI 0.12–0.57; $P < 0.001$), with statistically non-significant reductions in higher quality (RR 0.66, 95% CI 0.03–13.98; $P = 0.79$) and bipolar HA (RR 0.41, 95% CI 0.11–1.48; P = 0.17) studies. There was no difference in direction of effect for cemented or uncemented prosthesis. Despite any observed differences, there were no statistically significant differences between subgroups on revision rates (P > 0.05 for ratio of RRs). The lack of difference could reflect small sample sizes in subgroups.

Functional Status

Both systematic reviews included functional status outcomes; however, only Burgers et al (6) conducted a meta-analysis for the primary measure reported, the Harris Hip Score (HHS); therefore, results from this meta-analysis were used to assess the GRADE quality of evidence.

Harris Hip Score

The Harris Hip Score (HHS) is a 10-item questionnaire that assesses the domains of pain, function, absence of deformity and range of motion. (13) The total score ranges from 0 to 100, with higher scores depicting better hip function. Total scores <70 are considered poor, 70 to 80 fair, 80 to 90 good, and 90 to 100 excellent. (13)

Burgers et al identified 4 RCTS that evaluated total HHS, with mean scores across RCTs ranging from 75.2 to 87.2 for THA and 71.9 to 81.1 for HA, with a weighted mean score of 81 (standard deviation [SD] 11) for THA and 77 for HA. Meta-analysis identified an increase in the mean total HHS score among patients receiving THA in comparison to HA (mean difference [MD] 5.12, 95% CI 2.81–7.42) (Table 3). The GRADE for this outcome was assessed as low (Appendix 1, Table A2, and Table A3)

Table 3. Total Harris Hip Score Meta-Analysis Results for Revision Surgery after Total Hip Arthroplasty Versus Hemiarthroplasty

Author, Year	No. of RCTs	Total Sample Size	MD in HHS (95% CI) [a]	*P* [a]	I^2 [a]
Burgers et al, 2012 (6)	4	300	5.12 (2.81–7.42)	<0.0001	0%

Abbreviations: CI, confidence interval; HA, hemiarthroplasty; HHS, Harris hip score; MD, mean difference; No., Number; RCTs, randomized controlled trials; THA, total hip arthroplasty

[a] Assessed using an inverse-variance random effects analysis

Other Hip Scores

Carroll et al (7) reported individual RCT data for 5 alternative hip rating scores, all observing a trend towards greater function and mobility and less pain among patients receiving THA in comparison to HA. This improvement was found to be significant at final follow-up (2 to 3 years) in 3 RCTs, with no statistical analysis reported in 2 RCTs. Results for individual studies at final follow-up, as reported by Carroll et al (7) are presented in Table 5.

Table 5. Summary of Functional Status Outcomes Using Hip Rating Scores for Total Hip Arthroplasty Versus Hemiarthroplasty

Measure[a]	No. of RCTs	Follow-up (years)	N	Mean Score (Range or SD)		P
				THA	HA	
Oxford Hip Score (lower = better)	1	3	69	18.8 (range 12–47)	22.3 (range 12–48)	0.033
Hip Rating Questionnaire	1	2	131	79.9 (SD 17)	73.8 (SD 16)	0.04
WOMAC (Function Subscale)	1	2	40	81.8 (SD 10.2)	65.1 (SD 18.1)	0.03
WOMAC (Pain Subscale)	1	2	40	94.4 (SD 6.8)	77.8 (SD 20.9)	0.05
Modified D'Aubigne/Postel Hip Score	1	2	Unclear	Pain = 5.5 Ambulation = 4.1	Pain = 5.1[b] / 3.0[c] Ambulation =4.0[b] / 3.0[c]	NR
Barthel Index	1	4	43	85.3 (SD 11.6)	79.6 (SD 6.3)	NR

Abbreviations: HA, hemiarthroplasty; No, number; NR, not reported; RCTs, randomized controlled trials; SD, standard deviation; THA, total hip arthroplasty; WOMAC, Western Ontario and McMaster Universities Arthritis Index

[a]Higher scores represent better outcome, unless otherwise specified

[b] Cemented HA

[c] Uncemented HA

Source: Carroll et al (7)

Conclusions

On the basis of 2 systematic reviews evaluating the effectiveness of THA in comparison with HA for the treatment of displaced femoral neck fractures, the following conclusions were reached:

- Based on low quality of evidence, there was a significant reduction in revision rates among patients receiving THA in comparison with HA;
- Based on low quality of evidence, the total HHS was significantly improved among patients receiving THA in comparison with HA;
- Alternative hip functional status measures appear to favour THA in comparison with HA for improvements in function, mobility, or pain.

Results primarily reflect cognitively intact adults with high pre-fracture mobility and independence and might not represent the effectiveness of THA in comparison with HA among less mobile adults.

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Expert Panel for Health Quality Ontario: Episode of Care for Hip Fracture

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Appendices

Appendix 1: Literature Search Strategies

Database: Ovid MEDLINE(R) <1946 to November Week 3 2012>, Ovid MEDLINE(R) In-Process and Other Non-Indexed Citations <December 6, 2012>, Embase <1980 to 2012 Week 49>
Search Strategy:

#	Searches	Results
1	exp Hip Fractures/ use mesz	16801
2	exp Hip Fracture/ use emez	26238
3	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*).ti,ab.	56278
4	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*).ti,ab.	38861
5	or/1-4	69802
6	exp Arthroplasty, Replacement, Hip/ use mesz	15469
7	exp arthroplasty/	101540
8	exp total hip prosthesis/ use emez	19181
9	exp hip arthroplasty/ use emez	35979
10	exp hip hemiarthroplasty/ use emez	152
11	(Arthroplasty* or Arthroplasty72sty* or hemi-arthroplast* or prosthes* or implant* or bipolar* or bi-polar*).ti,ab.	760520
12	(total hip adj2 (replace* or arthroplasty*)).ti,ab.	34545
13	((bipolar or bi-polar) adj2 arthroplast*).ti,ab.	242
14	or/6-13	796729
15	5 and 14	14229
16	Meta Analysis.pt.	37949
17	Meta Analysis/ use emez	67610
18	Systematic Review/ use emez	55424
19	exp Technology Assessment, Biomedical/ use mesz	8944
20	Biomedical Technology Assessment/ use emez	11419
21	(meta analy* or metaanaly* or pooled analysis or (systematic* adj2 review*) or published studies or published literature or medline or embase or data synthesis or data extraction or 72rthropl).ti,ab.	300528
22	((health technolog* or biomedical technolog*) adj2 assess*).ti,ab.	3997
23	or/16-22	361006
24	15 and 23	396
25	limit 24 to 72rthrop language	372
26	limit 25 to yr="2008 –Current"	194
27	remove duplicates from 26	122

Cochrane Library

ID	Search	Hits
#1	MeSH descriptor: [Hip Fractures] explode all trees	955
#2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) near/4 fracture*):ti (Word variations have been searched)	1407
#3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) near/4 fracture*):ti (Word variations have been searched)	792
#4	#1 or #2 or #3	1699
#5	MeSH descriptor: [Arthroplasty, Replacement, Hip] explode all trees	1297
#6	MeSH descriptor: [Arthroplasty] explode all trees	2627
#7	(arthroplasty* or arthroplasty72sty* or hemi-arthroplast* or prosthes* or implant* or bipolar* or bi-polar*):ti (Word variations have been searched)	8357

#8	(total hip near/2 (replace* or arthroplasty*)):ti (Word variations have been searched)	1255
#9	((bipolar or bi-polar) near/2 arthroplast*):ti (Word variations have been searched)	6
#10	#5 or #6 or #7 or #8 or #9	9959
#11	#4 and #10 from 2008 to 2012, in Cochrane Reviews (Reviews and Protocols), Other Reviews, Methods Studies, Technology Assessments, Economic Evaluations and Cochrane Groups	34

Centre for Reviews and Dissemination (CRD)

Line	Search	Hits
1	MeSH DESCRIPTOR hip fractures EXPLODE ALL TREES	161
2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*)):TI	117
3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*)):TI	97
4	#1 OR #2 OR #3	197
5	MeSH DESCRIPTOR Arthroplasty, Replacement, Hip EXPLODE ALL TREES	281
6	MeSH DESCRIPTOR Arthroplasty EXPLODE ALL TREES	508
7	((arthroplasty* or arthroplasty* or hemi-arthroplast* or prosthes* or implant* or bipolar* or bi-polar*)):TI	1033
8	((total hip adj2 (replace* or arthroplasty*))):TI	103
9	((bipolar or bi-polar) adj2 arthroplast*)	2
10	#5 OR #6 OR #7 OR #8 OR #9	1251
11	#4 AND #10	50
12	(#11) FROM 2008 TO 2012	31

Appendix 2: Quality Assessment Tables

Table A1: Assessment of Multiple Systematic Reviews (AMSTAR) Scores of Included Systematic Reviews

Author, Year	AMSTAR scorea	1) Provided Study Design	2) Duplicate Study Selection	3) Broad Literature Search	4) Considered Status of Publication	5) Listed Excluded Studies	6) Provided Characteristics of Studies	7) Assessed Scientific Quality	8) Considered Quality in Report	9) Methods to Combine Appropriate	10) Assessed Publication Bias	11) Stated Conflict of Interest
Burgers et al, 2012	9	✓	✓	✓	✓		✓	✓	✓	✓		✓
Carroll et al, 2011	9	✓	✓	✓	✓		✓	✓	✓	✓		✓

[a]Maximum possible score is 11. Details of AMSTAR score are described in Shea et al (4)

Table A2: Risk of Bias for All Individual Studies Included in Carroll et al Review of Total Hip Arthroplasty Versus Hemiarthroplasty

Author, Year	Allocation Concealment	Blinding	Complete Accounting of Patients and Outcome Events	Selective Reporting Bias	Other Limitations
van den Bekerom et al, 2010 (14)	No serious limitations	Serious limitations[b]	Serious limitations[c]	No serious limitations	Serious limitations[d]
Mouzopoulos et al, 2008 (15)	Very serious limitations[a]	Serious limitations [b]	Serious limitations [c]	No serious limitations	No serious limitations
Macaulay et al, 2008 (16)	No serious limitations	Serious limitations[b]	No serious limitations	No serious limitations	Serious limitations[d]
Blomfeldt et al, 2006 (17)	No serious limitations	Serious limitations[b]	No serious limitations	No serious limitations	No serious limitations
Keating et al, 2006 (18)	No serious limitations	Serious limitations[b]	No serious limitations	No serious limitations	Serious limitations[d]
Baker et al, 2006 (19)	No serious limitations	Serious limitations[b]	Serious limitations[c]	No serious limitations	No serious limitations
Ravikumar and Marsh, 2000 (20) and Skinner et al 1989 (21)	Very serious limitations[a]	Serious limitations[b]	Serious limitations [c]	No serious limitations	Serious limitations[d]
Dorr et al, 1986 (22)	Very serious limitations[a]	Serious limitations[b]	Serious limitations [c]	No serious limitations	Serious limitations[d]

[a] Quasi-randomized trials with unclear or inadequate allocation concealment; randomization by order of admission in Mouzopoulos et al, day of week in Ravikumar and Marsh, and hospital number in Dorr et al
[b] Patients and physicians not blinded; only the study by Mouzopoulos et al blinded data assessors
[c] van den Bekerom et al conducted a per protocol analysis, with secondary exclusions applied after randomization (10.3% not included); Mouzopolous et al excluded patients after randomization (23%-30% at 1 year and 46%-53% at 4 years); Ravikumar and Marsh excluded patients after randomization with intent to treat and loss to follow-up unspecified; intent to treat and loss to follow-up unclear in study by Dorr et al and Baker et al
[d] Poor description and comparison of intervention groups in study by Dorr et al; unclear whether comparable care provided to randomized groups in other studies

Table A3: GRADE Evidence Profile for Comparison of Total Hip Arthroplasty with Hemiarthroplasty

No. of Studies (Design)	Risk of Bias	Inconsistency	Indirectness	Imprecision	Publication Bias	Quality
Revision Surgery (Analysis by Carroll et al)						
7 (RCTs)	Very serious limitations (-2)[a]	No serious limitations	No serious limitations	No serious limitations[b]	Undetected	⊕⊕ Low
Functional Status using Total HHS (Analysis by Burgers et al)						
4 (RCTs)	Very serious limitations (-2)[c]	No serious limitations	No serious limitations[d]	No serious limitations	Undetected	⊕⊕ Low

Abbreviations: HHS, Harris hip score; ITT, intent to treat; No., number; RCT, randomized controlled trial.

[a] Quasi-randomization or inadequate allocation concealment in 3 of 7 studies, which accounted for 71% of the weight of the meta-analysis; 5 of 7 studies failed to adhere to an ITT principle or had substantial loss to follow-up; 5 of 7 studies provided inadequate description of comparator groups or of additional care provided during or subsequent to surgery

[b] Study did not meet the optimal information size, but was not downgraded because confidence intervals were satisfactorily narrow and would not differ if the upper versus lower boundary represented the truth

[c] Inadequate allocation concealment in 1 of 4 studies; no studies blinded patients and 2 of 3 studies did not specify blinding assessors, which is likely to bias results for this subjective outcome; 2 of 3 studies failed to adhere to an ITT principle or to appropriately account for all patients; 2 of 3 studies provided inadequate description of comparator groups or of additional care provided subsequent to surgery

[d] Indirectness was not downgraded; however, it is noted that the HHS does not allow assessment of pre-fracture or pre-surgery status and has been validated only in reference to treatment of patients with degenerative disease of hip rather than femoral neck fractures

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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 (HTAs), 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.

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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 technology and services in Ontario.

On the basis of the research conducted by Health Quality Ontario and its partners, the Ontario Health Technology Advisory Committee—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 policymakers.

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

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To conduct its rapid reviews, Health Quality Ontario 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 technology; 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 could be included to assist in making timely and relevant decisions to optimize patient outcomes.

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Table of Contents

List of Abbreviations

AMSTAR	Assessment of Multiple Systematic Reviews
CI	Confidence interval
HTA	Health Technology Assessment
NCGC	National Clinical Guideline Centre
NICE	National Institute for Clinical Excellence
RCT	Randomized controlled trial
RR	Relative risk

Background

Objective of Analysis

This analysis aimed to evaluate the effectiveness of intramedullary nails versus extramedullary sliding hip screws for treatment of intertrochanteric hip fractures.

Clinical Need and Target Population

Intertrochanteric hip fractures are extracapsular fractures that occur between the greater and lesser trochanters. These fractures can further be subdivided into stable and unstable fractures. In stable intertrochanteric hip fractures, the lesser trochanter is not displaced, whereas unstable fractures are defined by displacement of the lesser trochanter. (1)

Technology/Technique

Intertrochanteric fractures are most frequently treated with internal fixation; the two major forms are intramedullary or extramedullary implants. Intramedullary implants, or intramedullary nails, are inserted down the middle of the femoral shaft, either from distal to proximal or from proximal to distal, and are held in place with screws. (2;3) Alternatively, extramedullary implants attach externally along the side of the femur. The most common extramedullary implants are the sliding hip screw, also called a compression hip screw or dynamic hip screw. (1) The sliding hip screw consists of a lag screw passed up the femoral neck through the femoral head, and attached to a plate on the side of the femur affixed with multiple screws that cross the upper femur. (1-3)

Rapid Review

Research Question

What is the effectivenesss of intramedullary nails in comparison with extramedullary sliding hip screws for the treatment of intertrochanteric hip fractures?

Research Methods

Literature Search

A literature search was performed on January 14, 2013, 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, 2008, until January 11, 2013. Abstracts were reviewed by a single reviewer, and full-text articles were obtained for any studies meeting the eligibility criteria. 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, 2008, and January 11, 2013
- HTAs, systematic reviews, and meta-analyses
- intertrochanteric hip fracture population
- studies comparing intramedullary fixation (i.e., intramedullary nails) to extramedullary fixation (i.e., sliding hip screws)

Exclusion Criteria

- individual RCTs, observational studies, case reports, editorials
- studies where outcomes of interest cannot be abstracted
- studies combining intertrochanteric and subtrochanteric hip fractures

Outcomes of Interest

- reoperations
- functional status

Expert Panel

In December 2012, an Expert Advisory Panel on Episodes of Care for Hip Fractures was struck. Members of the panel included physicians, personnel from the Ministry of Health and Long-Term Care, and representatives from the community.

The role of the Advisory Panel was to place the evidence produced by Health Quality Ontario in context and to provide advice on the appropriate clinical pathway for a hip fracture in the Ontario health care

setting. However, the statements, conclusions, and views expressed in this report do not necessarily represent the views of Advisory Panel members.

Quality of Evidence

The Assessment of Multiple Systematic Reviews (AMSTAR) measurement tool is used to assess the methodological quality of systematic reviews. (4)

The quality of the body of evidence for each outcome is examined according to the GRADE Working Group criteria. (5) The overall quality is determined to be very low, low, moderate or high using a step-wise, structural methodology.

Study design is the first consideration; the starting assumption is that RCTs are high quality, whereas observational studies are low quality. (5) Five additional factors—risk of bias, inconsistency, indirectness, imprecision, and publication bias—are then taken into account. Limitations or serious limitations in these areas result in downgrading the quality of evidence. Finally, 3 factors that could raise the quality of evidence were considered: large magnitude of effect, dose-response gradient, and accounting for all residual factors. For more detailed information, please refer to the latest series of GRADE articles. (5)

As stated by the GRADE Working Group (5) , 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 could 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 117 citations published between January 1, 2008, and January 11, 2013 (with duplicates removed). Articles were excluded on the basis of information in the title and abstract. The full texts of potentially relevant articles were obtained for further assessment.

Eight systematic reviews were identified that evaluated the effectiveness of intramedullary nails versus extramedullary implants for extracapsular hip fractures. Hand-searching of HTA websites identified 1 additional review, for a total of 9 reviews. Among these, 7 did not meet the inclusion and exclusion criteria of the current review; 1 focused solely on subtrochanteric hip fractures (6); 2 combined results for subtrochanteric and intertrochanteric fractures (1;7); 3 did not evaluate the specific outcomes of interest (2;8;9); and 1 did not provide adequate information to assess the primary studies included in the meta-analyses. (10)

Of the remaining 2 reviews, the meta-analysis by Liu et al had an AMSTAR score of 6 of a possible 11, and the review by the National Clinical Guideline Centre (NCGC)/National Institute for Clinical

Evaluation (NICE) had a score of 8. (3;11) (see **Appendix 2** for AMSTAR ratings). Because of the higher methodologic quality as assessed by AMSTAR, and because it is the most recent and comprehensive review, the systematic review and meta-analysis by NCGC/NICE was included in the current review.

Details of the review by the NCGC/NICE are summarized in **Table 1**. Trochanteric hip fractures were defined as intertrochanteric and reverse oblique fractures and were stratified into stable, unstable, and reverse oblique fractures. No studies included in the review evaluated reverse oblique fractures. All studies of subtrochanteric hip fractures were excluded, as well as studies where outcomes specifically for trochanteric hip fractures could not be extracted.

Table 1. Summary of National Clinical Guideline Centre Systematic Review

Author, Year	Review Type	Search Dates	Inclusion Criteria	No. of RCTs	AMSTAR Score
NCGS/NICE, 2011 (3)	HTA, MA	To August 2010	• RCTs • Patients > 18 years • Trochanteric extracapsular hip fracture (defined as intertrochanteric or reverse oblique fractures) • Extramedullary sliding hip screws vs intramedullary nails • Excluded people with fractures caused by specific pathologies other than osteoporosis or osteopenia	21	8

Abbreviations: AMSTAR, Assessment of Multiple Systematic Reviews; HTA, health technology assessment; MA, meta analysis; NCGS, National Clinical Guideline Centre; NICE, National Institute for Clinical Excellence; No., number; RCTs, randomized controlled trials

Results for Outcomes of Interest

Reoperations

The review by the NCGC/NICE evaluated reoperations within the follow-up period of the study, which included reoperations as a result of operative or postoperative fractures of the femur, cut-out or non-union. Sixteen RCTs were identified for meta-analysis; study follow-up ranged between 12 weeks and 27 months. The pooled results are summarized in **Table 2**.

Overall, there was no statistically significant difference in the rate of reoperations between patients receiving intramedullary nails and those receiving extramedullary sliding hip screws (relative risk [RR] 1.39; 95% confidence interval [CI] 0.87–2.23). The GRADE quality for the body of evidence was assessed as high. The authors noted that the definition of reoperation varied between studies to include both minor and major revisions, but did not downgrade the level of evidence for indirectness.

Subgroup analysis among studies that specified type of intertrochanteric fracture identified no significant difference in reoperations between intramedullary nails and sliding hip screws among patients with stable fractures (RR 7.42; 95% CI 0.93–59.01) or unstable fractures (RR 1.41; 95% CI 0.32–6.14). Additionally, in an attempt to account for potential improvements with newer implant designs, an analysis was conducted among the 9 RCTs published since 2000. This analysis similarly found no significant difference in reoperation rates (RR 1.10; 95% CI 0.52–2.34) between groups, but found greater statistical heterogeneity.

Table 2. Results from Meta-Analysis of Reoperations with Intramedullary Versus Extramedullary Implants for Intertrochanteric Hip Fractures

Subgroup of Reoperations	No. of RCTs	No. Of Participants	RR of Reoperation (95% CI)[a]	I^2	GRADE Quality of Evidence
All	16	2573	1.39 (0.87–2.23)	25%	High[bc]
Stable Fractures	1	173	7.42 (0.93–59.01)	NA	NR
Untable Fractures	5	783	1.41 (0.32–6.14)	65%	NR
Studies since 2000	9	1471	1.10 (0.52–2.34)	39%	NR

Abbreviations: CI, confidence interval; NA, not applicable; NCGC, National Clinical Guideline Centre; NICE, National Institute for Clinical Excellence; No., number; NR, not reported; RCTs, randomized controlled trials; RR, relative risk
[a] Using a Mantel-Haenzel statistical method with a random effects analysis
[b] GRADE assessed directly by review authors (3)
[c] Authors did not downgrade for indirectness, but noted that definition of reoperation varies between studies to include minor or major revisions
Source: NCGC/NICE, 2011 (3)

Functional Status

Functional status and quality of life were evaluated as primary outcomes of interest in the NCGC/NICE systematic review; however, only results for mean mobility were identified from the RCTs.

The review by the NCGC/NICE identified 4 RCTs reporting on mean mobility at 1-year follow-up, measured using the Parker-Palmer score. The Parker-Palmer score assesses 4 components of a person's mobility with total scores ranging from 0 to 9 (higher scores representing greater mobility). Meta-analysis of the studies identified no significant difference in the mean mobility score between patients receiving intramedullary nails and those receiving sliding hip screws (**Table 3**). Review authors assessed the GRADE quality of the body of evidence as high. Evaluation of only those studies published since the year 2000 (n = 3 RCTs) similarly found no significant difference in mean mobility between groups.

Table 3. Results from Meta-Analysis of Mean Mobility with Intramedullary Versus Extramedullary Implants for Intertrochanteric Hip Fractures

Subgroup of Mean Mobility Using Parker-Palmer Score	No. of RCTs	Total Sample Size	Mean Difference in Score (95% CI)[a]	I^2	GRADE Quality of Evidence
Overall	4	555	0.17 (-0.17 to 0.51)	0%	High[b]
Studies since 2000	3	455	0.20 (-0.56 to 0.96)	0%	NR

Abbreviations: CI, confidence interval; NCGS, National Clinical Guideline Centre; NICE, National Institute for Clinical Excellence; No., Number; NR, not reported; RCTs, randomized controlled trials
[a] Assessed using Mantel-Haenzel statistical method with a fixed effects analysis
[b] GRADE assessed directly by review authors (3)
Source: NCGC/NICE, 2011 (3)

Conclusions

One high-quality systematic review was identified that evaluated the effectiveness of intramedullary nails in comparison with extramedullary sliding hip screws for treatment of intertrochanteric hip fractures. (3) The following conclusions were reached:

- Based on high quality of evidence, there was no significant difference in reoperations among patients receiving intramedullary nails versus those receiving sliding hip screws.
- Based on high quality of evidence, there was no significant difference in mean mobility scores measured using the Parker-Palmer score between patients receiving intramedullary nails and those receiving sliding hip screws.

Acknowledgements

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Expert Panel for Health Quality Ontario: Episode of Care for Hip Fracture

Name	Role	Organization
Chair		
Dr. James Waddell	Orthopedic surgeon	St. Michael's Hospital, Toronto
Orthopedic Surgery		
Dr. John P. Harrington	Orthopedic surgeon	William Osler Health System, Toronto
Dr. Mark Harrison	Orthopedic surgeon	Queen's University, Kingston
Dr. Hans J. Kreder	Professor	Division of Orthopaedics, Department of Surgery, University of Toronto
Dr. Allan Liew	Orthopedic surgeon	Department of Surgery, University of Ottawa
Dr. Mark MacLeod	Orthopedic surgeon	London Health Sciences Centre
Dr. Aaron Nauth	Orthopedic surgeon	St. Michael's Hospital/University of Toronto
Dr. David Sanders	Orthopedic surgeon	London Health Sciences Centre
Dr. Andrew Van Houwelingen	Orthopedic surgeon	St. Thomas Elgin General Hospital
Anesthesiology		
Dr. Nick Lo	Staff anesthesiologist	St. Michael's Hospital, Toronto
Emergency Medicine		
Dr. Michael O'Connor	Emergency medicine	Kingston General Hospital
Dr. Lisa Shepherd	Emergency medicine	South West Local Health Integration Network (LHIN), London
Family Medicine		
Dr. Christopher Jyu	Physician lead, primary care	Central East LHIN, Ajax
Geriatrics		
Dr. Anna Byszewski	Geriatrician	The Ottawa Hospital
Dr. Maria Zorzitto	Chief of geriatric medicine	St. Michael's Hospital, Toronto
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Ruth Vallis	Physiotherapist	University Health Network, Toronto
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Brenda Flaherty	Executive vice president and chief operating officer	Hamilton Health Sciences
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Name	Role	Organization
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Kathy Sabo	Senior vice president, clinical programs/operations	University Health Network, Toronto
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Patricia (Tricia) Khan	Senior director, client services	Erie St. Clair Community Care Access Centre, Chatham
Janet McMullan	Project director, consultant	Bone and Joint Canada
Professional Organizations		
Ravi Jain	Director, Ontario osteoporosis strategy	Osteoporosis Canada
Rhona McGlasson	Executive director	Bone and Joint Canada

Appendices

Appendix 1: Literature Search Strategies

Database: Ovid MEDLINE(R) <1946 to November Week 3 2012>, Ovid MEDLINE(R) In-Process and Other Non-Indexed Citations <December 6, 2012>, Embase <1980 to 2012 Week 49>
Search Strategy:

#	Searches	Results
1	exp Hip Fractures/ use mesz	16801
2	exp Hip Fracture/ use emez	26238
3	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*).ti,ab.	56278
4	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*).ti,ab.	38861
5	or/1-4	69802
6	exp Arthroplasty, Replacement, Hip/ use mesz	15469
7	exp arthroplasty/	101540
8	exp total hip prosthesis/ use emez	19181
9	exp hip arthroplasty/ use emez	35979
10	exp hip hemiarthroplasty/ use emez	152
11	(Arthroplasty* or Arthroplasty93sty* or hemi-arthroplast* or prosthes* or implant* or bipolar* or bi-polar*).ti,ab.	760520
12	(total hip adj2 (replace* or arthroplasty*)).ti,ab.	34545
13	((bipolar or bi-polar) adj2 arthroplast*).ti,ab.	242
14	or/6-13	796729
15	5 and 14	14229
16	Meta Analysis.pt.	37949
17	Meta Analysis/ use emez	67610
18	Systematic Review/ use emez	55424
19	exp Technology Assessment, Biomedical/ use mesz	8944
20	Biomedical Technology Assessment/ use emez	11419
21	(meta analy* or metaanaly* or pooled analysis or (systematic* adj2 review*) or published studies or published literature or medline or embase or data synthesis or data extraction or 93rthropl).ti,ab.	300528
22	((health technolog* or biomedical technolog*) adj2 assess*).ti,ab.	3997
23	or/16-22	361006
24	15 and 23	396
25	limit 24 to 93rthrop language	372
26	limit 25 to yr="2008 –Current"	194
27	remove duplicates from 26	122

Cochrane Library

ID	Search	Hits
#1	MeSH descriptor: [Hip Fractures] explode all trees	955
#2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) near/4 fracture*):ti (Word variations have been searched)	1407
#3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) near/4 fracture*):ti (Word variations have been searched)	792
#4	#1 or #2 or #3	1699
#5	MeSH descriptor: [Arthroplasty, Replacement, Hip] explode all trees	1297
#6	MeSH descriptor: [Arthroplasty] explode all trees	2627
#7	(arthroplasty* or arthroplasty93sty* or hemi-arthroplast* or prosthes* or implant* or bipolar* or bi-polar*):ti (Word variations have been searched)	8357

#8	(total hip near/2 (replace* or arthroplasty*)):ti (Word variations have been searched)	1255
#9	((bipolar or bi-polar) near/2 arthroplast*):ti (Word variations have been searched)	6
#10	#5 or #6 or #7 or #8 or #9	9959
#11	#4 and #10 from 2008 to 2012, in Cochrane Reviews (Reviews and Protocols), Other Reviews, Methods Studies, Technology Assessments, Economic Evaluations and Cochrane Groups	34

Centre for Reviews and Dissemination

Line	Search	Hits
1	MeSH DESCRIPTOR hip fractures EXPLODE ALL TREES	161
2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*)):TI	117
3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*)):TI	97
4	#1 OR #2 OR #3	197
5	MeSH DESCRIPTOR Arthroplasty, Replacement, Hip EXPLODE ALL TREES	281
6	MeSH DESCRIPTOR Arthroplasty EXPLODE ALL TREES	508
7	((arthroplasty* or arthroplasty* or hemi-arthroplast* or prosthes* or implant* or bipolar* or bi-polar*)):TI	1033
8	((total hip adj2 (replace* or arthroplasty*))):TI	103
9	((bipolar or bi-polar) adj2 arthroplast*)	2
10	#5 OR #6 OR #7 OR #8 OR #9	1251
11	#4 AND #10	50
12	(#11) FROM 2008 TO 2012	31

Appendix 2: Quality Assessment Tables

Table A1: AMSTAR Scores of Included Systematic Reviews

Author, Year	AMSTAR score[a]	1) Provided Study Design	2) Duplicate Study Selection	3) Broad Literature Search	4) Considered Status of Publication	5) Listed Excluded Studies	6) Provided Characteristics of Studies	7) Assessed Scientific Quality	8) Considered Quality in Report	9) Methods to Combine Appropriate	10) Assessed Publication Bias	11) Stated Conflict of Interest
NCGC/NICE 2011 (3)	8	✓		✓		✓	✓	✓	✓	✓		✓
Lui et al, 2010 (11)	6	✓					✓	✓	✓	✓		✓

Abbreviations: AMSTAR, Assessment of Multiple Systematic Reviews; NCGC, National Clinical Guideline Centre; NICE, National Institute for Clinical Excellence

[a]Maximum possible score is 11. Details of AMSTAR score are described in Shea et al (4)

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S Brener

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AMSTAR	Assessment of Multiple Systematic Reviews
FIM	Functional Independence Measure
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HQO	Health Quality Ontario
RAP	Rehabilitation Activities Profile
RCT	Randomized controlled trial
TUG	Timed-Up-and-Go

Background

Objective of Analysis

To evaluate the optimal timing to begin an active rehabilitation program after hip fracture surgery.

Clinical Need and Target Population

It is generally accepted that active rehabilitation programs are an integral component of treatment following hip fracture surgery to encourage a full recovery for patients. (1-4) Rehabilitation programs typically include a combination of treatments by nurses, physiotherapists, occupational therapists and other specialists. (2;3) The programs are delivered in various settings with some offered in an inpatient rehabilitation facility while others are outpatient programs conducted either in the patient's home or in a community-based rehabilitation facility. (1-4) Approaches to implementing rehabilitation also vary, with programs ranging in frequency, duration and intensity. (1-4)

The Canadian 2011 National Hip Fracture Toolkit recommends that patients should transition from acute care to active rehabilitation settings within the first week after hip fracture surgery. (1) However, uncertainty remains as to the ideal time to begin rehabilitation programs. Furthermore, given the variation in these programs, it is unknown if a delay to active rehabilitation impacts their effectiveness regardless of intensity or location.

Rapid Review

Research Question

What is the optimal timing to begin an active rehabilitation program after hip fracture surgery?

Research Methods

Literature Search

A literature search was performed on February 12, 2013, using Ovid MEDLINE, Ovid MEDLINE In-Process and Other Non-Indexed Citations, Ovid EMBASE, EBSCO Cumulative Index to Nursing & Allied Health Literature (CINAHL), the Wiley Cochrane Library, and the Centre for Reviews and Dissemination (CRD) database, for studies published from January 1, 2002, until February 12, 2013. Appendix 1 provides details of the search strategies. 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, 2002, and February 12, 2013
- meta-analyses, systematic reviews, health technology assessments, randomized controlled trials (RCTs), and guidelines
- studies evaluating timing to begin an active rehabilitation program
- studies with similar active rehabilitation programs in both study arms

Exclusion Criteria

- studies where outcomes of interest cannot be abstracted
- studies evaluating time to early mobility during the immediate postoperative period

Outcomes of Interest

- Up to 2 measures of activities of daily living (ADL), prioritized in the following order:
  1. Functional Independence Measure (FIM)
  2. Instrumental ADLs
  3. Other validated ADL measures

Expert Panel

In December 2012, an Expert Advisory Panel on Episodes of Care for Hip Fractures was struck. The panel was comprised of physicians, personnel from the Ministry of Health and Long-Term Care, and representation from the community.

The role of the Expert Advisory Panel on Episode of Care for Hip Fractures was to contextualize the evidence produced by Health Quality Ontario and provide advice on the appropriate clinical pathway for

a hip fracture in the Ontario health care setting. 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 Assessment of Multiple Systematic Reviews (AMSTAR) tool was used to assess the quality of the final selection of systematic reviews. (5) Primary studies were abstracted from the selected reviews and referenced for assessment of the 2 outcomes of interest.

The quality of the body of evidence for each outcome was examined according to the GRADE Working Group criteria. (6) The overall quality was 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 randomized controlled trials 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. (6) For more detailed information, please refer to the latest series of GRADE articles. (6)

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 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 786 citations published between January 1, 2002, and February 12, 2013 (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.

Three reviews met the inclusion criteria. (7-9) The reference lists of the included reviews as well as health technology assessment websites were hand searched to identify any additional potentially relevant studies, and no additional citations were identified.

Among the three reviews, one was determined to consist of studies which did not meet the rapid review inclusion criteria (7) and one was a review of other reviews. (8) The review of other reviews identified the third paper, Chudyk et al (9), in its examination of timing to start active rehabilitation. Therefore, for the purposes of this rapid review, the Chudyk et al systematic review is examined. (9)

Summary of Included Review

The objective of the Chudyk et al systematic review was to conduct a general examination of rehabilitation practices in the hip fracture literature. This review identified 55 studies spanning 6 rehabilitation intervention approaches (clinical pathways, early supported discharge, interdisciplinary care, exercise, occupational/physiotherapy, and discharge setting) in 3 types of settings (acute care hospital, inpatient rehabilitation, and outpatient rehabilitation). (9) Overall, this review concluded that there was limited standardization of the measurement and application of rehabilitation programs for hip fracture. (9)

In examining early supported discharge programs—which included active rehabilitation—Chudyk et al review included 4 publications, summarized in

Quality Assessment of Review

As assessed by the AMSTAR scoring of reviews, the Chudyk et al (9) review was determined to have a quality level of 5 out of a possible 11 (Appendix 6, Table A4).

Table 2. (9) No meta-analysis or other quantitative method to combine results was conducted. Chudyk et al concluded that there was limited evidence that early supported discharge was associated with either improved self-efficacy in protection against falls or short-term functional recovery. In addition, they found conflicting evidence around its impact on length of stay. (9)

Quality Assessment of Review

As assessed by the AMSTAR scoring of reviews, the Chudyk et al (9) review was determined to have a quality level of 5 out of a possible 11 (Appendix 6, Table A4).

Table 2: Summary of Studies Included in Review[a] of Early Supported Discharge

Author, Year	Location	Study Design	Sample Size	Intervention	Control	Results and Conclusion[b]
Crotty, 2002 (10)	Australia	RCT	66	Accelerated discharge home (< 48 hours) and immediate access to a rehabilitation program	Conventional care (hospital-based care and rehabilitation as usual)	There is evidence to support accelerated discharge from hospital with a home-based rehabilitation program in select patients.
Crotty, 2003 (11)	Australia	RCT (12 months follow-up)		Same as Crotty, 2002; see row above		↓ in caregiver burden No difference in patient outcomes
van Balen, 2002 (12)	The Netherlands	Prospective observational study	208	At 5 days post surgery there was a decision protocol for discharge plan	Usual practice	13-day ↓ in hospital LOS No difference in: • patient outcomes • cost (but a shift in where the costs were accumulated)
Jaglal, 2002 (13)	Ontario, Canada	Prospective observational study	65	Accelerated discharge home with a plan on postoperative day 3, and multiple roles by single care-providers (e.g., physiotherapist could help with care coordination)	Physiotherapy early intervention system (EIS) which includes services post-discharge in the home consisting of care-coordination nursing, physiotherapy, and homemaker assistance	4-day ↓ in hospital LOS No difference at follow-up in TUG or FIM ↑ in use of home-care services and associated costs

Abbreviations: FIM, Functional Independence Measure; LOS, length of stay; TUG, Timed-Up-and-Go.
[a]Review by Chudyk et al. (9)
[b]From the perspective of the intervention group versus the control group.

Summary of Outcomes of Interest

In 2 of the 4 publications identified by Chudyk et al the evaluation of time to rehabilitation is confounded by differences in the rehabilitation received by the intervention and control groups. The patients in the intervention group of the Crotty et al RCT and its follow-up paper received a comprehensive rehabilitation program consisting of multidisciplinary care team, while the control group received usual care which consisted of in-hospital rehabilitation and discharge planning. (10;11)

The studies by van Balen et al (12) and Jaglal et al (13) provided similar rehabilitation programs in both study arms, isolating the exposure of time to an active rehabilitation program. Therefore, these studies are evaluated to examine the outcomes of interest for this rapid review.

Both studies had their control groups continue with usual practice, while the intervention groups received formal discharge protocols within 3 to 5 days after surgery. (12;13) This resulted in a statistically significant decrease in post-surgical hospital length of stay for the intervention groups compared with control groups. (12;13) Both studies commented that this change would likely not translate into system-wide cost savings as costs would shift to outpatient services such as rehabilitation and home-care programs. (12;13)

Activities of Daily Living

The van Balen et al study used the Rehabilitation Activities Profile (RAP) to measure both ADL and instrumental ADL. (12) Quantitative results for these outcomes were not provided in the publication, but the authors stated that they found no difference between study groups at 4 months follow-up. (12) The Jaglal et al study examined FIM (a higher score indicates increased physical and cognitive ability) and Timed-Up-and-Go (TUG, a mobility test where time, in seconds, to complete the test is the indication of capability) at both hospital discharge and discharge from home-care services. (13) They identified no

significant difference between patient groups at the end of the study. (13) Results of these studies are summarized in Table 3.

Table 3: Summary of Results for Activities of Daily Living

	FIM[a]		TUG[a]		RAP at 4 months[b]
	At hospital discharge (score ± SD)	At home-care discharge (score ± SD)	At hospital discharge (seconds ± SD)	At home-care discharge (seconds ± SD)	
Intervention	44.9 ± 12.3	70.4 ± 5.1	77.6 ± 35.1	21.6 ± 11.1	NR
Control	56.8 ± 10.3	69.5 ± 7.5	48.8 ± 32.8	22.3 ± 12.4	NR
P value	0.0004	No significant difference	0.005	No significant difference	No significant difference

Abbreviations: FIM, Functional Independence Measure; NR, not reported; RAP, Rehabilitation Activities Profile; SD, standard deviation; TUG, Timed-Up-and-Go.
[a] Based on data reported in Jaglal et al. (13)
[b] Based on data reported in van Balen et al. (12)

Quality Assessment of Outcomes of Interest

Given the limited data available, GRADE cannot be applied to assess the quality of evidence for the outcome of RAP. There is very low quality of evidence for the outcomes of FIM and TUG (Appendix 6, Table A2)

Conclusions

There is insufficient evidence to indicate the optimal time to an active rehabilitation program after hip fracture surgery.

Acknowledgements

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Expert Panel for Health Quality Ontario: Episode of Care for Hip Fracture

Name	Role	Organization
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Orthopedic Surgery		
Dr. John P. Harrington	Orthopedic surgeon	William Osler Health System, Toronto
Dr. Mark Harrison	Orthopedic surgeon	Queen's University, Kingston
Dr. Hans J. Kreder	Professor	Division of Orthopaedics, Department of Surgery, University of Toronto
Dr. Allan Liew	Orthopedic surgeon	Department of Surgery, University of Ottawa
Dr. Mark MacLeod	Orthopedic surgeon	London Health Sciences Centre
Dr. Aaron Nauth	Orthopedic surgeon	St. Michael's Hospital/University of Toronto
Dr. David Sanders	Orthopedic surgeon	London Health Sciences Centre
Dr. Andrew Van Houwelingen	Orthopedic surgeon	St. Thomas Elgin General Hospital
Anesthesiology		
Dr. Nick Lo	Staff anesthesiologist	St. Michael's Hospital, Toronto
Emergency Medicine		
Dr. Michael O'Connor	Emergency medicine	Kingston General Hospital
Dr. Lisa Shepherd	Emergency medicine	South West Local Health Integration Network (LHIN), London
Family Medicine		
Dr. Christopher Jyu	Physician lead, primary care	Central East LHIN, Ajax
Geriatrics		
Dr. Anna Byszewski	Geriatrician	The Ottawa Hospital
Dr. Maria Zorzitto	Chief of geriatric medicine	St. Michael's Hospital, Toronto
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Jo-anne Marr	Executive vice president and chief operating officer	Mackenzie Health, Richmond Hill

Name	Role	Organization
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Professional Organizations		
Ravi Jain	Director, Ontario osteoporosis strategy	Osteoporosis Canada
Rhona McGlasson	Executive director	Bone and Joint Canada

Appendices

Appendix 5: Literature Search Strategies

Search date: February 12, 2013
Databases searched: Ovid MEDLINE, Ovid MEDLINE In-Process and Other Non-Indexed Citations, EMBASE; CINAHL; Cochrane Library; CRD
Limits: 2002-current; English
Filters: Meta-analysis, systematic reviews, heath technology assessments, RCTs and guidelines

Database: Ovid MEDLINE(R) <1946 to January Week 5 2013>, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations <February 11, 2013>, EMBASE <1980 to 2013 Week 06>
Search Strategy:

#	Searches	Results
1	exp Hip Fractures/ use mesz	16222
2	exp Hip Fracture/ use emez	26495
3	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*).ti,ab.	55825
4	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*).ti,ab.	38575
5	or/1-4	69278
6	exp Rehabilitation/	332918
7	Rehabilitation Nursing/	1961
8	exp Rehabilitation Centers/ use mesz	11332
9	exp rehabilitation center/ use emez	8264
10	exp "Physical and Rehabilitation Medicine"/ use mesz	18976
11	exp rehabilitation medicine/ use emez	4537
12	exp rehabilitation research/ use emez	284
13	exp rehabilitation care/ use emez	7452
14	exp Hip Fractures/rh [Rehabilitation]	2151
15	exp hip fracture/rh [Rehabilitation]	2151
16	exp Physical Therapy Modalities/ use mesz	114382
17	exp physical medicine/ use emez	363451
18	exp mobilization/ use emez	15408
19	(rehabilitat* or habilitat* or movement therap* or physiotherap* or physical therap* or exercis* or occupational therap* mobili?ation or strength train*).ti,ab.	655369
20	or/6-19	1281990
21	Meta Analysis.pt.	36967
22	Meta Analysis/ use emez	68832
23	Systematic Review/ use emez	57208
24	exp Technology Assessment, Biomedical/ use mesz	8791
25	Biomedical Technology Assessment/ use emez	11440
26	(meta analy* or metaanaly* or pooled analysis or (systematic* adj2 review*) or published studies or published literature or medline or embase or data synthesis or data extraction or cochrane).ti,ab.	302266
27	((health technolog* or biomedical technolog*) adj2 assess*).ti,ab.	3953
28	exp Random Allocation/ use mesz	76124
29	exp Double-Blind Method/ use mesz	117322
30	exp Control Groups/ use mesz	1362
31	exp Placebos/ use mesz	31199
32	Randomized Controlled Trial/ use emez	336877
33	exp Randomization/ use emez	60702
34	exp Random Sample/ use emez	4568
35	Double Blind Procedure/ use emez	113044
36	exp Triple Blind Procedure/ use emez	37
37	exp Control Group/ use emez	41888

38	exp Placebo/ use emez	212539
39	(random* or RCT).ti,ab.	1412123
40	(placebo* or sham*).ti,ab.	454632
41	(control* adj2 clinical trial*).ti,ab.	39053
42	exp Practice Guideline/ use emez	285751
43	exp Professional Standard/ use emez	275459
44	exp Standard of Care/ use mesz	620
45	exp Guideline/ use mesz	23122
46	exp Guidelines as Topic/ use mesz	102366
47	(guideline* or guidance or consensus statement* or standard or standards).ti.	222418
48	(controlled clinical trial or meta analysis or randomized controlled trial).pt.	455849
49	or/21-48	3032841
50	5 and 20 and 49	1269
51	limit 50 to english language	1163
52	limit 51 to yr="2002-Current"	914
53	remove duplicates from 52	695

CINAHL

#	Query	Limiters/Expanders	Results
S1	(MH "Hip Fractures+")	Search modes - Boolean/Phrase	3,713
S2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) N4 fracture*)	Search modes - Boolean/Phrase	6,343
S3	((hip* or ((femur* or femoral*) N3 (head or neck or proximal))) N4 fracture*)	Search modes - Boolean/Phrase	5,032
S4	S1 OR S2 OR S3	Search modes - Boolean/Phrase	6,352
S5	(MH "Rehabilitation+")	Search modes - Boolean/Phrase	130,686
S6	(MH "Rehabilitation Nursing")	Search modes - Boolean/Phrase	1,982
S7	(MH "Rehabilitation Centers+")	Search modes - Boolean/Phrase	5,305
S8	(MH "Hip Fractures+/RH")	Search modes - Boolean/Phrase	487
S9	(MH "Physical Therapy Practice, Evidence-Based")	Search modes - Boolean/Phrase	1,172
S10	(MH "Physical Medicine")	Search modes - Boolean/Phrase	821
S11	(rehabilitat* or habilitat* or movement therap* or physiotherap* or physical therap* or exercis* or occupational therap* mobili?ation or strength train*)	Search modes - Boolean/Phrase	179,950
S12	S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11	Search modes - Boolean/Phrase	231,805
S13	S4 AND S12	Search modes - Boolean/Phrase	1,297
S14	(MH "Random Assignment") or (MH "Random Sample+") or (MH "Meta Analysis") or (MH "Systematic Review") or (MH "Double-Blind Studies") or (MH "Single-Blind Studies") or (MH "Triple-Blind Studies") or (MH "Placebos") or (MH "Control (Research)") or (MH "Practice Guidelines") or (MH "Randomized Controlled Trials")	Search modes - Boolean/Phrase	Display
S15	((health technology N2 assess*) or meta analy* or metaanaly* or pooled analysis or (systematic* N2 review*) or published studies or medline or embase or data synthesis or data extraction or cochrane or random* or sham*or rct* or (control* N2 clinical trial*) or guideline* or guidance or consensus statement* or standard or standards or placebo*)	Search modes - Boolean/Phrase	Display
S16	S14 or S15	Search modes - Boolean/Phrase	Display
S17	S13 AND S16	Search modes - Boolean/Phrase	309
S18	S13 AND S16	Limiters - English Language Search modes - Boolean/Phrase	303
S19	S13 AND S16	Limiters - Published Date from: 20020101-20131231; English Language Search modes - Boolean/Phrase	248

Cochrane Library

ID	Search	Hits
#1	MeSH descriptor: [Hip Fractures] explode all trees	968
#2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) near/4 fracture*):ti (Word variations have been searched)	1418
#3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) near/4 fracture*):ti (Word variations have been searched)	801
#4	#1 or #2 or #3	1712
#5	MeSH descriptor: [Rehabilitation] explode all trees	12263
#6	MeSH descriptor: [Rehabilitation Nursing] explode all trees	33
#7	MeSH descriptor: [Rehabilitation Centers] explode all trees	511
#8	MeSH descriptor: [Physical Therapy Modalities] explode all trees	12803
#9	MeSH descriptor: [Physical Medicine] explode all trees	293
#10	(rehabilitat* or habilitat* or movement therap* or physiotherap* or physical therap* or exercis* or occupational therap* mobili?ation or strength train*):ti (Word variations have been searched)	20590
#11	#5 or #6 or #7 or #8 or #9 or #10	35148
#12	#4 and #11 from 2002 to 2013	111

CRD

Line	Search	Hits
1	MeSH DESCRIPTOR hip fractures EXPLODE ALL TREES	167
2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*)):TI	126
3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*)):TI	104
4	#1 OR #2 OR #3	212
5	MeSH DESCRIPTOR rehabilitation EXPLODE ALL TREES	1376
6	MeSH DESCRIPTOR rehabilitation nursing EXPLODE ALL TREES	6
7	MeSH DESCRIPTOR rehabilitation centers EXPLODE ALL TREES	74
8	MeSH DESCRIPTOR physical therapy modalities EXPLODE ALL TREES	1588
9	MeSH DESCRIPTOR physical medicine EXPLODE ALL TREES	88
10	(rehabilitat* or habilitat* or movement therap* or physiotherap* or physical therap* or exercis* or occupational therap* mobili?ation or strength train*):TI	1291
11	#5 OR #6 OR #7 OR #8 OR #9 OR #10	2962
12	#4 AND #11	19
13	(#12):TI FROM 2002 TO 2013	12

Appendix 6: Quality Assessment Tables

Table A4: AMSTAR Score of Reviews[a]

Author, Year	AMSTAR score[a]	1) Provided Study Design	2) Duplicate Study Selection	3) Broad Literature Search	4) Considered Status of Publication	5) Listed Excluded Studies	6) Provided Characteristics of Studies	7) Assessed Scientific Quality	8) Considered Quality in Report	9) Methods to Combine Appropriate	10) Assessed Publication Bias	11) Stated Conflict of Interest
Chudyk, 2009 (9)	5	✓		✓				✓	✓			✓

[a] Details of AMSTAR method are described in Shea et al. (5)

Table A5: GRADE Evidence Profile for Examination of Optimal Timing to Begin an Active Rehabilitation Program

No. of Studies (Design)	Risk of Bias[a]	Inconsistency	Indirectness	Imprecision	Publication Bias	Upgrade Considerations	Quality
FIM							
1 (observational)	Very serious limitations (-2)[b]	No serious limitations	No serious limitations	No serious limitations	Undetected	None detected	⊕ Very Low
TUG							
1 (observational)	Very serious limitations (-2)[b]	No serious limitations	No serious limitations	No serious limitations	Undetected	None detected	⊕ Very Low

Abbreviations: FIM, functional independence measure; TUG, timed-up-and-go.

[a] See Table A3.

[b] Risk of bias limitations with eligibility criteria, measurement of outcome and control of potential confounding.

Table A6: Risk of Bias Among Observational Trials for the Examination of Optimal Timing to Begin an Active Rehabilitation Program

Author, Year	Appropriate Eligibility Criteria	Appropriate Measurement of Exposure	Appropriate Measurement of Outcome	Adequate Control for Confounding	Complete Follow-Up
Jaglal, 2002 (13)	Limitations[a]	No limitations	Limitations[b]	Serious limitations[c]	No limitations

[a] Patients were selected based on whether or not they might benefit from the intervention program.

[b] The sample size of the intervention group was small (n=15).

[c] Patients in the intervention group were statistically significantly older than patients in the control group, creating the potential for differences in disease burden, caregiver support, and access to health care, but these differences were not clearly discussed or adjusted for in the analysis.

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Community Versus Inpatient Rehabilitation in Hip Fracture Patients: A Rapid Review—*Draft*

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April 2013

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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 (SRs), 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 SR 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 SR has not evaluated the primary studies using GRADE, the primary studies included in the SR are retrieved and a maximum of two outcomes are graded. If no well-conducted SRs 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 policymakers.

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.

Permission Requests

How to Obtain Rapid Reviews from Health Quality Ontario

All rapid reviews are freely available in PDF format at the following URL:
http://www.hqontario.ca/evidence/publications-and-ohtac-recommendations/rapid-reviews.

Table of Contents

List of Abbreviations

ADL	Activities of Daily Living
AMSTAR	Assessment of Multiple Systematic Reviews
CI	Confidence interval
FIM	Functional Independence Measure
HQO	Health Quality Ontario
MBI	Modified Barthel Index
MD	Mean difference
NCGC	National Clinical Guideline Centre
NICE	National Institute for Health and Clinical Excellence
RCT	Randomized controlled trial
SR	Systematic review

Background

Objective of Analysis

This rapid review aims to determine the effectiveness of inpatient versus community-based rehabilitation among hip fracture patients.

Clinical Need and Target Population

Rehabilitation through inpatient, outpatient, or home-based physiotherapy is an essential component of care after hip fracture surgery. (1) The high cost of hospitalizations coupled with the increased chance for iatrogenic complications from an extended hospital stay, especially for older patients, warrant study of alternatives to inpatient rehabilitation. (2;3) Community and home-based rehabilitation have been shown to be an effective and low-cost way for patients to recover from hip fracture surgery. (1-4) Therefore, it is important to evaluate the effectiveness of inpatient versus community-based rehabilitation among hip fracture patients.

The National Hip Fracture Toolkit by Bone and Joint Decade Canada notes three main rehabilitation settings: inpatient, community-based, and supportive living environments. The toolkit defines inpatient rehabilitation as any form of rehabilitation in a freestanding facility or hospital; community-based as rehabilitation where extensive home services are available; and supportive living as rehabilitation in a place that offers assistance in living, such as a nursing home or lodge. (5)

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.

Rapid Review

Research Question

What is the effectiveness of inpatient rehabilitation compared with community-based rehabilitation for hip fracture patients?

Research Methods

Literature Search

A literature search was performed on February 12, 2013, using Ovid MEDLINE, Ovid MEDLINE In-Process and Other Non-Indexed Citations, Ovid Embase, EBSCO Cumulative Index to Nursing & Allied Health Literature (CINAHL), the Wiley Cochrane Library, and the Centre for Reviews and Dissemination database, for studies published from January 1, 2002, until February 12, 2013. 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, 2002, and February 12, 2013
- RCTs, SRs, meta-analyses, and guidelines
- adult hip fracture population
- studies comparing inpatient, or usual care, rehabilitation to community-based rehabilitation[a]

[a]Community-based rehabilitation was defined by The National Hip Fracture Toolkit as any rehabilitation approaches where extensive home care is available. (5)

Exclusion Criteria

- studies where outcomes of interest cannot be extracted

Outcomes of Interest

- up to two Activities of Daily Living (ADL), with the following order of priority, as available:
    1. Functional Independence Measure (FIM)
    2. Instrumental ADL
    3. Any other ADL
- length of rehabilitation

Expert Panel

In December 2012, an Expert Advisory Panel on Episodes of Care for Hip Fractures was struck. Members of the panel included physicians, personnel from the Ministry of Health and Long-Term Care, and representatives from the community.

The role of the Advisory Panel was to place the evidence produced by Health Quality Ontario in context and to provide advice about the appropriate clinical pathway for a hip fracture in the Ontario health care

setting. However, the statements, conclusions, and views expressed in this report do not necessarily represent the views of Advisory Panel members.

Quality of Evidence

The Assessment of Multiple Systematic Reviews (AMSTAR) tool was used to assess the quality of the final selection of the SR. (6) Details on the outcomes of interest were abstracted from the selected review, and primary studies were referenced as-needed.

The quality of the body of evidence for each outcome was examined according to the GRADE Working Group criteria. (7) The overall quality was determined to be very low, low, moderate, or high using a step-wise, structural method.

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 factors that could raise the quality of evidence were considered: large magnitude of effect, dose-response gradient, and accounting for all residual factors. (7) For more detailed information, please refer to the latest series of GRADE articles. (7)

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 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 could 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 786 citations published between January 1, 2002, and February 12, 2013 (with duplicates removed). Articles were excluded on the basis of information in the title and abstract. The full texts of potentially relevant articles were obtained for further assessment.

Six SRs were identified that evaluate the effectiveness of inpatient rehabilitation versus community-based rehabilitation, with AMSTAR ratings ranging from 5 to 9. (1;3;8-11) Among these, 3 SRs meet the inclusion criteria. (3;8;9) Two of these reviews use the Modified Barthel Index (MBI) as a tool to evaluate ADL (3;9); 1 evaluates the FIM as an outcome (8); and all 3 report on length of stay. (3;8;9) All 3 SRs were, therefore, reviewed by AMSTAR. (Appendix 2, Table A1)

The SR by the National Clinical Guideline Centre (NCGC) that was fed into the National Institute for Health and Clinical Excellence (NICE) Guidelines received an AMSTAR rating of 9. (8) The reviews by Chudyk et al (9) and Stolee et al (3) received AMSTAR scores of 3 and 9, respectively. (Appendix 2, Table A1) Because the NCGC/NICE SR was published more recently, captures the same literature as the other reviews, and has the highest AMSTAR rating, this review was selected for the current analysis. (8)

The NCGC defines community-based rehabilitation as including any rehabilitation approaches that are based in a patient's own home, community hospital, residential care unit, or a Social Care Unit. (8) This coincides with the definition for community-based rehabilitation provided by the National Hip Fracture Toolkit. (5) Of note, this review focuses specifically on *multidisciplinary* rehabilitation in the community rather than on inpatient care. (8)

The SR by NCGC/NICE is summarized in Table 1.

Table 1. Summary of Systematic Review Included

Author, Year	Review Type	Search Dates	Inclusion Criteria	No. of RCTs	AMSTAR Score
NCGC/NICE, 2011 (8)	SR	To August 2010	RCTs English-language only Patients aged ≥ 18 years with intracapsular or extracapsular hip fracture treatment of multidisciplinary rehabilitation	2	9

Abbreviations: AMSTAR, Assessment of Multiple Systematic Reviews ; NCGC, National Clinical Guideline Centre; NICE, National Institute for Health and Clinical Excellence; No., number; RCTs, randomized controlled trials ; SR, systematic review

Results for Outcomes of Interest

The SR by NCGC/NICE (8) provides the GRADE level of evidence for FIM and length of rehabilitation. While this review does not directly assess MBI as an outcome, it does include an RCT (2) that reports on MBI. (8) This RCT (2) was therefore pulled, and the GRADE was separately assessed.

Functional Independence Measure

The FIM is an 18-item questionnaire that assesses a patient's level of disability in terms of burden of care. The score for each individual item ranges from 1 to 7; a higher score indicates more independence. The FIM can generate a few separate scores: a total score, a self-care score, a locomotion score, and a mobility score. (12)

The results from the NCGC/NICE (8) SR are summarized in Table 2. The review reported one RCT for this outcome (13), which received a high quality score according to GRADE. (8)

Ziden et al published a subsequent paper to document the long-term measures for this same study at 12 months after discharge. (14) This RCT was pulled, and the two RCTs by Ziden et al (13;14) were treated as one to measure short-term (1-month follow-up) and long-term (12-month follow-up) FIM scores. The NCGC/NICE SR identifies an increase in mobility, self-care, and locomotion FIM scores with community-based rehabilitation over scores with inpatient care (mean difference [MD] 4.90, 95% confidence interval [CI] 2.81–6.99) (8) in the short-term. Long-term results from Ziden et al, 2010, also showed significantly higher total, self-care, and locomotion FIM scores for the community-based rehabilitation group than for inpatient care. (14)

Table 2. Systematic Review and Follow-up Study on Functional Independence Measure

Author, Year	Sample Size	Inclusion/Exclusion Comparison Group	FIM Scores[a]	GRADE
Ziden et al, 2008 and 2010 (13;14)	**Short-term:** 102 patients **Long-term:** 93 patients	**Inclusion**: Aged 65 or older, approved by geriatrician for needing geriatric care and rehabilitation, able to speak and understand Swedish **Exclusion**: Severe mental illness, expected survival less than 1 year, drug or alcohol abuse, cognitive impairment **Home rehabilitation group**: Conventional care and rehabilitation same as control group. Home rehabilitation consisted of 3-week intervention period **Usual care (inpatient) group**: Participation in standard rehabilitation with physiotherapy and occupational therapy sessions	**Baseline, Mean (SD)**:[b] ***Community Rehabilitation*** Self-care: 40.6 (2.5) Mobility: 20.3 (1.3) Locomotion: 12.2 (3.2) ***Inpatient Rehabilitation*** Self-care: 40.5 (2.9) Mobility: 20.1 (1.4) Locomotion: 11.6 (3.0) **Short-term, MD (95% CI)**:[c] Self-care**:** 4.90 (2.81, 6.99)[d] Mobility: 2.00 (1.02, 2.98)[d] Locomotion: 2.80 (1.61, 3.99)[d] **Long-term, median (min-max):**[e] ***Community Rehabilitation***[f] Total FIM: 85 (46-91) Self-care: 40 (23-42) Locomotion: 32 (11-35) ***Inpatient Rehabilitation***[e] Total FIM: 80 (29-91) Self-care: 38 (12-42) Locomotion: 29 (9-35)	High[g]

Abbreviations: CI, confidence interval; FIM, Functional Independence Measure; MD, mean difference; NCGC, National Clinical Guideline Centre; NICE, National Institute for Health and Clinical Excellence; RCT, randomized controlled trial; SD, standard deviation

[a] Dissimilarity between measurements is an unfortunate limitation of the study; converting to the same unit reduces accuracy in measurement.

[b] Ziden et al, 2008, reported no significant difference between the two arms at baseline (13)

[c] $p<0.05$ for all measures of FIM in short-term follow-up (1 month) (13)

[d] NCGC/NICE review found to be statistically significant with $p<0.00001$ (8)

[e] NCGC/NICE review did not evaluate long-term FIM. (8) Ziden et al, 2010 did not report mean or SDs. Long-term FIM scores for locomotion were not reported either, but total FIM score was reported (14)

[f] Ziden et al, 2010, reported statistically significant difference between the two arms for all measures of FIM, with $p<0.05$ (14)

[g] GRADE assessed directly by NCGC/NICE. (8) Authors did not downgrade

Activities of Daily Living

The review by NCGC/NICE does not report on any tool that measures ADL, except for FIM. (8) It does, however, identify one RCT (2) that reports MBI as an outcome, but the authors do not evaluate this outcome.

Modified Barthel Index

The MBI is a ten-item questionnaire that assesses the level of an individual's functional independence in ADLs. (12) The score ranges from 0 to 100, with a higher score indicating less dependence. (15)

The NCGC/NICE SR (8) identifies, but does not evaluate, the RCT by Crotty et al (2), which assesses the MBI as an outcome. Crotty et al published a subsequent paper to document the long-term outcome measures 12 months after rehabilitation. (16) Both RCTS by Crotty et al (2;16) were pulled and treated as one RCT that measures short-term (6 months post-discharge) and long-term (12 months post-discharge) outcomes. The results found a greater improvement in MBI from baseline in the short term for patients receiving community-based multidisciplinary rehabilitation than for those receiving inpatient rehabilitation, but no difference between the groups in the long term. The GRADE for this outcome was assessed as low (Appendix 1, Table A2, and Table A3).

Table 3. Modified Barthel Index as a Tool to Measure Activities of Daily Living

Author, Year	Sample Size	Group Characteristics	MBI Score, Mean (95% CI)[a]	GRADE
Crotty et al, 2002[b] and 2003[c] (2;16)	**Short-term**: 66 patients **Long-term**: 60 patients	**Inclusion**: medically stable, age 65 or more, physically and mentally capable of participating in rehabilitation, and suitable home environment for rehabilitation **Exclusion**: inadequate patient support at home, no phone, out of region **Home rehabilitation group**: patients were discharged within 48 hours of surgery. Standard therapy services podiatry, nursing care, and help with light tasks, were provided. **Usual care (inpatient) group**: conventional care within the hospital was provided.	**Baseline**: Usual (Inpatient) care: 85.0 (77.0-89.0) Home care: 85.0 (79.0-89.0) **Short-term**:** Usual (Inpatient) care: 94.0 (83.7-97.0) Home care: 97.0 (93.5-99.0) **Long-term**:* Usual (Inpatient) care: 97.0 (85.3-100.0) Home care: 97.0 (92.3-100.0)	Low[a]

Abbreviations: CI, confidence interval; MBI, Modified Barthel Index; MD, mean difference; NCGC, National Clinical Guideline Centre; NICE, National Institute for Health and Clinical Excellence

[a]The outcome of MBI, as well as its GRADE assessment, was not evaluated by the NICE/NCGC review (8)

[b]Crotty et al, 2002, reported a statistically significant difference between the inpatient and community-based rehabilitation groups at 6 months post-discharge ($p<0.05$) (2)

[c]Crotty et al, 2003, reported that there was no statistically significant difference between the arms at 12 months postdischarge ($p>0.05$) (16)

Length of Stay

The results from the NCGC/NICE SRare summarized in Table 4. The review identifies one RCT by Crotty et al, 2002 (2) to report on the outcome of length of rehabilitation stay. Review authors found a statistically significant increase in total length of rehabilitation (hospital + home) with community-based multidisciplinary care over inpatient care (MD 14.0, 95% CI 7.9, 20.1), on the basis of moderate GRADE quality of evidence. (8)

Table 4. Systematic Review of Length of Rehabilitation (Days in Hospital + Home)

Author, Year	No. of RCTs	Community-Based Rehabilitation, Days (min, max)	Usual Care (Inpatient) Rehabilitation	MD (95% CI)	P	GRADE
NCGC/NICE, 2011 (8)	1	28.3 (23.1, 33.6)	14.3 (10.5, 18.1)	14.0 (7.9, 20.1)	<0.00001	Moderate[a]

Abbreviations: CI, confidence interval; MD, mean difference; NCGC, National Clinical Guideline Centre; NICE, National Institute for Health and Clinical Excellence; No., number; RCT, randomized, controlled trial

[a]GRADE assessed directly by NCGC/NICE (8); Authors downgraded for study quality

Conclusions

On the basis of one SR evaluating the effectiveness of inpatient rehabilitation in comparison with community-based rehabilitation among hip fracture patients, the following conclusions were reached:

- High-quality evidence shows the total FIM improved among patients receiving community-based rehabilitation versus inpatient rehabilitation;
- Low-quality evidence indicates the total MBI is not significantly different among patients receiving community-based rehabilitation than among those receiving inpatient rehabilitation;
- Moderate-quality evidence indicates patients receiving community-based multidisciplinary rehabilitation have longer stays in rehabilitation (hospital + home) than those receiving inpatient rehabilitation.

The results primarily reflect cognitively intact and medically stable adults older than 65 with high prefracture mobility and independence and might not represent the effectiveness of community versus inpatient rehabilitation among less mobile and more dependent adults.

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Expert Panel for Health Quality Ontario: Episode of Care for Hip Fracture

Name	Role	Organization
Chair		
Dr. James Waddell	Orthopedic surgeon	St. Michael's Hospital, Toronto
Orthopedic Surgery		
Dr. John P. Harrington	Orthopedic surgeon	William Osler Health System, Toronto
Dr. Mark Harrison	Orthopedic surgeon	Queen's University, Kingston
Dr. Hans J. Kreder	Professor	Division of Orthopaedics, Department of Surgery, University of Toronto
Dr. Allan Liew	Orthopedic surgeon	Department of Surgery, University of Ottawa
Dr. Mark MacLeod	Orthopedic surgeon	London Health Sciences Centre
Dr. Aaron Nauth	Orthopedic surgeon	St. Michael's Hospital/University of Toronto
Dr. David Sanders	Orthopedic surgeon	London Health Sciences Centre
Dr. Andrew Van Houwelingen	Orthopedic surgeon	St. Thomas Elgin General Hospital
Anesthesiology		
Dr. Nick Lo	Staff anesthesiologist	St. Michael's Hospital, Toronto
Emergency Medicine		
Dr. Michael O'Connor	Emergency medicine	Kingston General Hospital
Dr. Lisa Shepherd	Emergency medicine	South West Local Health Integration Network (LHIN), London
Family Medicine		
Dr. Christopher Jyu	Physician lead, primary care	Central East LHIN, Ajax
Geriatrics		
Dr. Anna Byszewski	Geriatrician	The Ottawa Hospital
Dr. Maria Zorzitto	Chief of geriatric medicine	St. Michael's Hospital, Toronto
Physiotherapy		
Ruth Vallis	Physiotherapist	University Health Network, Toronto
Rehabilitation		
Charissa Levy	Executive director	GTA Rehab Network
Dr. Peter Nord	Vice president, chief medical officer and chief of staff	Providence Healthcare, Toronto
Research		
Dr. Susan Jaglal	Chair	Toronto Rehabilitation Institute, University of Toronto
Dr. Valerie Palda	Associate professor	Department of Medicine and Institute of Health Policy, Management and Evaluation, University of Toronto
Administration		
Jane de Lacy	Executive director, patient services	William Osler Health System, Toronto
Brenda Flaherty	Executive vice president and chief operating officer	Hamilton Health Sciences
Jo-anne Marr	Executive vice president and chief operating officer	Mackenzie Health, Richmond Hill
Malcolm Moffat	Executive vice president, programs	Sunnybrook Health Sciences Centre, Toronto

Name	Role	Organization
Kathy Sabo	Senior vice president, clinical programs/operations	University Health Network, Toronto
Community Care Access Centres		
Patricia (Tricia) Khan	Senior director, client services	Erie St. Clair Community Care Access Centre, Chatham
Janet McMullan	Project director, consultant	Bone and Joint Canada
Professional Organizations		
Ravi Jain	Director, Ontario osteoporosis strategy	Osteoporosis Canada
Rhona McGlasson	Executive director	Bone and Joint Canada

Appendices

Appendix 1: Literature Search Strategies

Search date: February 12, 2013
Databases searched: OVID MEDLINE, MEDLINE In-Process and Other Non-Indexed Citations, Embase; **Cumulative Index to Nursing and Allied Health (**CINAHL); Cochrane Library; **Centre for Reviews and Dissemination (CRD)**
Limits: 2002-current; English
Filters: Meta-analysis, systematic reviews, heath technology assessments, RCTs, and guidelines

Database: Ovid MEDLINE(R) <1946 to January Week 5 2013>, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations <February 11, 2013>, Embase <1980 to 2013 Week 06>
Search Strategy:

#	Searches	Results
1	exp Hip Fractures/ use mesz	16222
2	exp Hip Fracture/ use emez	26495
3	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*).ti,ab.	55825
4	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*).ti,ab.	38575
5	or/1-4	69278
6	exp Rehabilitation/	332918
7	Rehabilitation Nursing/	1961
8	exp Rehabilitation Centers/ use mesz	11332
9	exp rehabilitation center/ use emez	8264
10	exp "Physical and Rehabilitation Medicine"/ use mesz	18976
11	exp rehabilitation medicine/ use emez	4537
12	exp rehabilitation research/ use emez	284
13	exp rehabilitation care/ use emez	7452
14	exp Hip Fractures/rh [Rehabilitation]	2151
15	exp hip fracture/rh [Rehabilitation]	2151
16	exp Physical Therapy Modalities/ use mesz	114382
17	exp physical medicine/ use emez	363451
18	exp mobilization/ use emez	15408
19	(rehabilitat* or habilitat* or movement therap* or physiotherap* or physical therap* or exercis* or occupational therap* mobili?ation or strength train*).ti,ab.	655369
20	or/6-19	1281990
21	Meta Analysis.pt.	36967
22	Meta Analysis/ use emez	68832
23	Systematic Review/ use emez	57208
24	exp Technology Assessment, Biomedical/ use mesz	8791
25	Biomedical Technology Assessment/ use emez	11440
26	(meta analy* or metaanaly* or pooled analysis or (systematic* adj2 review*) or published studies or published literature or medline or embase or data synthesis or data extraction or cochrane).ti,ab.	302266
27	((health technolog* or biomedical technolog*) adj2 assess*).ti,ab.	3953
28	exp Random Allocation/ use mesz	76124
29	exp Double-Blind Method/ use mesz	117322
30	exp Control Groups/ use mesz	1362
31	exp Placebos/ use mesz	31199
32	Randomized Controlled Trial/ use emez	336877
33	exp Randomization/ use emez	60702
34	exp Random Sample/ use emez	4568
35	Double Blind Procedure/ use emez	113044
36	exp Triple Blind Procedure/ use emez	37
37	exp Control Group/ use emez	41888
38	exp Placebo/ use emez	212539
39	(random* or RCT).ti,ab.	1412123

40	(placebo* or sham*).ti,ab.	454632
41	(control* adj2 clinical trial*).ti,ab.	39053
42	exp Practice Guideline/ use emez	285751
43	exp Professional Standard/ use emez	275459
44	exp Standard of Care/ use mesz	620
45	exp Guideline/ use mesz	23122
46	exp Guidelines as Topic/ use mesz	102366
47	(guideline* or guidance or consensus statement* or standard or standards).ti.	222418
48	(controlled clinical trial or meta analysis or randomized controlled trial).pt.	455849
49	or/21-48	3032841
50	5 and 20 and 49	1269
51	limit 50 to english language	1163
52	limit 51 to yr="2002 -Current"	914
53	remove duplicates from 52	695

Cumulative Index to Nursing and Allied Health (CINAHL)

#	Query	Limiters/Expanders	Results
S1	(MH "Hip Fractures+")	Search modes - Boolean/Phrase	3,713
S2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) N4 fracture*)	Search modes - Boolean/Phrase	6,343
S3	((hip* or ((femur* or femoral*) N3 (head or neck or proximal))) N4 fracture*)	Search modes - Boolean/Phrase	5,032
S4	S1 OR S2 OR S3	Search modes - Boolean/Phrase	6,352
S5	(MH "Rehabilitation+")	Search modes - Boolean/Phrase	130,686
S6	(MH "Rehabilitation Nursing")	Search modes - Boolean/Phrase	1,982
S7	(MH "Rehabilitation Centers+")	Search modes - Boolean/Phrase	5,305
S8	(MH "Hip Fractures+/RH")	Search modes - Boolean/Phrase	487
S9	(MH "Physical Therapy Practice, Evidence-Based")	Search modes - Boolean/Phrase	1,172
S10	(MH "Physical Medicine")	Search modes - Boolean/Phrase	821
S11	(rehabilitat* or habilitat* or movement therap* or physiotherap* or physical therap* or exercis* or occupational therap* mobili?ation or strength train*)	Search modes - Boolean/Phrase	179,950
S12	S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11	Search modes - Boolean/Phrase	231,805
S13	S4 AND S12	Search modes - Boolean/Phrase	1,297
S14	(MH "Random Assignment") or (MH "Random Sample+") or (MH "Meta Analysis") or (MH "Systematic Review") or (MH "Double-Blind Studies") or (MH "Single-Blind Studies") or (MH "Triple-Blind Studies") or (MH "Placebos") or (MH "Control (Research)") or (MH "Practice Guidelines") or (MH "Randomized Controlled Trials")	Search modes - Boolean/Phrase	Display
S15	((health technology N2 assess*) or meta analy* or metaanaly* or pooled analysis or (systematic* N2 review*) or published studies or medline or embase or data synthesis or	Search modes - Boolean/Phrase	Display

	data extraction or cochrane or random* or sham*or rct* or (control* N2 clinical trial*) or guideline* or guidance or consensus statement* or standard or standards or placebo*)		
S16	S14 or S15	Search modes - Boolean/Phrase	Display
S17	S13 AND S16	Search modes - Boolean/Phrase	309
S18	S13 AND S16	Limiters - English Language Search modes - Boolean/Phrase	303
S19	S13 AND S16	Limiters - Published Date from: 20020101-20131231; English Language Search modes - Boolean/Phrase	248

Cochrane Library

ID	Search	Hits
#1	MeSH descriptor: [Hip Fractures] explode all trees	968
#2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) near/4 fracture*):ti (Word variations have been searched)	1418
#3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) near/4 fracture*):ti (Word variations have been searched)	801
#4	#1 or #2 or #3	1712
#5	MeSH descriptor: [Rehabilitation] explode all trees	12263
#6	MeSH descriptor: [Rehabilitation Nursing] explode all trees	33
#7	MeSH descriptor: [Rehabilitation Centers] explode all trees	511
#8	MeSH descriptor: [Physical Therapy Modalities] explode all trees	12803
#9	MeSH descriptor: [Physical Medicine] explode all trees	293
#10	(rehabilitat* or habilitat* or movement therap* or physiotherap* or physical therap* or exercis* or occupational therap* mobili?ation or strength train*):ti (Word variations have been searched)	20590
#11	#5 or #6 or #7 or #8 or #9 or #10	35148
#12	#4 and #11 from 2002 to 2013	111

Centre for Reviews and Dissemination (CRD)

Line	Search	Hits
1	MeSH DESCRIPTOR hip fractures EXPLODE ALL TREES	167
2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*)):TI	126
3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*)):TI	104
4	#1 OR #2 OR #3	212
5	MeSH DESCRIPTOR rehabilitation EXPLODE ALL TREES	1376
6	MeSH DESCRIPTOR rehabilitation nursing EXPLODE ALL TREES	6
7	MeSH DESCRIPTOR rehabilitation centers EXPLODE ALL TREES	74
8	MeSH DESCRIPTOR physical therapy modalities EXPLODE ALL TREES	1588
9	MeSH DESCRIPTOR physical medicine EXPLODE ALL TREES	88
10	(rehabilitat* or habilitat* or movement therap* or physiotherap* or physical therap* or exercis* or occupational therap* mobili?ation or strength train*):TI	1291
11	#5 OR #6 OR #7 OR #8 OR #9 OR #10	2962
12	#4 AND #11	19
13	(#12):TI FROM 2002 TO 2013	12

Appendix 2: Quality-Assessment Tables

Table A7: AMSTAR Score of Reviews [a]

Author, Year	AMSTAR score[a]	1) Provided Study Design	2) Duplicate Study Selection	3) Broad Literature Search	4) Considered Status of Publication	5) Listed Excluded Studies	6) Provided Characteristics of Studies	7) Assessed Scientific Quality	8) Considered Quality in Report	9) Methods to Combine Appropriate	10) Assessed Publication Bias	11) Stated Conflict of Interest
NICE/NCGC, 2011 (8)	9	✓		✓	✓	✓	✓	✓	✓	✓		✓
Stollee et al, 2011 (3)	8		✓	✓	✓		✓	✓	✓			✓
Chudyk et al, 2009 (9)	5		✓	✓			✓	✓	✓			

Abbreviations: AMSTAR, Assessment of Multiple Systematic Reviews; NCGC, National Clinical Guideline Centre; NICE, National Institute for Clinical Excellence

a details of AMSTAR method are described in Shea et al (6)

Table A2: Risk of Bias for All Studies included in the NCGC/NICE Systematic Review of Community-Based Rehabilitation versus Inpatient Rehabilitation

Source Author, Year	Allocation Concealment	Blinding	Complete Accounting of Patients and Outcome Events	Selective Reporting Bias	Other Limitations
Crotty et al, 2002 and 2003 (2;16)[a]	No serious limitations	Serious limitations[b]	Serious limitations[c]	No serious limitations	Serious limitations[d]
Ziden et al, 2008 and 2010 (13;14)[a]	No serious limitations	Serious limitations[b]	No serious limitations	Serious limitations[e]	No serious limitations

Abbreviations: FIM, Functional Independence Measure; NCGS, National Clinical Guideline Centre; NICE, National Institute for Clinical Excellence
[a] Both studies treated as one, reporting short- and long-term results
[b] Assessors were blinded to treatment allocation, but trial participants were not blinded.
[c] While the loss to follow-up and death were fully reported, the 3 lost to follow-up were all in the accelerated care group.
[d] Very poor description of the inpatient group in the study. It is unclear whether the intervention group is receiving the same intensity of rehabilitation as the control group
[e] NCGC/NICE (8) did not downgrade for reporting bias, but it is important to note that in the follow-up study by Ziden et al, 2010, mean values and standard deviations are not reported; median values and ranges are reported instead (14). Further, the authors do not report mobility FIM score, but they do report total FIM score. (14)

Table A3: GRADE Evidence Profile for Comparison of Community-Based versus Inpatient Rehabilitation in Hip Fracture Patients

No. of Studies (Design)	Risk of Bias	Inconsistency	Indirectness	Imprecision	Publication Bias	Quality
FIM						
1 (RCT)[a]	No serious limitations[b]	No serious limitations	No serious limitations	No serious limitations	Undetected	⊕⊕⊕⊕ High
ADLs evaluation using MBI[c]						
1 (RCT)[d]	Serious limitations (-1)[e]	No serious limitations	No serious limitations	Serious limitations[f]	Undetected	⊕⊕ Low
Length of Rehabilitation (Hospital + Home)						
1 (RCT)[a]	Serious limitations (-1)[g]	No serious limitations	No serious limitations	No serious limitations	Undetected	⊕⊕⊕ Moderate

Abbreviations: ADL, Activities of Daily Living;, FIM Functional Independence Measure; MBI, Modified Barthel Index; NCGS, National Clinical Guideline Centre; NICE, National Institute for Clinical Excellence; No., number; RCT, randomized controlled trial

[a] This outcome was evaluated for GRADE by NCGC/NICE (8)

[b] Risk of bias was not downgraded by NCGC/NICE (8), despite minor limitations in blinding. There are serious limitations in blinding for the follow-up study that is not reported by NCGC/NICE, but given the same statistical tests were run in the short-term and follow-up studies (13;14), no additional downgrading was done.

[c] GRADE was not assessed by review authors and was based on review of the primary RCT included in the systematic review that assessed the outcome of the MBI

[d] The two RCTs by Crotty et al (2;16) are treated as one RCT, reporting both short- and long-term outcomes

[e] Patients were not blinded, which is likely to bias results for this subjective outcome; all patients lost to follow-up were in the control group, and an inadequate description of comparator groups was provided

[f] The small number of patients gives wide confidence intervals around the estimate effect, making it difficult to know the true effect size for this outcome

[g] NCGC/NICE downgraded, because the baseline data for in each study arm were not given (8)

References

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Intensity of Rehabilitation After Hip Fracture: A Rapid Review. April 2013; pp. 1–17.

Intensity of Rehabilitation After Hip Fracture: A Rapid Review

M Nikitovic

April 2013

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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.

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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.

Permission Requests

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Table of Contents

List of Abbreviations

ADL	Activities of Daily Living
FIM	Functional Independence Measure
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 assess if increasing the intensity of the same types of rehabilitation after hip fracture improves patient functional recovery.

Clinical Need and Target Population

Hip fractures often result in significant morbidity, with most people failing to regain their prefracture levels of mobility and activity. (1) Rehabilitation after hip fracture has been recommended to improve patient recovery. (1-3) However, the dose or level of intensity of this rehabilitation is unknown.

For the purposes of this review, rehabilitation intensity was defined as different doses of the same therapy. Differences in doses of rehabilitation therapy can be reflected by the amount of time spent in therapy (e.g., time per session, frequency of sessions, and/or duration of the intervention) or the amount of work or power required to perform the same exercise (e.g., increased weights used in resistance training).

Rapid Review

Research Question

Does increasing the intensity of rehabilitation improve functional recovery following hip fracture?

Research Methods

Literature Search

A literature search was performed on February 12, 2013, using OVID MEDLINE, OVID MEDLINE In-Process and Other Non-Indexed Citations, OVID EMBASE, EBSCO Cumulative Index to Nursing & Allied Health Literature (CINAHL), the Wiley Cochrane Library, and the Centre for Reviews and Dissemination database, for studies published from January 1, 2002, until February 12, 2013. 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-text reports
- published between January 1, 2002, and February 12, 2013
- health technology assessments, systematic reviews, meta-analyses, randomized controlled trials (RCTs) and guidelines
- adult hip fracture population
- studies comparing 2 or more levels of intensity (as defined above) of the same type of rehabilitation

Exclusion Criteria

- observational studies, case reports, editorials
- studies where outcomes of interest cannot be abstracted
- studies that compared 1 dose of therapy with no treatment
- studies that compared 1 dose of therapy with different types of treatment (e.g., weight-bearing exercises versus non-weight-bearing exercises)
- studies that did not describe the control or usual care group intensity
- studies in which experimental and control groups were not treated in the same setting

Outcomes of Interest

- Two or more measures of activities of daily living (ADLs), prioritized as follows:
    1. Functional independence measure (FIM)
    2. Validated measure of instrumental ADLs
    3. Validated measure of ADLs

Expert Panel

In December 2012, an Expert Advisory Panel on Episodes of Care for Hip Fractures was struck. Members of the panel included physicians, personnel from the Ministry of Health and Long-Term Care, and representation from the community.

The role of the Expert Advisory Panel Episodes of Care for Hip Fractures was to contextualize the evidence produced by Health Quality Ontario and provide advice on the appropriate clinical pathway for a hip fracture in the Ontario health care setting. However, the statements, conclusions and views expressed in this report do not necessarily represent the views of Expert Advisory Panel members.

Results of Literature Search

The database search yielded 786 citations published between January 1, 2002, and February 12, 2013 (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.

Two systematic reviews were identified that evaluated the effectiveness of intensive physiotherapy compared to nonintensive physiotherapy after hip fracture within a larger assessment of mobilization strategies for hip fracture. (2;4) The review conducted by the National Clinical Guideline Centre (NCGC) for the National Institutes of Clinical Excellence (NICE) defined intensity broadly to include comparisons of different types of exercises or self-defined intensive programs in comparison to usual care. (2) The 3 RCTs included in the review were obtained for further assessment; however, none met the inclusion criteria of this rapid review. The Cochrane systematic review identified 2 RCTs comparing intensive physiotherapy to standard physiotherapy, defined by the amount of treatment received. (4) No outcomes of interest were reported by the Cochrane review, which was further confirmed on reviewing the RCTs.

The literature search did not identify any RCTs that assessed the effectiveness of increased intensity of rehabilitation compared with a lower dose of the same therapy. Individual RCTs or observation studies categorized as assessing intensity of rehabilitation from broad, general systematic reviews evaluating mobilization strategies or rehabilitation practices after hip fracture were further reviewed for potential inclusion. (5;6) No studies were identified that met the specific inclusion criteria of the current review. Most individual trials were designed to evaluate different types of therapy, augmentation of one therapy with another, or the effects of a therapy compared with no treatment, placebo treatment, or an undefined or multicomponent usual care intervention.

Clinical Guidelines

No clinical guidelines were identified that provided an evaluation or recommendations on the intensity of rehabilitation subsequent to hip fracture.

Conclusions

No systematic reviews, meta-analyses, health technology assessments, or randomized controlled trials (RCTs) were identified that directly evaluated the evidence for increased intensity of rehabilitation on activities of daily living (ADL) after hip fracture.

Acknowledgements

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Joanna Odrowaz, BSc (Hons.)

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

Expert Panel for Health Quality Ontario: Episode of Care for Hip Fracture

Name	Role	Organization
Chair		
Dr. James Waddell	Orthopedic surgeon	St. Michael's Hospital, Toronto
Orthopedic Surgery		
Dr. John P. Harrington	Orthopedic surgeon	William Osler Health System, Toronto
Dr. Mark Harrison	Orthopedic surgeon	Queen's University, Kingston
Dr. Hans J. Kreder	Professor	Division of Orthopaedics, Department of Surgery, University of Toronto
Dr. Allan Liew	Orthopedic surgeon	Department of Surgery, University of Ottawa
Dr. Mark MacLeod	Orthopedic surgeon	London Health Sciences Centre
Dr. Aaron Nauth	Orthopedic surgeon	St. Michael's Hospital/University of Toronto
Dr. David Sanders	Orthopedic surgeon	London Health Sciences Centre
Dr. Andrew Van Houwelingen	Orthopedic surgeon	St. Thomas Elgin General Hospital
Anesthesiology		
Dr. Nick Lo	Staff anesthesiologist	St. Michael's Hospital, Toronto
Emergency Medicine		
Dr. Michael O'Connor	Emergency medicine	Kingston General Hospital
Dr. Lisa Shepherd	Emergency medicine	South West Local Health Integration Network (LHIN), London
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Community Care Access Centres		
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Janet McMullan	Project director, consultant	Bone and Joint Canada
Professional Organizations		
Ravi Jain	Director, Ontario osteoporosis strategy	Osteoporosis Canada
Rhona McGlasson	Executive director	Bone and Joint Canada

Appendices

Appendix 1: Literature Search Strategies

Search date: February 12, 2013
Databases searched: OVID MEDLINE, MEDLINE In-Process and Other Non-Indexed Citations, EMBASE; CINAHL; Cochrane Library; CRD

Limits: 2002-current; English
Filters: Meta-analysis, systematic reviews, heath technology assessments, RCTs and guidelines

Database: Ovid MEDLINE(R) <1946 to January Week 5 2013>, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations <February 11, 2013>, Embase <1980 to 2013 Week 06>
Search Strategy:

#	Searches	Results
1	exp Hip Fractures/ use mesz	16222
2	exp Hip Fracture/ use emez	26495
3	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*).ti,ab.	55825
4	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*).ti,ab.	38575
5	or/1-4	69278
6	exp Rehabilitation/	332918
7	Rehabilitation Nursing/	1961
8	exp Rehabilitation Centers/ use mesz	11332
9	exp rehabilitation center/ use emez	8264
10	exp "Physical and Rehabilitation Medicine"/ use mesz	18976
11	exp rehabilitation medicine/ use emez	4537
12	exp rehabilitation research/ use emez	284
13	exp rehabilitation care/ use emez	7452
14	exp Hip Fractures/rh [Rehabilitation]	2151
15	exp hip fracture/rh [Rehabilitation]	2151
16	exp Physical Therapy Modalities/ use mesz	114382
17	exp physical medicine/ use emez	363451
18	exp mobilization/ use emez	15408
19	(rehabilitat* or habilitat* or movement therap* or physiotherap* or physical therap* or exercis* or occupational therap* mobili?ation or strength train*).ti,ab.	655369
20	or/6-19	1281990
21	Meta Analysis.pt.	36967
22	Meta Analysis/ use emez	68832
23	Systematic Review/ use emez	57208
24	exp Technology Assessment, Biomedical/ use mesz	8791
25	Biomedical Technology Assessment/ use emez	11440
26	(meta analy* or metaanaly* or pooled analysis or (systematic* adj2 review*) or published studies or published literature or medline or embase or data synthesis or data extraction or cochrane).ti,ab.	302266
27	((health technolog* or biomedical technolog*) adj2 assess*).ti,ab.	3953
28	exp Random Allocation/ use mesz	76124
29	exp Double-Blind Method/ use mesz	117322

30	exp Control Groups/ use mesz	1362
31	exp Placebos/ use mesz	31199
32	Randomized Controlled Trial/ use emez	336877
33	exp Randomization/ use emez	60702
34	exp Random Sample/ use emez	4568
35	Double Blind Procedure/ use emez	113044
36	exp Triple Blind Procedure/ use emez	37
37	exp Control Group/ use emez	41888
38	exp Placebo/ use emez	212539
39	(random* or RCT).ti,ab.	1412123
40	(placebo* or sham*).ti,ab.	454632
41	(control* adj2 clinical trial*).ti,ab.	39053
42	exp Practice Guideline/ use emez	285751
43	exp Professional Standard/ use emez	275459
44	exp Standard of Care/ use mesz	620
45	exp Guideline/ use mesz	23122
46	exp Guidelines as Topic/ use mesz	102366
47	(guideline* or guidance or consensus statement* or standard or standards).ti.	222418
48	(controlled clinical trial or meta analysis or randomized controlled trial).pt.	455849
49	or/21-48	3032841
50	5 and 20 and 49	1269
51	limit 50 to english language	1163
52	limit 51 to yr="2002 -Current"	914
53	remove duplicates from 52	695

CINAHL

#	Query	Limiters/Expanders	Results
S1	(MH "Hip Fractures+")	Search modes - Boolean/Phrase	3,713
S2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) N4 fracture*)	Search modes - Boolean/Phrase	6,343
S3	((hip* or ((femur* or femoral*) N3 (head or neck or proximal))) N4 fracture*)	Search modes - Boolean/Phrase	5,032
S4	S1 OR S2 OR S3	Search modes - Boolean/Phrase	6,352
S5	(MH "Rehabilitation+")	Search modes - Boolean/Phrase	130,686
S6	(MH "Rehabilitation Nursing")	Search modes - Boolean/Phrase	1,982

S7	(MH "Rehabilitation Centers+")	Search modes - Boolean/Phrase	5,305
S8	(MH "Hip Fractures+/RH")	Search modes - Boolean/Phrase	487
S9	(MH "Physical Therapy Practice, Evidence-Based")	Search modes - Boolean/Phrase	1,172
S10	(MH "Physical Medicine")	Search modes - Boolean/Phrase	821
S11	(rehabilitat* or habilitat* or movement therap* or physiotherap* or physical therap* or exercis* or occupational therap* or mobili?ation or strength train*)	Search modes - Boolean/Phrase	179,950
S12	S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11	Search modes - Boolean/Phrase	231,805
S13	S4 AND S12	Search modes - Boolean/Phrase	1,297
S14	(MH "Random Assignment") or (MH "Random Sample+") or (MH "Meta Analysis") or (MH "Systematic Review") or (MH "Double-Blind Studies") or (MH "Single-Blind Studies") or (MH "Triple-Blind Studies") or (MH "Placebos") or (MH "Control (Research)") or (MH "Practice Guidelines") or (MH "Randomized Controlled Trials")	Search modes - Boolean/Phrase	Display
S15	((health technology N2 assess*) or meta analy* or metaanaly* or pooled analysis or (systematic* N2 review*) or published studies or medline or embase or data synthesis or data extraction or cochrane or random* or sham*or rct* or (control* N2 clinical trial*) or guideline* or guidance or consensus statement* or standard or standards or placebo*)	Search modes - Boolean/Phrase	Display
S16	S14 or S15	Search modes - Boolean/Phrase	Display
S17	S13 AND S16	Search modes - Boolean/Phrase	309
S18	S13 AND S16	Limiters - English Language Search modes - Boolean/Phrase	303
S19	S13 AND S16	Limiters - Published Date from: 20020101-20131231; English Language Search modes - Boolean/Phrase	248

Cochrane Library

ID	Search	Hits
#1	MeSH descriptor: [Hip Fractures] explode all trees	968
#2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) near/4 fracture*):ti (Word variations have been searched)	1418
#3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) near/4 fracture*):ti (Word variations have been searched)	801
#4	#1 or #2 or #3	1712
#5	MeSH descriptor: [Rehabilitation] explode all trees	12263
#6	MeSH descriptor: [Rehabilitation Nursing] explode all trees	33
#7	MeSH descriptor: [Rehabilitation Centers] explode all trees	511
#8	MeSH descriptor: [Physical Therapy Modalities] explode all trees	12803
#9	MeSH descriptor: [Physical Medicine] explode all trees	293
#10	(rehabilitat* or habilitat* or movement therap* or physiotherap* or physical therap* or exercis* or occupational therap* mobili?ation or strength train*):ti (Word variations have been searched)	20590
#11	#5 or #6 or #7 or #8 or #9 or #10	35148
#12	#4 and #11 from 2002 to 2013	111

CRD

Line	Search	Hits
1	MeSH DESCRIPTOR hip fractures EXPLODE ALL TREES	167
2	((hip* or femur* or femoral* or trochant* or petrochant* or intertrochant* or subtrochant* or intracapsular* or extracapsular*) adj4 fracture*)):TI	126
3	((hip* or ((femur* or femoral*) adj3 (head or neck or proximal))) adj4 fracture*)):TI	104
4	#1 OR #2 OR #3	212
5	MeSH DESCRIPTOR rehabilitation EXPLODE ALL TREES	1376
6	MeSH DESCRIPTOR rehabilitation nursing EXPLODE ALL TREES	6
7	MeSH DESCRIPTOR rehabilitation centers EXPLODE ALL TREES	74
8	MeSH DESCRIPTOR physical therapy modalities EXPLODE ALL TREES	1588
9	MeSH DESCRIPTOR physical medicine EXPLODE ALL TREES	88
10	(rehabilitat* or habilitat* or movement therap* or physiotherap* or physical therap* or exercis* or occupational therap* mobili?ation or strength train*):TI	1291
11	#5 OR #6 OR #7 OR #8 OR #9 OR #10	2962
12	#4 AND #11	19
13	(#12):TI FROM 2002 TO 2013	12

References

(1) McGlasson R, MacDonald V, Lo N, Spafford D, McMullan JL, Beaupre L, et al. Waddell J,editor. National hip fracture toolkit [Internet]. Bone and Joint Decade Canada. 2011 [cited 2013 Feb]. 73 p. Available from: www.boneandjointcanada.com

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