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Optimal Timing of Hip Fracture Surgery: A Rapid Review

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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 This rapid review may be superseded by an updated publication on the same topic.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

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

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 2, 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
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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
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

Name	Role	Organization
Research		
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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
Kathy Sabo	Senior vice president, clinical programs/operations	University Health Network, Toronto
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: 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 2: Quality Assessment Table

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
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)

References

(1) Whinney CM. Do hip fractures need to be repaired within 24 hours of injury? Cleve Clin J Med. 2005 Mar;72(3):250-2.

(2) Mullen JO, Mullen NL. Hip fracture mortality. A prospective, multifactorial study to predict and minimize death risk. Clin Orthop Relat Res. 1992 Jul;(280):214-22.

(3) Frood J, Johnson T. Improving measures of hip fracture wait times: a focus on Ontario. Healthcare Quarterly. 2010;13(4):16-8.

(4) 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 2012 Dec]. 73 p. Available from: www.boneandjointcanada.com.

(5) Mak JC, Cameron ID, March LM. Evidence-based guidelines for the management of hip fractures in older persons: an update. Med J Aust. 2010 Jan 4;192(1):37-41.

(6) National Clinical Guideline Centre. The management of hip fracture in adults: methods, evidence & guidance [Internet]. London, UK: National Clinical Guideline Centre; 2011. [cited 2012 Dec]. 658 p. Available from: www.ncgc.ac.uk.

(7) Scottish Intercollegiate Guidelines Network. Management of hip fracture in older people: A national clinical guideline [Internet]. Edinburgh: Scottish Intercollegiate Guidelines Network; 2009. Available from: www.sign.ac.uk.

(8) Ontario Ministry of Health and Long-Term Care. First ever common benchmarks will allow Canadians to measure progress in reducing wait times [Internet]. Toronto: Ontario Ministry of Health and Long-Term Care; [updated 2005; cited 2012 Jun 12]. Available from: http://news.ontario.ca/archive/en/2005/12/12/First-ever-common-benchmarks-will-allow-Canadians-to-measure-progress-in-reducin.html.

(9) Ontario Ministry of Health and Long-Term Care. Ontario Wait Times [Internet]. Toronto: Ontario Ministry of Health and Long-Term Care; [updated 2009; cited 2012 Dec 17]. Available from: http://www.health.gov.on.ca/en/pro/programs/waittimes/surgery/target.aspx

(10) Canadian Institute for Health Information. Health Indicators [Internet]. Toronto: CIHI; 2012 [cited 2012 Dec 17]. Available from: https://secure.cihi.ca/free_products/health_indicators_2012_en.pdf.

(11) Royal College of Physicians. Falling standards, broken promises: report of the national audit of falls and bone health in older people. England: Royal College of Physicians; 2010 [cited 2012 Oct 12]. Available from: http://www.rcplondon.ac.uk/sites/default/files/national_report.pdf.

(12) 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.

(13) 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.

(14) Shiga T, Wajima Z, Ohe Y. Is operative delay associated with increased mortality of hip fracture patients? Systematic review, meta-analysis, and meta-regression. Can J Anaesth. 2008 Mar;55(3):146-54.

(15) Khan SK, Kalra S, Khanna A, Thiruvengada MM, Parker MJ. Timing of surgery for hip fractures: a systematic review of 52 published studies involving 291,413 patients. Injury. 2009 Jul;40(7):692-7.

(16) Simunovic N, Devereaux PJ, Sprague S, Guyatt GH, Schemitsch E, Debeer J, et al. Effect of early surgery after hip fracture on mortality and complications: systematic review and meta-analysis. CMAJ. 2010 Oct 19;182(15):1609-16.

(17) Leung F, Lau TW, Kwan K, Chow SP, Kung AW. Does timing of surgery matter in fragility hip fractures? Osteoporos Int. 2010 Dec;21(Suppl 4):S529-S534.

(18) Moja L, Piatti A, Pecoraro V, Ricci C, Virgili G, Salanti G, et al. Timing matters in hip fracture surgery: patients operated within 48 hours have better outcomes. A meta-analysis and meta-regression of over 190,000 patients. PLoS One. 2012;7(10):e46175.

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