Infection preventive interventions in primary total hip replacements

This is an excerpt from the full technical report, which is written in Norwegian.

The excerpt provides the report's main messages in English.

No. 14–2011

Systematic review

kunnskapssenteret

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Norwegian Knowledge Centre for the Health Services summarizes and disseminates evidence concerning the effect of treatments, methods, and interventions in health services, in addition to monitoring health service quality. Our goal is to support good decision making in order to provide patients in Norway with the best possible care. The Centre is organized under The Norwegian Directorate for Health, but is scientifically and professionally independent. The Centre has no authority to develop health policy or responsibility to implement policies.

We would like to thank all contributers for their expertise in this project. Norwegian Knowledge Centre for the Health Services assumes final responsibility for the content of this report.

Norwegian Knowledge Centre for the Health Services
Oslo, August 2011

Key Messages (in English)

We have evaluated the level of evidence related to infection control measures in total hip replacement (arthroplasty) based on relevant systematic reviews and evidence-based guidelines. We included eight systematic reviews. We found no evidence based guidelines on hip arthroplasty, arthroplasty or orthopaedic surgery, but we included one guideline on infection control in general surgery. The following major conclusions were drawn:

- Systemic prophylaxis with antibiotics may reduce the number of infections in total hip arthroplasty
- Closed suction wound drainage probably has no, or very low impact on the number of infections associated with total hip arthroplasty
- For minimally invasive surgery, choice of prosthesis, ventilation, clinical pathways, suture versus staples, and reduction of methotrexate, we were unable to conclude regarding infection control in total hip arthroplasty
- Based on the included guideline we found no references to studies focusing on infection control and hip arthroplasty

Recommendations on infection control measures in total hip arthroplasty, need to a large extent to rely on transferability of evidence from other patient populations, analysis of results from registries, expert opinions as well as knowledge about causality. New research may alter the conclusions.

Infection preventive interventions in primary total hip replacements

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Type of publication:

Systematic review

A review of a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyse data from the studies that are included in the review. Statistical methods (meta-analysis) may or may not be used to analyse and summarise the results of the included studies.

Doesn't answer everything:

- Excludes studies that fall outside of the inclusion criteria
- No recommendations

Publisher:

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Last search for studies: August, 2010.

Executive summary (English)

Background

In Norway there are approximately 8000 hip replacements (hip arthroplasty) performed each year. The majority of these involve total hip arthroplasty due to coxarthrosis. Deep infections associated with the prosthesis are rare but serious complications of total hip arthroplasty with the need for long lasting treatment often with an uncertain outcome. This has prompted a need for evaluation of infection control measures in this area. In the spring of 2009 we received four partially overlapping requests regarding the prevention of infections after surgery, with special emphasis on orthopedic implant surgery. A decision was made to asses this question in the light of a National patient safety campaign. In August and September 2009 initial meetings were held between the project group and commissioning parties. Based on these meetings it was decided that the project should focus on two questions:
1) What is the evidence in support of using the checklists for safe surgery?
2) What is the evidence in support of infection preventive measures in total hip arthroplasty?
Question 1 was answered in an early assessment report on the WHO checklist for safe surgery, published at our website for emerging technologies in January 2010 (10). The current report is intended to answer question 2.

Method

We searched several databases for systematic reviews and guidelines on infection prevention measures. To supplement the information we also performed a hand search. The last systematic search was performed in August 2010, the last hand search was performed in January 2011. The quality of relevant reviews was evaluated using our check list for systematic reviews. For each intervention the most updated systematic review of high or medium quality was included. In cases where outcome measures could be extracted or calculated, the level of evidence in support of each estimate was graded according to the program GRADEprofiler.

Results

We did not find a systematic review focusing on the research question per se. Among 137 identified unique titles, eight medium to high quality reviews were included. The research question of each review varied, but at least infection and/or revision due to infection in total hip arthroplasty was said to be among the outcomes to be reported. Interventions evaluated in the reviews were antibiotic prophylaxis, surgical wound drainage, minimally invasive surgery, choice of prosthesis, ventilation, clinical pathways suture versus staples and reduction of methotrexate for patients with rheumatoid arthritis. Main findings relevant to this report are summarized in Table 1. We found no evidence-based guidelines for infection control in hip arthroplasty, arthroplasty, or orthopedic surgery in general. We found an evidence-based English guideline from 2008 on the prevention of infection after surgery which provided answers to 29 questions on different interventions (9). With the exception of antibiotic prophylaxis, there were no interventions in particular recommended for arthroplasty.

Discussion

We did not search for primary research and can not exclude that more relevant studies may be available. However, our evaluation of the included guideline revealed that recommendations on infection control measures in total hip arthroplasty to a large extent need to rely on transferability of evidence derived from other patient populations, results of registry studies, knowledge about causality and expert opinions. This is probably due to the fact that infection is a relatively rare complication, and that the field of hip arthroplasty is quickly evolving with large variations in procedures and implants. Systematic reviews that were not with weaknesses in the synopsis of results were included. Conclusions based on findings in these reviews must be interpreted with caution. We found a protocol on an English ongoing HTA on infection prevention in total hip arthroplasty to be completed in 2014, as well as a Danish ongoing HTA on ventilation during hip surgery to be completed in 2011.

Conclusions

While prophylaxis with systemic antibiotics may reduce the number of infections, closed suction wound drainage probably does not have an impact on the number of infections associated with total hip arthroplasty. For other interventions no conclusions could be made regarding infection control measures in particular relating to total hip arthroplasty. Recommendations on infection control measures in total hip arthroplasty, need to a large extent to rely on transferability of evidence from other patient populations, analysis of results from registries, expert opinions, as well as knowledge about causality. New research may alter our conclusions.

Table 1 *Included systematic reviews and main findings related to infection in total hip arthroplasty*

Source, year and quality[1]	Intervention/ Comparator	Studies [2] (partcipants)	Main findings	Graded level of evidence[3]
HTA 2010 (1) High	Systemic ab[4] prophylaxis/ No ab prophylaxis	1 HTA 1999: 5 RCT (2582)	A meta-analysis revealed that systemic antibiotic prophylaxis may reduce the number of infections	Moderate
	One type of ab[4]/another type of ab	1 HTA 1999 and 1SR 2008: 17 RCT (not stated)	Meta-analysis revealed no significant differences	Very low to low
	One dose or duration of ab[4] / another dose or duration of ab	7 RCT (196 to 3013), 1 OBS 2003 (3618 and 14465)	The studies were to different to aggregate. Estimates based on individual studies revealed no significant difference in the number of infections.	Very low to moderate
	Ab[4] in cement alone / systemic ab prophylaxis alone	2 RCT (1685 and 402)	The studies were to different to aggregate. Based on the largest study gentamicin in cement may reduce deep infections, but increase superficial infections	Low
SR 2007 (2) High	Closed suction wound drainage/ no wound drainage	12 RCT (1415)	A meta-analysis revealed no significant differences in the number of infections.	Low
HTA 2008 (3) High	Minimal invasive surgery/ Open surgery	7 RCT (819), 9 OBS (974)	Few and very small studies. No significant difference in number of inefctions	Very low
HTA 2002 (4) High*	Choice of implant type/Choice of a different implant type	Not summarized	Several RCTs to small to provide conclusions alone, and to different to allow aggregation of results.	Not graded
HTA 2001 (5) Medium*	Ventilation ultra clean air/ No ventilation	2 RCT (8000 and 7305)	Different results, many unecrainties realted to study design, data on infection not reported in detail.	Not graded
SR 2009 (6) Medium**	Clinical pathway/ No Clinical pathwayr	1 RCT (163), 2 OBS (893 and 110)	Few and very small studies	Not graded
SR 2010(7) Medium**	Staples / sutur	1 RCT (69), 2 OBS (64 and 73)	Few and very small studies	Not graded
SR 2009 (8) Medium**	Reduction of methotrexate usage/ no reduction of methotrexate usage	2 RCT (162 and 338), 2 OBS (32 and 116)	Few and very small studies	Not graded

*[1]According to our checklist for systematic reviews, [*]Not updated, **With weakness related to synopsis of results. [2] Restricted to comparisons and outcomes relevant for this report were review. [3]Documentation for outcome measures evaluated using GRADE profiler. HTA= Health Technology Assessment, RCT= Randomized Controlled Trial, SR= Systematic Review. OBS= Observational studies. [4] ab= antibiotic prophylaxis*

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