The clinical effectiveness of glucosamine and chondroitin supplements in slowing or arresting progression of osteoarthritis of the knee: a systematic review and economic evaluation

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Record Status

This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary

This study examined the cost-effectiveness of glucosamine supplements for patients with knee osteoarthritis. The Health Technology Assessment (HTA) systematically reviewed the clinical evidence on glucosamine and chondroitin supplements and concluded that the cost-effectiveness of glucosamine was not conclusively demonstrated given the uncertainty in some inputs to the model, especially the quality of life associated with therapy. It was conducted in accordance with the recommendations for HTAs and this ensures the validity of the conclusions.

Type of economic evaluation

Cost-utility analysis

Study objective

This study examined the cost-effectiveness of glucosamine supplement added to usual care for the management of patients with osteoarthritis of the knee. It was a Health Technology Assessment (HTA) that systematically reviewed the clinical evidence not only on glucosamine, but also on chondroitin supplements.

Interventions

Glucosamine sulphate added to usual care was compared against usual care alone. Usual care was defined as any care received from health care providers, with or without physical therapies and investigations, and treatment with prescribed medicines. Chondroitin supplements were excluded from the economic analysis as no clinical advantage over usual care was found in the clinical review.

Location/setting

UK/primary and secondary care.

Methods

Analytical approach:

The analysis was based on a probabilistic Markov model with a lifetime horizon. The authors stated that the perspective of the National Health Service (NHS) was adopted.

Effectiveness data:

A systematic review of the literature was undertaken. Several medical and economic electronic databases were searched. Details of search methods and inclusion/exclusion criteria were reported. Only randomised controlled trials (RCTs) with a follow-up longer than 12 months and systematic reviews of RCTs were included in the analysis. The key clinical input was the probability of undergoing total knee replacement, which was considered as a definition of treatment efficacy and was derived from a published pooled analysis of two RCTs with long follow-up periods (three and five years).

Monetary benefit and utility valuations:

Utility values were derived from a published RCT that reported Western Ontario and McMaster Universities (WOMAC) Osteoarthritis Index data, which could be converted into a preference-based utility scale, namely the Health Utilities Index (HUI3). This conversion was based on the results of a Canadian study that included 255 patients with symptomatic knee osteoarthritis.

Measure of benefit:
Quality-adjusted life-years (QALYs) were used as the summary benefit measure and were discounted at an annual rate of 3.5%.

Cost data:
The economic analysis included costs associated with supplements, management of knee osteoarthritis (general practitioner visits, medications, out-patient visits, in-patient care, professions allied to medicine consultations, complementary therapists and X-ray procedures) and total knee replacement surgery. Resource use data were obtained from an RCT conducted in the UK and from NHS reference costs. Glucosamine sulphate had no UK licence, thus the price of glucosamine hydrochloride was used. Costs were in UK pounds sterling (£) and referred to 2007 to 2008 prices. A 3.5% annual discount rate was used.

Analysis of uncertainty:
The issue of uncertainty was investigated with two approaches. First, both stochastic and non-stochastic parameters were varied individually in a one-way sensitivity analysis that used lower and upper bounds derived from published confidence intervals. Second, a probabilistic sensitivity analysis was undertaken that used specific distribution probability for model inputs. The expected value of perfect information (EVPI) was determined in order to investigate whether it would be worthwhile commissioning further research on the cost-effectiveness of supplements.

Results
Discounted costs were £4,634 with usual care and £7,039 with glucosamine. QALYs were 8.17 with usual care and 8.28 with glucosamine. The incremental cost per QALY gained with glucosamine over usual care was £21,335.

Deterministic analysis showed that cost-utility ratios were robust. The most influential model inputs were quality of life associated with therapy.

The probability of glucosamine being cost-effective was 0.43 at a willingness-to-pay threshold of £20,000 per QALY and 0.73 at a threshold of £30,000 per QALY. The EVPI indicated that the value of further research was high for a range of commonly applied ceiling ratios (£10,000 to £50,000).

Authors' conclusions
The authors concluded that cost-effectiveness of glucosamine had not been conclusively demonstrated, given the uncertainty observed for some determinants of the models and especially assumptions of quality of life associated with therapy.

CRD commentary
Interventions:
The HTA considered the following supplements: glucosamine sulphate, glucosamine hydrochloride, chondroitin and glucosamine/chondroitin combination therapy. However, the literature review on clinical efficacy showed that only glucosamine sulphate was associated with evidence of long-term efficacy over placebo. Thus the other comparators were excluded from the economic evaluation. The authors pointed out that usual care included a wide range of prescribed medicines such as: antacids; hypnotics and anxiolytics; antidepressants; analgesics; corticosteroids, drugs for nutritional, blood, musculoskeletal and joint diseases; and local anaesthetics.

Effectiveness/benefits:
The approach used to identify the clinical inputs of the model was valid and was described extensively. Inclusion criteria were appropriate and ensured inclusion of high-quality evidence. Only RCTs and systematic reviews of RCTs were included. Some key details of data sources were reported; these ensured a high degree of transparency for the analysis. Details of the derivation of utility values and underlying assumptions were reported and appeared appropriate and justified. QALYs were a valid benefit measure given the impact of the disease and therapy on quality of life.

Costs:
The economic analysis was consistent with the study perspective with respect to both data sources and types of costs. The economic estimates reflected the UK setting and might not be applicable to other health care systems. The price

year and use of discounting were reported. Some details on unit costs and quantities of resources used were provided. Costs were varied, both in a deterministic and in a stochastic sensitivity analysis.

Analysis and results:
The analytic approach used to derive and to synthesise costs and benefits was appropriate. The study results were clearly presented. The issue of uncertainty was satisfactorily investigated with various approaches and was discussed clearly. Details of the decision model were clearly presented. The authors compared their findings with those from other economic evaluations that showed the potential differences with other studies. Further research was recommended with a view to reducing the uncertainty associated with some model parameters.

Concluding remarks:
The study was conducted in accordance with the recommendations for HTAs, which ensures the validity of the authors' conclusions.

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Bibliographic details
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Other publications of related interest
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