Cost-effectiveness analysis of oseltamivir for influenza treatment considering the virus emerging resistant to the drug in Japan

Nagase H, Moriwaki K, Kamae M, Yanagisawa S, Kamae I

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 oseltamivir for influenza treatment, in the general population, considering complications, such as pneumonia, and the emergence of a drug-resistant virus. The authors concluded that oseltamivir was a cost-effective treatment for influenza in Japan, especially in high-risk patients with a 70% prevalence of disease or at an emergence rate of less than 27%. The methods appear to have been valid and, despite the limited reporting of the data sources, the authors’ conclusions are robust.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to examine the cost-effectiveness of oseltamivir for influenza treatment, in the general population, considering complications, such as pneumonia, and the emergence of a drug-resistant virus.

Interventions
The two interventions were rapid diagnostic testing followed by treatment with oseltamivir compared with no testing plus conventional treatment, which was a dose of a febrifuge, such as paracetamol, without oseltamivir.

Location/setting
Japan/primary care.

Methods
Analytical approach:
The analysis was based on a decision tree with a 53-day time horizon. The authors stated that the perspectives of the payer and the society were adopted.

Effectiveness data:
Some of the clinical data were from Japanese trials, while other data were from a systematic review of studies conducted in Western countries. The prevalence of influenza and the rate of emergence of a drug-resistant virus were the key inputs.

Monetary benefit and utility valuations:
The utility values were from two published sources. No Japanese studies were found and so the utility weights were from patients in other countries.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure.

Cost data:
The economic analysis included the costs of drugs, primary and secondary resources for treating each complication, physician consultations, prescriptions, hospitalisations, and productivity losses. These costs were derived from Japanese databases. The resource use data were estimated using published sources and authors’ opinions. Productivity losses were determined using average working rates for the adult Japanese population and the mean wage of healthy adults. The
costs were in Japanese yen (JPY) and were also reported in US dollars ($).

**Analysis of uncertainty:**
A deterministic one-way sensitivity analysis was undertaken on four key inputs: the prevalence of influenza, the sensitivity and specificity of the rapid diagnostic test, and the rate of emergence of a drug-resistant virus. The prevalence of influenza and the rate of emergence of a drug-resistant virus were also varied in a two-way sensitivity analysis. A Monte Carlo simulation was performed, using a normal distribution for the prevalence of influenza and a triangular distribution for the rate of emergence of a drug-resistant virus.

**Results**
The expected costs without productivity losses were JPY 13,269 with conventional treatment and JPY 13,548 with oseltamivir. Including productivity losses they were JPY 22,455 with conventional treatment and JPY 20,813 with oseltamivir. The QALYs were 0.1374 with conventional treatment and 0.1381 with oseltamivir.

The incremental cost per QALY gained without productivity losses was JPY 398,571 ($3,320). When including productivity losses, oseltamivir was dominant as it was less expensive and more effective. In the elderly population (over 65 years old) oseltamivir was dominant, even without productivity losses.

The sensitivity analysis showed that oseltamivir was no longer dominant: when the prevalence of influenza was under 39%, when the sensitivity of the rapid diagnostic test was lower than 60%, or when the rate of emergence of a drug-resistant virus was greater than 27%. The emergence rate had more influence in a non-epidemic season than in an epidemic one. At a threshold of JPY 6,000,000 ($50,000) per QALY, there was an 80% probability that oseltamivir was cost-effective.

**Authors' conclusions**
The authors concluded that oseltamivir was a cost-effective treatment for influenza in Japan, especially in high-risk patients with a 70% prevalence of disease or at a drug-resistant virus emergence rate of less than 27%.

**CRD commentary**
**Interventions:**
The selection of the comparators was appropriate as oseltamivir, a new neuraminidase inhibitor, was compared with the usual care in the authors' setting.

**Effectiveness/benefits:**
The approach used to identify the clinical data and the sources were not appropriately described, which means an extensive assessment of the data quality is not possible. Extensive sensitivity analyses were performed on the clinical inputs. The authors stated that most of the data were not available for Japanese populations and studies conducted in other countries had to be used. QALYs were a valid benefit measure and they capture the impact of the disease on health-related quality of life, but little information was provided on the derivation of utility values.

**Costs:**
The economic analysis adopted two perspectives, and the categories of costs were appropriate. The unit costs were reported extensively, but the resource use data were only partly given. The price year was not clearly stated, which will hinder reflation exercises for other time periods. The data sources were not fully described. The cost estimates were treated deterministically and were not varied in the sensitivity analysis.

**Analysis and results:**
The analytic approach used to synthesise the costs and benefits was appropriate. The issue of uncertainty was satisfactorily addressed, but focused exclusively on the epidemiological inputs. The results were clearly presented. An appropriate explanation for the selection of the short time horizon was provided. The authors acknowledged some limitations of their analysis and these mainly related to the lack of Japanese data for some clinical inputs and the utility weights.

**Concluding remarks:**
The methods appear to have been valid and, despite the limited reporting of the data sources, the authors’ conclusions are robust.

**Funding**
No funding received.

**Bibliographic details**

**PubMedID**
20586984

**DOI**
10.1111/j.1524-4733.2009.00629.x

**Original Paper URL**

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Antiviral Agents /economics /therapeutic use; Cost-Benefit Analysis; Decision Support Techniques; Drug Resistance, Viral; Humans; Influenza, Human /drug therapy /economics; Japan; Models, Economic; Oseltamivir /economics /therapeutic use; Quality-Adjusted Life Years

**AccessionNumber**
22010000155

**Date bibliographic record published**
14/07/2010

**Date abstract record published**
29/09/2010