Cost-effective strategies for mitigating a future influenza pandemic with H1N1 2009 characteristics

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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
The objective was to estimate the cost-effectiveness of a range of interventions for a pandemic of influenza with H1N1 2009 characteristics. The authors concluded that the most cost-effective interventions were antiviral treatment and prevention strategies with or without school closures for a limited period. There was no incremental cost-effectiveness analysis, the cost data were not Australian, and a limited sensitivity analysis was performed. Caution is required when assessing the validity of the authors’ conclusions.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to estimate the cost-effectiveness of a range of interventions for a pandemic of influenza, with H1N1 2009 characteristics.

Interventions
The interventions were school closures (for various periods), antiviral drugs (treatment and prevention), a 50% reduction in workplace attendance, and a 50% reduction in community contact. All interventions were assessed individually and in combination, and they were compared with no intervention.

Location/setting
Australia/community care.

Methods
Analytical approach:
A developed, individual person, model was used to simulate the dynamics of an H1N1 pandemic in a community of approximately 30,000 people in Western Australia. The authors stated that a societal perspective was adopted.

Effectiveness data:
The clinical and effectiveness data were from a number of published sources and studies. The main effectiveness estimate was the probability of transmission of the virus with each of the interventions. Most of these estimates were from three published studies.

Monetary benefit and utility valuations:
None.

Measure of benefit:
The measure of benefit was H1N1 cases prevented.

Cost data:
The direct costs included those of antiviral drugs including dispensing, general practitioner visits, and hospitalisations including intensive care. The indirect costs included those of death and illness, and the impact of the intervention, such as workplace or school closures. The probabilities of accessing health care after being infected with H1N1 were from Western Australia. Those for length of stay and intensive care resource use were from published studies. All
productivity losses were valued using average wages. Productivity lost due to death was calculated using the net present value of future earnings and this was discounted at an annual rate of 3%. All unit costs were from US sources. The price year was 2010 and all costs were in US dollars ($).

Analysis of uncertainty:
A one-way sensitivity analysis was performed by altering the transmission rate of the H1N1 virus.

Results
For 100,000 people, the cost of an H1N1 pandemic, with no intervention, was $6.3 million. The interventions with the lowest costs were the antiviral drug strategies, and combinations of these with school closures. These costs ranged from $5.9 million to $7.7 million. The most costly interventions were school and workplace closures plus reduced contact plus antiviral treatment ($22.3 million), and continuous school and workplace closures ($103 million).

The highest percentage reduction in the attack rate or the most H1N1 cases prevented was produced by a combination of school and workplace closure, contact reduction, and antiviral treatment and prevention (reduction of 81.5%). The antiviral prevention and treatment strategies and combinations of these with school closures reduced the attack rate by from 65.1% to 79%.

The cost per case prevented was lowest for the antiviral prevention and treatment strategies with or without school closures, where it ranged from $632 to $777. It was highest ($9,894) for continuous school and workplace closures. Increasing the transmission rate of the H1N1 virus had no impact on the results.

Authors' conclusions
The authors concluded that the most cost-effective interventions were antiviral treatment and prevention strategies with or without school closures for a limited period.

CRD commentary
Interventions:
The interventions were reported adequately.

Effectiveness/benefits:
The authors provided very brief details on the methods used to identify and derive the effectiveness estimates. No systematic review was reported, and few details of the data sources were provided. This makes it impossible to determine if the most up to date and relevant information was used. The outcome of cases prevented was quite specific, making comparisons with other interventions, within the same or other therapeutic areas, difficult. It also limited the ability to make decisions on cost-effectiveness.

Costs:
The authors stated that a societal perspective was adopted, and all the relevant cost categories and costs appear to have been included. The authors appropriately reported the sources for the resource use and unit costs. The resource quantities were mostly from Australian studies, but the authors used US unit costs, which might not have reflected the costs in their setting. The time horizon was not explicitly reported.

Analysis and results:
Some details of the model were provided, with the references for its previous applications. No incremental cost-effectiveness analysis, comparing interventions to their next best alternative, was performed. Instead each intervention was compared with no intervention. The intervention with the lowest average cost-effectiveness ratio might not be the same as that with the lowest incremental cost-effectiveness ratio. A limited one-way sensitivity analysis was performed, but the overall model uncertainty was not assessed in a probabilistic sensitivity analysis. The authors reported that the main limitation of their study was that it was based on a developed, Western health care system, which might not be generalisable to developing countries.

Concluding remarks:
No incremental cost-effectiveness analysis was performed, the cost data were not from Australia, and a limited
sensitivity analysis was performed. Caution is required when assessing the validity of the authors' conclusions.

**Funding**
Funded by the National Health and Medical Research Council of Australia.

**Bibliographic details**
Halder N, Kelso JK, Milne GJ. Cost-effective strategies for mitigating a future influenza pandemic with H1N1 2009 characteristics. PLOS ONE 2011; 6(7):e22087

**PubMedID**
21760957

**DOI**
10.1371/journal.pone.0022087

**Original Paper URL**
http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0022087

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Adolescent; Adult; Aged; Antiviral Agents /therapeutic use; Child; Child, Preschool; Computer Simulation; Cost-Benefit Analysis; Decision Making; Delivery of Health Care /economics; Humans; Infant; Infant, Newborn; Influenza A Virus, H1N1 Subtype /physiology; Influenza, Human /drug therapy /economics /epidemiology /virology; Middle Aged; Pandemics /economics /prevention & control; Young Adult

**AccessionNumber**
22011001304

**Date bibliographic record published**
28/09/2011

**Date abstract record published**
02/02/2012