Osel tamivir use in an Influenza Outbreak: Linking Pharmacology to Pharmacoeconomics

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BACKGROUND AND OBJECTIVE

- Simulation models are used widely in pharmacology, epidemiology and health economics. However, there have been no attempts to incorporate models from these disciplines into a single integrated model.
- Accordingly, we explored this avenue to evaluate the epidemiological and economic impact of oseltamivir dose optimization in supporting pandemic influenza planning in the US.

METHODS

- A multi-method (IE) decision analytic model was linked to a previously published pharmacoeconomic/pharmacokinetic/pharmacodynamic (PK/PD) susceptible-exposed-infectected/recovered (SIR) epidemic model which simulated the infected population in an influenza outbreak under different scenarios (Figure 1).
- The infected individual produced by SIR model entered the IE model either as an outpatient or inpatient. Inpatients would be admitted to a general ward or an intensive care unit (ICU), and may experience either pneumonia, sepsis or acute respiratory distress syndrome (Figure 2).

RESULTS

- Model inputs & assumptions
  - A cost-utility analysis was undertoken based on healthy adults aged 18 to 64 years old in the US from both payer and societal perspectives.
  - Oseltamivir 75mg or 150mg BD was compared with no treatment of three levels of uptake; 25%, 80% and 100% for a strain with comparable virulence to typical seasonal influenza over a 1 time horizon.
  - Data inputs for IE model such as branch probabilities, direct medical care cost, direct nonmedical cost and indirect costs were used to estimate the length of stay were all US-specific.
  - Assumptions were made to calculate the outcomes in the model (Table 1).
- Costs were expressed in 2013 USD.

CONCLUSIONS

- High dose oseltamivir has economic value and may have a role in pandemic influenza planning in high transmissibility and requires further investigation.
- Integrating PK/PD/ME models is achievable. Whilst further refinement of this novel linked model to better reflect the pharmacology needed, our current study has generated useful insights to support influenza planning.
- Sensitivity analyses included 1) consideration of other interventions such as masks, school closure and influenza vaccine; 2) Broadening the model beyond healthcare costs, specifically including the cost associated with emergency department visits.
- All costs were done based on US dollars and using the Healthcare Cost and Utilization Project National Inpatient Sample and the National Hospital Discharge Survey to calculate the base costs. In addition, we made cost comparisons for 150mg vs. 75mg and 75mg vs. no treatment. The results are displayed in Table 1.

REFERENCES

2. JGIM 2014; 19(6): 523-31
4. Cost-Effectiveness Analysis of Clinical Outcomes of Oseltamivir for無い・インフルエンザ・ウイルスの感染を防ぐために、効果的な治療を提供するため、より適切な薬物療法を考慮する必要があります。本研究は、インフルエンザのプランニングを支援するために、パンデミックインフルエンザの出発点を評価するために、オセルタミビルの使用を扪تكするための薬理学・薬経済学の統合モデルを構築することを試みました。