A Knowledge Representation of Local Pandemic Influenza Planning Models

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ABSTRACT
Planning for pandemic flu outbreak at the small-government level can be aided through the use of mathematical policy models. Formulating and analyzing policy models, however, can be a time- and expertise-expensive process. We believe that a knowledge-based system for facilitating the instantiation of locale- and problem-specific policy models can reduce some of these costs. In this work, we present the ontology we have developed for pandemic influenza policy models.

BACKGROUND
Imminent influenza pandemic poses a serious threat to public health worldwide. Planning for pandemic influenza is fraught with many uncertainties, such as those concerning the epidemiological characteristics of the outbreak, biological characteristics of the virus, effectiveness of antiviral therapies and vaccines, and the relative costs of implementing different strategies. Mathematical policy modeling is a powerful methodology that can help determine the best strategies to prevent and/or manage such a disease outbreak in the face of such uncertainties.1

Policy modeling will be particularly important at the local-government level, where much of the work for pandemic influenza planning and management will actually take place. However, the process of building these policy models, analyzing them, and conveying their results to non-modeler policymakers may be too expensive in terms of time and expertise needed to allow their widespread use by city- or county-wide public health decision-makers. To solve this problem, we have proposed building a knowledge-based system (KBS) to facilitate the instantiation of locale- and problem-specific policy models for the purpose of planning for and managing pandemic influenza outbreak in local populations. This poster describes our work in developing the knowledge base underpinning this proposed system.

METHODS
First, we developed a “class of policy problems” (similar to Holtzman’s “class of decisions”)2 that would define the scope of policy problems that this system could model. This was done by a) doing a systematic literature review to qualitatively assess the kinds of pandemic influenza policy problems that local-government public health officials are facing, and b) interviewing potential users of the KBS (e.g., public health authorities at a local university, of an urban county, and of a suburban county) to elicit the kinds of pandemic influenza policy questions they are currently considering.

We then developed, within the Protégé OWL environment (http://protege.stanford.edu), an ontology to structure the knowledge necessary to build epidemiological compartment model-based policy models to solve that class of policy problems. This ontology is comprised of three parts:
1) Disease (pandemic flu) model concepts, which describe the parameters and data necessary to inform the compartmental model;
2) Intervention concepts, which describe the broad variety of population-based interventions that might be considered by a county or city public health authority; and
3) Outcome concepts, which describe the types of health and economic outcomes that would be of interest to the user of this system.

REMARKS
We have defined a class of pandemic influenza policy models that policymakers at local-government levels are specifically interested in, and structured the knowledge contained in that class of models in our knowledge base. Future work will focus on validating the knowledge base by using it to build situation-specific policy models.

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REFERENCES