Optimizing financial effects of health information exchanges: a multi-party linear programming approach

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Objective

Is sharing health care data of financial value to an institution?

We propose an analytical framework to:
- quantify both societal and institutional consequences of health information exchange (HIE)
- design pricing policies for sustainable HIEs.

Background

HIEs efficiently share health care data across institutions.

Accurate financial models assist policy making concerning HIEs

We build on Dixon et al. to address: cost, effort and value of an HIE

How can an agent make optimal decisions?

In linear programming (LP), an agent seeks to
- identify the optimal decisions maximize an objective
- satisfy a set of constraints.

Methods

Our LP framework was populated with patient data!

We tested robustness against various modeling assumptions.

We considered three desired outcomes of HIE-related emergency care
- preventing unrequired hospitalizations (UH)
- reducing duplicative medical work (DUP)
- reducing repeat emergency department visits (AED)

In our LP model:
- the objective was to maximize financial benefits of HIE.
- the decisions were HIE charging & subscription policies.
- the constraints were financial sustainability of the HIE & minimum financial benefit for each agent in the system.

We considered three pricing policies for providers: fixed annual subscription, per visit or per-lookup charge or subsidy.

Data

We considered 4369 ED visits in a 12-month period in three large EDs in Milwaukee, Wisconsin.

Our LP framework aggregated data from various sources.

Results

Effect of HIE participation of providers and payers

- HIE data produced financial savings to all agents.
- HIE savings significant for hospitals with more HMO patients.
- AED & UH created 70% of the savings.

Sources of HIE savings

Discussion

Fixed annual subscriptions can sustain this HIE, while ensuring financial gains to all participants.

Pricing recommendations arise from and apply only to the study population.

The merit of this study is in the modeling approach, which is applicable to other settings.

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