12ª cnes

conferência nacional de economia da saúde
Lisboa de 13 a 15 de Outubro, 2011
Fundação Calouste Gulbenkian
http://12cnes.apes.pt

Organizing hospital networks throughout a planning horizon: Which options for different trade-offs between access and costs?

Ana M. Mestre[1], Mónica D. Oliveira[1], Ana P. Barbosa-Póvoa[1]

[1] Centro de Estudos em Gestão do IST,Lisboa, PORTUGAL

Contact: anamestre@ist.utl.pt

Objectivos (Objectives): Planning hospital networks involves making decisions that should remain suitable for future configurations of the health system. Typically, investments in a hospital network are hardly reversible, have key implications on resources and often have political impacts. Therefore, when designing hospital networks it should be take into consideration on future prospects regarding the demand and supply of health care. Also, when planning public facilities, trade-offs between access and costs have to be established. While the decisionmaker might wish to improve access through the supply of smaller hospital facilities near the populations, this often can only be obtained at the expense of higher inefficiencies and costs. A balanced solution between those conflicting objectives is required. This work contributes by presenting a unified framework to assist the design of hospital networks through a planning horizon, while considering the maximization of access and the minimization of costs. Hospital network characteristics are modelled in detail through namely: a hierarchical structure with two-tier levels, with district and central hospitals and ascendant and descendent flows between those levels; hospitals as multiservice suppliers, providing inpatient, outpatient and emergency services; capacity thresholds that indirectly model scale economies; rules on demand allocation informed by hospital practice; and institutional settings and the policy context of the hospital network.

Metodologia (Methodology): A mathematical programming model is built to address simultaneously the maximization of access and the minimization of costs in a network of hospitals. The model considers a time dimension that allows for modelling critical moments in which changes to the network might occur. This type of model is known in the literature as a dynamic location model. The time dimension allows that location-allocation decisions, in each moment, account for current and future information on the need and supply of hospital care. A multiobjective approach is adopted to balance access and cost. Such an approach allows for the definition of a set of model solutions for different considered access and costs. In the current study both objectives are to be handled separately, so that the trade-offs between them are defined and understood by the health care planner. A solution for the multiobjective model is obtained when one objective cannot be improved without worsening the remaining objectives. There are different approaches to obtain this set of solutions and define the Pareto frontier, with the following method having been selected: the ε-constraint method. This algorithm starts by optimizing each objective individually. Subsequently the search space is divided and, for instance, minimum cost is optimized while access is constrained. While this step is repeated, the Pareto Frontier is generated.

Resultados (Results): The model was developed using Mixed Linear Integer Programming and the results were obtained using the General Algebraic Modelling System with the commercial solver CPLEX 11.0. The model is applied to a case study based in the Portuguese Health System providing illustrative results on how it can assist the health care planners. Results show the following model outputs, under different trade-offs between access and cost: hospital network structure, hospital capacity, hospital catchment areas and schedule for system changes.

Conclusões (Conclusions): The design of hospitals networks was addressed in this study through the development of a dynamic multiobjective location model. The results from applying the model to Portugal illustrate the potential of the model to inform hospital planning. Further work will address the robustness of the results obtained and the assumptions made through scenario analysis.