

Strategic Workforce Planning

Workforce planning in Italy is a task of great complexity due to the decentralized organization of the Health Care Services. As a result of major constitutional reforms, Italian regions are in charge of determining the organization of their health services and define the amount of annual budget to be allocated to providing care to the population. The decentralized organization of national health service is yearly negotiated and regulated by agreements and pacts debated in the State-Regions Permanent Conference. Within this conference, each year the Ministry of Health collects and negotiates regional workforce requirement forecasts with regional and health professional stakeholders and in collaboration with the Ministry of Education, University and Research (MIUR), determines the total number of medical doctors that should start specialization training.

The final goal of the presented study is to provide a Decision Support System for health workforce planning and forecasting so as to foresee future shortages or surpluses through a proper management of residency grant allocations under budget constraints in the Emilia-Romagna Region. In order to meet the objectives, the decision-making model that will support regional planners has to be separated in two main components. A simulation model, which describes the health workforce supply and demand behavior over time, and an optimization model that evaluates the imbalances emerging from the simulation model and suggests an optimal funding allocation in order to reduce the gap between human health resources (HHR) availability and requirements. As we are dealing with a complex dynamic system, we have opted for the development of a System Dynamics simulation model to represent Emilia-Romagna region health workforce, while an Integer Programming model computes the optimal assignments of residency grants.

The proposed methodology allows a comprehensive overview of regional data availability, defines the level of accuracy that can be reached by a quantitative approach to HHR regional planning, and provides the first quantitative decision-making tool for needs forecasting and fund allocation in Italy. At the Emilia-Romagna level, the proposed approach has been included within the planning tools of “Servizio Relazioni con gli Enti del SSR, Sistemi Organizzativi e Risorse Umane in ambito sanitario e sociale, supporto giuridico” of the “Assessorato Sanit\`a e Politiche Sociali”. In addition, the Emilia-Romagna experience and methodology has been included in the Work Package 5 of the EU “Joint Action Health Workforce Planning and Forecasting” of which the Italian Ministry of Health is

responsible. (Joint work with Paolo Tubertini, Roberto Grilli, Angelina Mazzocchetti, Corrado Ruozi and Francesca Senese.)

SHORT BIO

Dr. Andrea Lodi is a leading international researcher in mixed linear and nonlinear programming. As Canada Excellence Research Chair in Data Science for Real-Time Decision-Making at Polytechnique Montréal, he holds Canada's main chair in operations research.

Before joining the Polytechnique, Lodi was a professor in operations research in the faculty of electrical and information engineering at Italy's University of Bologna. He earned his doctorate in systems engineering from this same university in 2000.

Lodi is interested in developing new models and algorithms that would make it possible to process a large quantity of data from multiple sources both rapidly and effectively. Through his research, he is looking for solutions designed to improve the electricity market, rail transport logistics, and health-care planning.

Lodi's innovative work has earned him several awards, including the Google Faculty Research Award in 2010 and the IBM Faculty Award in 2011. In 2005 and 2006, he was a fellow in the prestigious Herman Goldstine program at the IBM Thomas J. Watson Research Center in New York.

In addition to co-ordinating several large-scale European projects in operations research, Lodi has also acted as a consultant for the IBM CPLEX research and development team since 2006. He has authored more than 70 publications in top mathematical programming journals; and has served as associate editor for several of these journals.