

CENTER FOR HEALTHCARE ECONOMICS AND POLICY

Reform Simulation Modeling

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In order to compete in today's dynamic healthcare environment, hospitals must change the way they deliver healthcare services. Already operating with constrained resources, hospitals must ensure that reforms under consideration will deliver the benefits expected. Trial and error can be a costly option and is not viable. A better approach, Reform Simulation Modeling, enables hospitals to simulate a change to determine if it will deliver the benefits expected and to assess unanticipated effects that may occur. Typically, hospitals don't have the expertise or modeling tools necessary to build and run reform simulations. The Center for Healthcare Economics and Policy ("the Center") within FTI Consulting provides simulation experts who draw upon extensive experience in providing healthcare modeling solutions.

Discrete Event Simulation Background

In the constantly changing healthcare industry, hospitals struggle to address operational issues – how should patients be routed, how many nurses should be made available, how can MRIs be used most effectively. Hospitals use Discrete Event Simulation (DES) modeling to improve efficiencies, perform basic capacity planning, determine numbers of beds and staff required, and evaluate strategies to reduce ED wait times.

With DES, hospitals can model its operations and capacity, accounting explicitly for labs, beds, departments, wards, ambulances, pharmacies, ORs, EDs, ICUs, physicians, nurses, administrators, pharmacists, and other hospital resources. The objective of a DES model is to replicate hospital operations, as completely and accurately as possible, including all of its major services, resources, personnel, and equipment. With a DES model, the hospital can test different configurations to identify areas where the hospital can enhance its productivity and save money and increase value.

The Reform Simulation Model

The Center has designed its DES model to address larger issues of healthcare reform and strategic change. Using the model, we can replicate detailed operations of a specific hospital or a set of hospitals or facilities as a baseline and then simulate the effect on operations and financials of major changes in utilization. Examples of major changes include:

- Re-alignment of inpatient care to more cost-effective out-of-hospital care facilities
- Implementation of specific models of care and care coordination
- Initiatives to reduce avoidable inpatient admissions

- Initiatives to reduce avoidable ED episodes
- Rationalization of hospital programs across newly acquired and existing system hospitals
- Additions, expansion, reduction or elimination of particular services lines
- Changes in physician referrals either through physician practice acquisitions or loss

Once the model determines the effects of a major event change, the DES model can simulate the effect of various strategies to re-optimize a hospital's operations, patient flows, and capacity to deal with any adverse operational or financial effects of the event change.

For example, the Center's DES model can simulate the effect of a targeted percentage reduction in avoidable Medicaid inpatient admissions and ED visits on the operations of a hospital or hospital system. Once the model is complete, we work with the hospital administration to construct model scenarios to test the effects of changes to the current operations and potential strategies to minimize adverse effect of such a reduction on the hospital's overall operations and financials. The Center's DES model can model the need for new capacity, such as outpatient facilities, within an area,

The demand component of DES relies on historical patient flow data to create an expected demand profile that incorporates arrival times, processing times, and condition of the patient. The simulation model uses these data to predict how the patient moves through the hospital and the resources necessary to treat the patient. The demand can be dependent on time of day and day of the week to represent more accurately the patient's use of hospital resources. Random surges of demand can also be included to test how a hospital would handle unexpected stress to its capacity.

Our DES model uses patient data to simulate inflows and outflows, including how many people arrive each day (on average), time of arrival, time of discharge, condition at admission, and procedures undergone. The more detailed the available information, the more comprehensive the model and the greater its capability to simulate the impact of external effects. Within the hospital, we model the care pathways taken by patients to approximate time spent with each service provided.

About the Center

The Center for Healthcare Economics and Policy applies cutting-edge economics and quantitative methods to assist clients in developing and implementing market-based solutions across the spectrum of healthcare activity. The Center assists clients and communities in achieving goals by providing empirically based, actionable metrics and quantitative analyses, including powerful tools for assessing transformative change and for discerning value and benefits that inform choice and action.

The Center uses "gold standard" models and extensive proprietary and public databases to assist clients in developing strategies that address fundamental changes in demand (e.g., declining inpatient admissions) and supply (e.g., shifts in the location of care delivery or new facilities) ongoing within a system or a community. Our particular expertise is the ability to use probabilistic or predictive modeling that takes into account the impact of future changes in population health, migration, patient mix, or utilization on operations, finances, and capacity needs for health systems. These form the basis of opportunities to evaluate how best to "optimize" or re-optimize capacity or strategies proactively and with sound simulations at lower cost.