

Predictive Modeling NEWS

Does a Non-Linear Model of Chronic Disease Suggest a New Direction for Predictive Modeling?

by William H. Rice MD, Chief Medical Officer, Whiteglove House Call Health Inc., Austin, TX

Well, we're in trouble....

Health cost projections have finally become so monstrous that there is near-universal agreement that something must be done. But Washington policymakers are logjammed because reform is so expensive.

Why does health reform look so expensive? Lots of reasons, but the two biggest are (1) we're trying to address the large uninsured population and (2) cost estimates are largely based on an expanded form of what we have now. But what if the whole cost argument could be taken off the table? What if predictive modeling and disease management can produce savings of \$500 billion over the next 10 years and solve the American health cost crisis? Sound crazy? Fasten your seatbelts.

When looking at the health cost landscape, there is one dominant fact: Chronic disease spending is a major part of overall health spending and, with an aging population, chronic disease will consume an increasingly large portion of the overall health budget for the foreseeable future. Trillions annually.

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FDI Uses Predictive Modeling to Plan Smoother Operational, Structural Changes

Is your proposed change worth making? The simulation results may surprise you. Paul Gorman of FDI provides a peek at how PM can streamline operations.

by Russell A. Jackson

The best laid schemes o' mice an' men, as they say, often go awry. That presumably includes hospital executives, even when the plans they've laid are well-intentioned systemic improvements in the way their facilities operate. Without knowing how the planned improvements will actually play out, there's no way to know for sure that you're implementing the right changes.

Enter Phoenix-based planning company Facilities Development Inc., which uses sophisticated predictive modeling to determine exactly how planned changes in hospital operations will actually operate in the real world. FDI "specializes in helping hospitals determine which operational improvements yield the most efficient financial and experiential benefits with the least amount of change," the company says in a statement. It uses computer simulation to help hospitals answer the two most important questions in any business endeavor, the statement adds: "What if...?" and "How much...?"

David Ferrin, a principal at FDI, says that "it's all about our clients' bottom lines. We can typically provide a large return on investment within a very short time, and our client hospitals re-capture their project investments within only a few months. After that, any income that results is pure profit." The company, he adds, helps hospitals reduce project risk by testing various scenarios using computer simulation before implementation, and before any capital has been invested.

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FDI Uses PM to Plan ... *continued*

"It's an insurance policy for project risk -- an important proof technique in today's economy," he comments. "Healthcare facilities are looking for critical solutions to improve overall efficiency and profitability, and we help them run faster, leaner and better."

FDI's custom models incorporate best practices, facility data and "lean" principles, and routinely yield multi-million-dollar financial impacts, the company says. The models can simulate and analyze hundreds of scenarios and project their long-term effect. FDI then provides clients prioritized implementation strategies for patient throughput and capacity issues.

One report on an FDI project, for example, notes that "one of the most complex maneuvers a hospital system can perform is moving an entire patient population from an old facility to a replacement facility. All patients must be transported via ambulance or van to [the] new hospital, [requiring] massive resources, permits, cooperation of local government and, often, assistance from neighboring hospitals." Before embarking on such a gigantic endeavor, the hospital in question looked to FDI for advice on how to accomplish it. The resulting study "utilized simulation to determine optimal resources, routing and timing for the movement of almost 600 inpatients from two different facilities to a new replacement facility. Potential resource constraints of specialized move teams, ambulances and other staffing constraints were explored to predict and reduce the likelihood of complications during the two-day patient move."

In another example, an FDI client needed to combine six emergency departments into one, which would become one of the largest in the country. "Each of [the] six serve[d] a different type of patient population and each maintain[ed] its own independent processes," a report on the project from FDI says. "[The] hospital required all the EDs to effectively function using the same floor space, processes and ancillary services, such as testing facilities, waiting rooms and registration. Healthcare planners need to understand the ramifications of sharing resources among multiple departments and the operational impact of high-volume systems. [The] project explored [those] challenges to find key bottlenecks and mitigation strategies using simulation."

Here's a closer look at another of FDI's recent client projects:

"A first-generation ED simulation was developed to test the [facility's quality management teams'] most promising ideas. The simulation provided a quantitative comparison of process improvement ideas and showed hospital executives which ideas [would] likely yield the most improvement. Selected experimental results indicated that:

- discharging inpatients earlier each day reduce[d] ED patient length of stay;
- a small increase in the number of inpatient beds [would] dramatically cut the ED patient LOS; and
- a reduction in lab test turnaround time [wouldn't] significantly affect overall patient LOS until it was significantly reduced."

In addition, the report says, "despite increase[ed] bed capacity, the simulation showed the hospital would not meet [its] long-range goals for patient LOS. The [quality management] teams [would] need to implement more profound process changes."

Emergency departments aren't FDI's only area of operational predictive modeling expertise. Here's a peek at another project the company recently managed:

"The clinic faced issues with insufficient clinic space and inefficient staff utilization," a report on the project says.

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“Senior management wanted to explore various operational alternatives to determine if best practices [would] work. [Those] alternatives varied the configuration of physician offices and exam rooms, sharing versus dedicated staff [for] clinic services, clinic schedules and projected increases in procedure volumes over the [ensuing] three to five years. FDI facilitated a process modeling workshop to map [the clinic’s] current processes for each service. The team then collected process data through information technology system queries, clinic observations and staff interviews. FDI built, validated and experimented with the simulation model, exploring the feasibility of each operational alternative.”

The results? “FDI identified [more than] \$2.5 million in additional revenues through streamlining processes and staffing and through improved utilization of clinic space,” the report says. “The simulation model proved that all clinic exam rooms and staff could be shared and located in a single location. It also showed that the new clinic could accommodate up to 30% [more] patients for existing services, resulting in \$1.5 million in new services.”

Predictive Modeling News talked to FDI’s Paul Gorman about the company’s predictive modeling services.

Predictive Modeling News: What kinds of operational improvement projects do hospitals ask you to help them model?

Paul Gorman: FDI focuses on operations planning and analysis, so hospitals hire us to help improve key performance indicators, improve efficiencies and improve safety. And by doing that, we can improve revenues and cut costs. It’s important to be sure not to look at any hospital operations in a vacuum. For an emergency department project, for example, you have to look at the ED within the context of the overall system. It’s really a system/subsystem situation.

PMN: What kind of variables do you consider for a client’s project?

PG: We work with each client’s staff in a collaborative way. The first thing to do when you’re going to use any simulation model is to define the problem. We do that through a dialog with the management and staff of the facility itself. It’s not our problem, it’s their problem and we’re trying to help them fix it. To do that, we go through a process where, once we’re engaged, we sit down with the staff of the hospital and define the processes involved in the project at hand. What are the processes when a patient hits the front door of the ED, for example? Then we start the simulations. What if we discharge patients earlier in the day? What if we change the process of run-through triage? What is the impact likely to be on the overall operations? Once we assess the impact of each possible change, we can determine if it’s worth making – from a financial standpoint or an operations standpoint. If you’re changing operations, there needs to be some payoff. We’ve proven in some cases that making the change under consideration is not worth the cost, because the organization would have to go through the pain of change.

PMN: Do you sometimes find that the preliminary process evaluation work you do shows that the client is focused on the wrong problem or the wrong possible solution?

PG: That happens all the time. We let the model and the data tell us what the problem is and what the impact of a potential improvement would be. That’s what the simulation model is for. It allows people to fully understand their own systems and allows us to identify the real problems and where the most impact could be made. We have many clients who thought it would be something and then discover it’s something else. The simulation model is thus a very, very good communications aid because it allows for visualization of a system through graphics and animation to demonstrate what the problem really is.

PMN: What kind of data populate the predictive model?

PG: As part of the process we go through to build the model, we have staff work directly with the client to define the problem, lay out the processes and give us the framework to build the model. As part of the input, we use an industrial engineering approach. We go through a period of data-gathering to populate the model and represent the systems in a realistic way. Once the model is built, we go through a period of verification and validation so that everyone agrees that it represents the situation accurately. Once the model is developed, we go through an iterative process, sometimes running through hundreds of scenarios, changing the variables a lot or a little each time. We try increasing the number of beds, for example, or increasing the number of staff, doing this and doing that. Each simulation scenario produces a set of output statistics, and from them we can derive the degree and level of impact of the change we’re considering. The precision of the metrics we use is very high.

FDI is a wholly owned subsidiary of Kitchell Corp. Contact Gorman at 858-204-9547 or at pgorman@fdiplan.com.

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