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## Business

# Hospitals deploy AI to send patients home earlier — and keep them there

By Rebecca Robbins

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**B**eth Israel Deaconess Medical Center has a problem familiar to many hospitals: Too many patients aren't being discharged when they're healthy enough to go home. It's an issue with wide-ranging ripple effects: Because of operational holdups, much-needed beds remain filled when they don't need to be, leading emergency rooms to become congested. Patients must often be sent wherever there's a free bed, even when it's not the best ward for them to be treated, which might further delay a discharge.

In a bid to tackle that problem, the Boston hospital is developing an artificial intelligence model designed to suggest a bed assignment for every patient from the get-go. If there isn't a space for them in the most appropriate area, the model recommends other options.

"Length of stay is one of the most critical and complex problems a hospital like ours faces," said Manu Tandon, Beth Israel Deaconess' chief information officer. "It can lead to further infections, and it also has a financial implication, and more importantly, someone very sick who needs a bed is not getting a bed."

Beth Israel Deaconess' model has only been tested in a simulation so far. But other top hospitals and clinics around the country are increasingly using similar AI systems to advise routine care decisions for both hospitalized and those recently discharged, with the goal of sending them home earlier and making sure they aren't soon readmitted.

While hospitals have long grappled with challenges around discharge and readmissions, keeping patients out of the hospital who don't need to be there has taken on even greater importance during the pandemic. Health systems in the hardest-hit areas of the country are scrambling to accommodate a wave of COVID-19 patients on top of patients hospitalized for all the usual reasons. Even hospitals that have not yet been overwhelmed are bracing for that possibility.

"Some of our customers have referred to the area of discharge and such as the equivalent of hand-washing for hospitals: We should have always been doing it, but it's even more critical in the current time," said Mudit Garg, founder and CEO of the Silicon Valley AI company Qventus, which counts more than 60 health systems in the United States and Canada that are paying customers for its AI-powered discharge planning tool.

For hospitals looking to cut costs, there's a significant amount of money riding on discharge and readmissions decisions. Hospitals spend more money internally when they deliver care inefficiently because their units are congested with patients not needing to be there.



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They also face financial penalties externally — through a program of the Affordable Care Act that reduces Medicare payments to a hospital if too many of its patients get readmitted within 30 days. And too many readmissions also lowers a hospital's score on a government star rating system that patients and health plans look to to assess the quality of care.

Hospitals have long relied on human clinicians and staffers to assign patients to beds and make decisions about when to send them home. But inefficiencies in those systems and financial pressures around readmissions are driving demand for AI tools.

But despite their promise to free up beds and save money, these AI tools have largely not yet been shown to improve patient outcomes. While some are backed by supporting data, those results are typically early stage and not generated under the kind of gold-standard research design that would more definitively make a case for their efficacy. And critics also worry that the push to free up hospital beds may lead to patients being sent home before they're medically ready.

System architects say that the tools are never used to send home a patient who's not clinically ready; rather, they're being deployed to eliminate the barriers that are keeping patients stuck in the hospital for more prosaic operational reasons. A congestive heart failure patient may have been able to be transferred to a rehab facility two days sooner if only she had been cared for in the medically appropriate unit. And a patient recovering from knee surgery might have been able to go home a day earlier if only his final physical therapy appointment had been scheduled for Tuesday instead of Wednesday.

At M Health Fairview in Minnesota, health system leaders have spent the past year and a half gradually rolling out Qventus' tool, which is now being used in four of the system's 13 hospitals. The Qventus dashboard lists hospitalized patients who are likely to be clinically ready to go home soon and flags steps that might be needed to make that happen.

M Health Fairview has also started rolling out a still-in-development "ICU step-down list," an AI tool to identify which patients are likely ready to transfer out of intensive care.

"Given that ICU beds seem to be the biggest constraint around COVID — even more than floor beds or ventilators — this helps anticipate and free up space and say: maybe Mrs. Jones can leave the unit safely now," said internist Karyn Baum, who's leading M Health Fairview's rollout of the tools.

While the tools may have potential to help with COVID-19 care, M Health Fairview generally has been only using them to advise care decisions for non-COVID patients. That's in part because the health system has sequestered the vast majority of its COVID-19 patients at a single hospital — and in part because clinicians are still learning about how best to manage a disease that's still relatively new, Baum said.

It's not just hospitals that are rushing to develop or buy AI tools — it's the health plans paying for those visits.

US insurers have emerged as eager customers for the Israeli start-up Diagnostic Robotics's AI powered tool for assessing readmissions risk, said Kira Radinsky, the company's chairwoman and chief technology officer. The tool predicts the probability of readmission within 30 days for a patient who was recently discharged. Health plans that are piloting the readmissions tool are working with providers to deliver targeted interventions to patients at high risk of being hospitalized again soon, Radinsky said.

Meanwhile in Israel, its health maintenance organizations — insurance groups that provide services for a fixed fee — that have been piloting the rollout of a Diagnostic Robotics tool to identify patients at elevated risk of a hospital stay of less than three days, whose care might be better managed outside of the hospital.

These AI systems are generally built around data stored in electronic medical records, insurance claims, and the software systems that hospital transfer centers use to make bed assignments. They're trained and tested on data from patients who've been treated, discharged, and readmitted in the past. When they're deployed, the models analyze data about a patient's condition and risk factors, as well as the hospital's capacity — and then spit out a prediction on how to proceed.

Developers of these systems typically don't seek approval for their products from the Food and Drug Administration. They emphasize that their tools are a decision aid, not a replacement, for a clinician's judgement.

Jvion, a Georgia-based health care AI company, markets a tool that identifies patients at high risk for readmission within 30 days — and suggests targeted interventions to try to avoid that outcome.

The steps the AI suggests are commonsensical, obvious even: Before patients get discharged, they should be walked through how to take their medications. Their financial status should be evaluated, and so should their diet. Early results, while preliminary, show promise. Jvion has a paper under review for publication in a journal.

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