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MEDICAL TECHNOLOGY

Doctors Prescribed System For Avoiding Drug Errors

By Donna Howell
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Does that scribbled prescription say Aldoril or Ativan? The difference could be life or death.

A 50-milligram dose of the first drug lowers blood pressure. The other drug treats insomnia. But "boy, if you got 50 milligrams you'd be sleeping for a few months," said Boston physician John Halamka.

Drug errors happen often. Some do kill, and many are otherwise costly to care providers. That's why Boston-based CareGroup Healthcare System is spending $2.5 million on a computerized prescribing system. It calls the price a bargain.

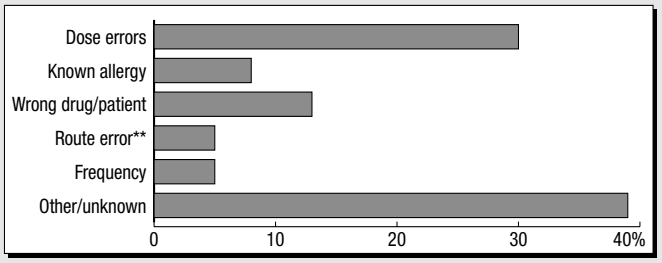
"The Institute of Medicine, in the last two years, has highlighted medication errors as the greatest threat to medical care today," said Halamka, spokesman for CareGroup.

He cites studies that show seven out of 100 patients suffer a drug error or adverse event due to medication. Each costs hospitals about $5,000, mostly in the extra care that's needed after the mistake is made, Halamka says. Yet a computer-based drug order entry system "has been shown to eliminate 90% of all medication errors," he said.

CareGroup looked for such a system, but wound up building its own.

Hampering Health

Studies sort out the role of medication errors in adverse drug reactions*



* an average of four studies that, combined, looked at 3,400 incidents
** way a drug is administered (by pill, intravenous, etc.)
Source: Agency for Healthcare Research and Quality

"The reality is we didn't find any product that would be all-Web, integrate into our existing systems and allow us alternate means of input," Halamka said. "So we wrote it."

Docs Keep Tons Of Files

The six-hospital group had a tall order. It needed a single drug database and prescribing system for 9 million patients, 12,000 employees and 3,000 doctors.

Some doctors keep lots of electronic files. "I alone have 21 terabits of patient data," Halamka said. That's enough to fill the hard drives of 60-plus high-end personal computers.

Hospital workers needed nearly instant access to patient records. That would take lots of costly processing power if the hospital used a conventional "relational" database.

The software would cost plenty. "Under Oracle, we estimate we'd need $2 million of hardware alone," Halamka said. Oracle Corp. is the largest maker of relational databases.

CareGroup wanted a solution that required much less hardware expense. So, rather than use a relational database — a database with a broad search method that lets all data be "compared" — CareGroup kept things simple.

A tech staff of 20 built a database that centered on patients' names. Other data fields branch from that. It's called a "hierarchical" approach.

How efficient is the hospital's pared-down choice? "I can run the system on $250,000 Unix boxes with 9,000 users at a time, 50 transactions a second against 21 terabytes of data with subsecond response," Halamka said. "That's just the nature of hierarchical (branching) databases." Unix is a small, inexpensive and flexible operating system.

A relational database would be useful for scientific studies of patient groups. But for CareGroup, it offered too much bang for too many bucks.

CareGroup's prescription system does only what the hospital chain needs. Doctors, for instance, can easily see all the patient records for the floor they're on.

"What we mostly do in medicine is, we care today what patients are on and what their situation was five minutes ago," Halamka said. A hierarchical database fits the bill, allowing speedy access to data.

CareGroup built its system on the Cache′ database platform by InterSystems Corp. of Cambridge, Mass. That technology's already widely used in health care, and it's used in other systems at CareGroup.

Privately held InterSystems says its annual sales growth has averaged 30% since its founding in 1978. Cache′ is its flagship product.

Hierarchical Vs. Relational

It's built like some of the earliest databases in computing. In it, all data are accessed in reference to a single entry field, such as a name.

Early hierarchical databases "were very efficient in their use of resources, and they could be very fast," said Carl Olofson, an analyst at research firm International Data Corp. in Framingham, Mass. But such databases all were built differently and tended to be hard to use, he says.

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Because of that, relational databases took over. They let a user manipulate information fields more easily. But "you're kind of compromising efficiency for ease of use when you go to a relational model," Olofson said. The databases carry bulkier programming for sophisticated operations.

InterSystems tries to combine the best of both types of databases, Olofson says. Its Cache′ product is built for speed, he said, but it's "capable of putting on a relational face."

For users, it works much like the popular databases on the market, most of which are relational. Cache′ uses some of the same commands.

The InterSystems product seemed ideal because it worked with many users and carried a "small footprint," Halamka said. Thus, it works with handheld devices, which many physicians use.

"We use schemes internally that are very, very lightweight," said Robert Nagle, director of systems software development at InterSystems. "Consequently when you increase the number of users by a factor of 10, we're able to scale up to that easily."

The need for fast-access, scalable databases is rising, Nagle says. "In health care, we've seen extraordinary consolidation over the last five years." As hospitals or other providers merge, their databases get that much bigger.

CareGroup's new system is better than the ways hospitals typically handle prescribing, Halamka says.

In the old-fashioned way, a drug order is scribbled on paper. "Typically, that's then taken off on a carbon," Halamka said. "That is then faxed to a pharmacy."

Some prescriptions that reach a pharmacy just aren't legible, he says.

"What the physician order entry system does is say 'Stop the madness,' " Halamka said.

The system not only ensures that prescriptions are legible, Halamka says. It also screens for possibly dangerous drug interactions.

After logging in securely, "I type in a medication, say Atenolol, a blood pressure medication," Halamka said. "The system says, 'Wait a minute, Mary Smith is on a calcium channel blocker, and here are five articles in the literature saying the combination could be dangerous.' "

The system also checks the dosage prescribed to make sure it's normal. What's Halamka's advice to other hospitals that might build their own order systems? "Don't underestimate the time you'll spend with people."