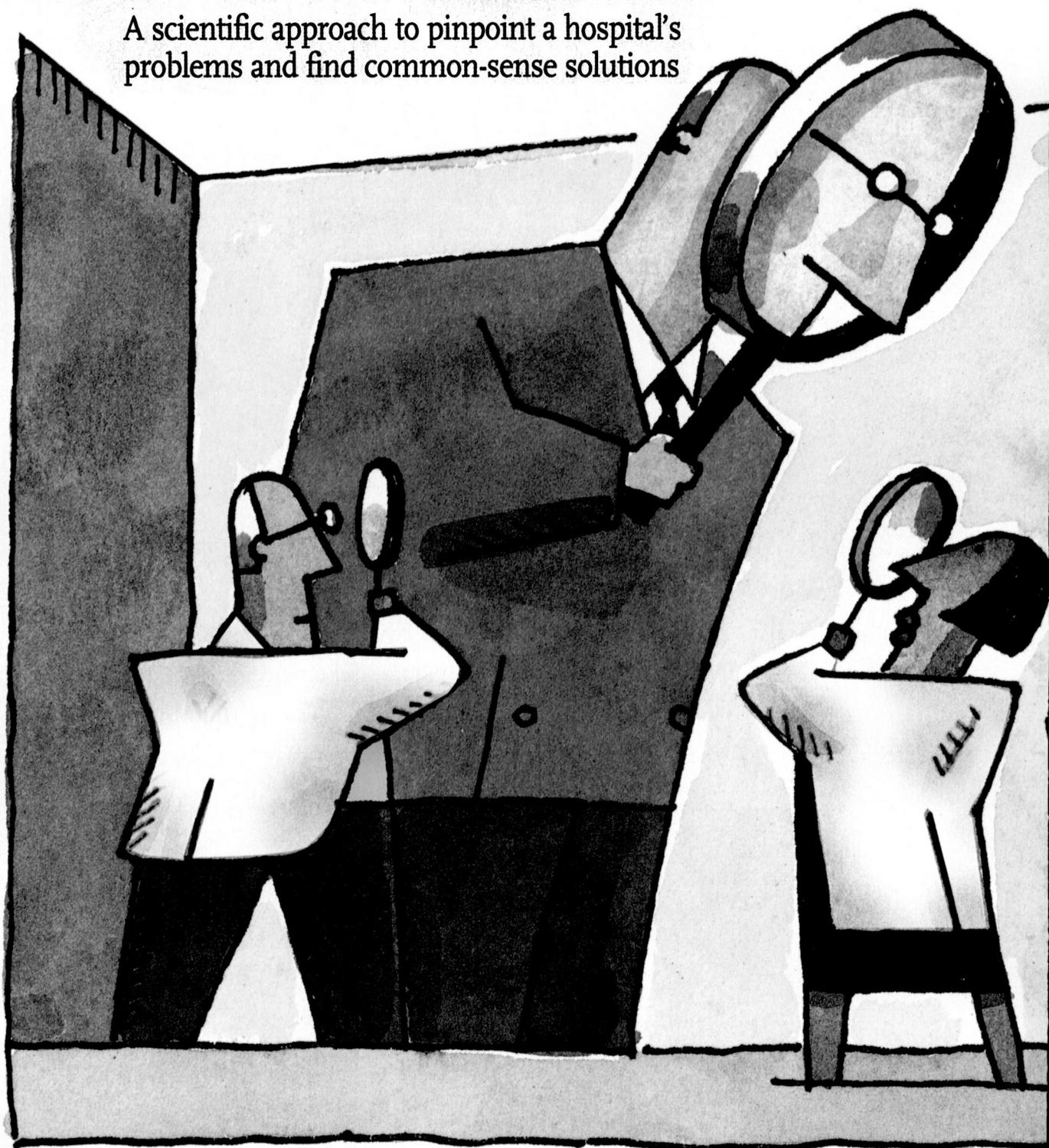


**MANAGEMENT**

# Management Engineers:

A scientific approach to pinpoint a hospital's problems and find common-sense solutions





**A**s a physician at the Mayo Clinic for 31 years, Denis Cortese, M.D., took the organization's systematic approach to health care for granted: unified health records, team-based patient care and optimized workflow.

Visiting other hospitals, Cortese, president and CEO of the Mayo Clinic since 2003, was dumbfounded: Not only did many facilities not employ the management engineering tools that work so well at Mayo, but many also had no discernable systems at all. "There really is no health care system," he says. "There is no systematic approach to patient care in this country. We have to go back to basics and define what a health care system should be and what it should do."

When it comes to defining and building systems, there's no one better suited to the task than management engineers. In a hospital, management engineers bring their problem-solving skills to bear on specific problems and also bridge the gap between various silos to help the institution as a whole function more effectively, improving both quality and patient safety. "Management engineering provides the tools that we need to improve health care," says David Eitel, M.D., director of health services design in the Department of Emergency Medicine at the York (Pa.) Hospital. "It is a discipline that is based in research, that takes a quantitative approach to breaking down a problem and fixing it."

Few would disagree that hospitals need concrete, verifiable methods to improve patient safety and quality. The United States spends more than \$1.9 trillion on health care a year, yet one-half of that spending is unnecessary, spent on clinical and administrative waste, theft and excess costs, according to a 2005 Boston University School of Public Health study. Not only are insurers and corporations breathing down hospitals' collective necks to reign in costs and provide better outcomes, but the federal government, patient advocate groups and credentialing bodies are also pushing for more teamwork, increased levels of accountability and additional use of evidence-based medicine.

Many hospitals that employ management, industrial and quality engineers find that increases in efficiencies, safety and quality more than offset the costs of employing these engineers in the first place. By bringing management engineers on board to examine well-defined problems, providing them with the necessary resources and authority to get their jobs done and encouraging clinical staff and physicians to buy into their methods, hospital administrations can set their facilities on the road to improvement.

### **The ABCs of Management Engineering**

Management engineers apply common-sense solutions to systems and problems. Engineering, as a discipline, is rooted in a scientific, systematic approach to breaking down problems step-by-step and building new systems to solve problems. "Management engineers can map out a system as it exists now and ask questions such as which staff members are involved in a particular process, what are the various steps in a process and how long the various steps take to accomplish, and figure out where the problems are occurring and pro-

**BY AMY BUTTELL CRANE**

pose solutions,” says Steve Mayfield, senior vice president of quality and performance improvement at the American Hospital Association and and director of the AHA Quality Center.

Craig Clapper, a management engineer and instructor at the American Society of Quality, describes it this way, “The best analogy is to a patient who is suffering from back pain. The patient knows he is in pain, but doesn’t know why or how to fix it. Similarly, a hospital knows it is suffering and that it is not functioning as well as it could. So in looking at a hospital, we follow the physician’s model—we do a diagnostic intervention, looking at a number of differ-

ent criteria from the big picture to smaller details, in an effort to figure out what is being done and how it can be improved.”

In its book *Building a Better Delivery System: A New Engineering/Health Care Partnership*, the National Academy of Sciences concluded that a partnership between management engineers and health care professionals has the potential to “transform the U.S. health care sector from an underperforming conglomerate of independent entities (individual practitioners, small group practices, clinics, hospitals, pharmacies, community health centers, et al.) into a high-performance system in which every participating unit recognizes its dependence and influence on every other unit.”

Projects suitable for management engineering expertise range from reorganizing a hospital floor’s supply room to unsnarling patient flow in a chronically overcrowded emergency room. Management engineers are involved in construction projects at some hospitals, working with clinical staff and architects to better design patient rooms and entire floor plans; in others, they design information technology systems, figuring out what types of devices the clinical staff needs to function most effectively.

**Clinical Staff & Physician Buy-In**

Two factors are absolutely essential for management engineers to succeed in a hospital environment. First, they need the backing of the hospital’s administration. Second, they must work collaboratively with physicians, clinical staff and nonclinical staff. By nature, clinical staff—physicians in particular—are suspicious of management engineers, fearing they will usurp their authority and burden them with systems that make patient care more difficult.

“Above all, management engineers need to play the role of facilitator to bring teams of health providers together to solve problems,” says Don Faulk, CEO of the Medical Center of Central Georgia in Macon. When management engineers do their jobs well, they can not only facilitate cooperative approaches, but also train or orient people in applying management engineering practices to the clinical setting.

David Belson, senior research associate at the Viterbi Engineering School of the University of Southern California, currently has a bird’s-eye view on how much engineers and clinical staff can accomplish when they work together. Belson, along with other USC engineering staff, is working with clinicians at Los Angeles County Hospi-

**Training Programs Focus on Health Care**

**F**inding a management engineer who can hit the ground running in a hospital environment may not be as difficult as you think, given the growing number of management engineering health system programs around the country.

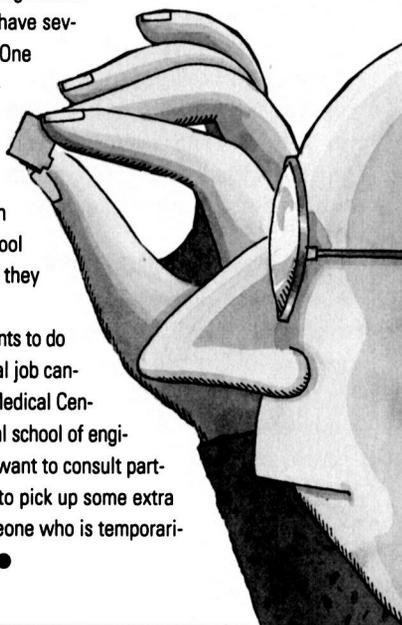
Grounded in scientific research and using a multidisciplinary approach, these programs aim to educate up-and-coming engineers in techniques that cross department and discipline boundaries. The Health Systems Institute at the George Institute of Technology, a partnership between Georgia Tech and Emory University, has spawned several related initiatives including:

- The Center for Operations Research in Medicine and Health Care
- The Center for Pediatric Outcomes and Quality
- The Center for Health Care Robotics
- The Center for Interactive Systems Engineering

A number of other programs focused on integrating health care and engineering can be found at schools such as Drexel University, University of Wisconsin at Madison, Oregon Health & Sciences University and the University of Virginia, among others.

Hospitals new to management engineering have several options when it comes to testing the waters. One option is to hire a management engineering consulting firm specializing in health care; another is to hire a full-time staff member; a third option is to hire a management engineer on a consulting basis to work on a project here and there; and a fourth option involves hooking up with an engineering school to bring students in as interns to work on projects they must complete for their degree.

“We’ve used Mercer Engineering School students to do projects, which is one way of testing out a potential job candidate for the future,” says Don Faulk, CEO of the Medical Center of Central Georgia in Macon. “Check out the local school of engineering’s alumni database for engineers who may want to consult part-time. This can work well for engineers who want to pick up some extra income in addition to their full-time job or for someone who is temporarily out of the workforce.”—AMY BUTTELL CRANF ●



tal and two other health systems to reduce patient wait times and backups in care in the state's safety net hospital radiology and surgery departments. The project is funded by the California HealthCare Foundation.

"At one hospital, I'm working with a team of 15 nurses to figure out how to eliminate bottlenecks in a department and together we are coming up with some amazing ideas that will save the staff time and provide the facility with some cost savings," he says.

For instance, nurses came up with ways to better track radiology charts, including having doctors sign for them. That's because doctors would often take charts out of the department and not return them promptly. Then there's the problem of missing or incorrect patient identification numbers on physician orders. The solution was to improve training so that orders wouldn't move forward without a patient identification number. They are also looking at ways to automate the process.

"Most of the ideas were safety related and some were productivity related, but in all we hope through these efforts to have a significant impact on the number of patients the hospital can handle," he says. A different effort already led to a 50 percent increase in the number of patients scheduled for CT exams in the radiology department.

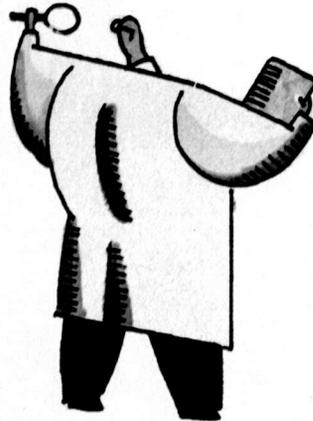
Humility is a key virtue for management engineers. "In many cases, it works well to have a doctor in the leadership role and engineers are brought in to supplement that," says David Cowan, executive in residence at the Georgia Tech Health Systems Institute in Atlanta. "We don't mind letting others lead—there are no limits to what you can accomplish if you don't mind who gets the credit."

Faulk, an engineer by training, believes that management engineers need the strong backing of the administration to be effective, especially on a systemwide basis. "The administration needs to enable that person to move from silo to silo and, through their work, eventually do away with some of them," he says.

Resistance to change is characteristic of many institutions, notes Eitel, a practicing emergency department physician who was sold on the benefits of management engineering during a project for his MBA program.

"It's hard to know what you don't know,

## Where to start? Experts suggest taking a look at your emergency department first.



so I try to turn on the light in people's minds in my presentations," he says. "Frequently a workflow diagram of a unit at the hospital will bring an epiphany." In fact, he tends to avoid the word "engineering" in his presentations, finding that "design" is a much more friendly term that expresses what he is trying to get across.

### Cost-Benefit Analysis

Improved systems lead to improved quality and patient care, which is—or should be—the bottom line for all health systems, says Cortese of the Mayo Clinic. While there are a lot of competing priorities and hospital leaders may be a bit squeamish about allocating resources to something that has a longer-term outlook, Cortese says the incremental costs, while they can be high, are worthwhile.

"It is not a wasted effort to spend money to figure out where resources are being wasted," he says, adding, "If we can do for medicine what Toyota did for the automobile industry using the tools and techniques of system engineering, imagine the improvements we can make in medical care." By attacking errors at their root, hospitals can improve patient safety and overall quality of care and experience significant cost savings.

A 2006 study by the Agency for Healthcare Research and Quality revealed that patients with one of the five most common adverse events suffered by Medicare recipients in 2002 cost hospitals anywhere from 4.6 percent to 29.7 percent

of their total Medicare payment. For example, a hospital with a median 300-patient daily census, 40 percent of them on Medicare, will spend, on average, \$732,000 more than their total Medicare reimbursement treating those patients for bed sores, a routine and potentially avoidable problem.

By embracing management engineering, hospitals can potentially make such changes across the board. "It always costs less to do something right the first time than to do it twice," says Faulk. "If you have a good process, quality is less expensive, not more. And while there are only so many dollars in a health care system, having two or three management engineers who can lead others and teach these techniques, you'll create systemwide efficiencies."

### Other Issues

Bringing a management engineer into your facility brings up a host of other issues. They include:

#### Fitting Into the Organizational Chart.

Faulk believes that management engineers should work closely with a hospital's chief of operations. "The chief of operations will likely have multiple operational problems in areas studied by management engineering," he says. "If the staff has a reasonable exposure to the COO, then they will be actively used to finding solutions to the problems that COOs deal with."

**Where to Start.** "The emergency department is the front door to the institution," Eitel says. "That is where most people come into the hospital. If we can improve patient flow and make the ED systems work together more efficiently, that will have a measurable impact on the rest of the hospital." Another approach, Faulk notes, is to work on whatever problem is on the mind of the COO. Once the administration sees how successful management engineering techniques can be, other projects will follow.

**Building Momentum.** "Success breeds success," says David O'Neill, senior program officer at the California HealthCare Foundation. "It can be easy to get overwhelmed by the problems of a particular institution, but rather than focusing on that, management engineers can do some very good work in specific areas of the hospital. By using analysis and engineering techniques, they get to understand the problems and relationships between various pieces, helping them get to the root cause of problems."—*Amy Buttell Crane is a writer based in Erie, Pa.* ●



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