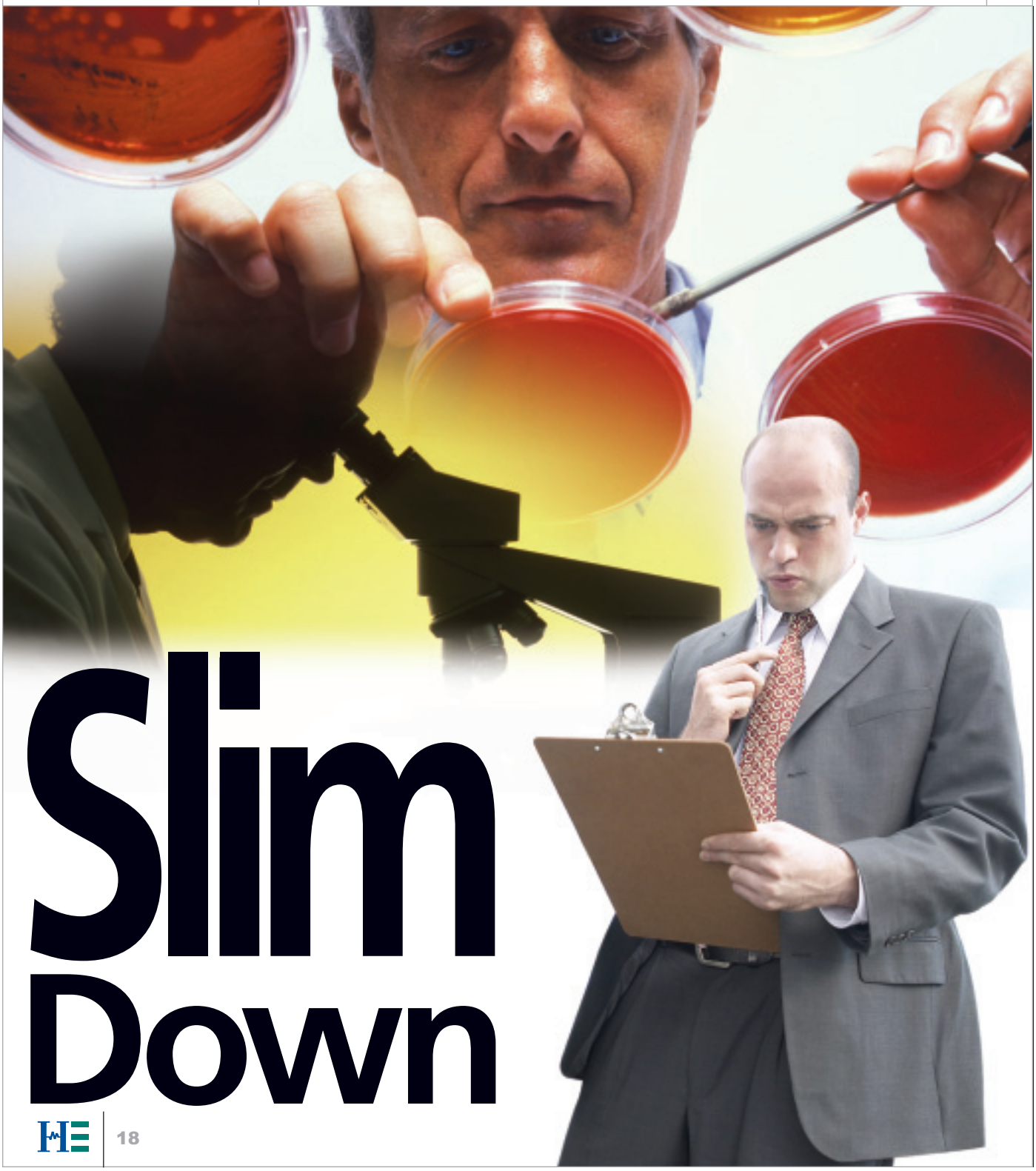
Dr. David Novis says lean processes can do for healthcare what they've done for manufacturing—reduce errors and improve productivity.



Slim Down

When I announced to my associates that all case material would require review by a second pathologist prior to the release of surgical pathology reports, I accomplished two things. First, I became the most unpopular chairman in the history of my hospital.

Second, I reduced our amended report rate (the number of reports that require reissue due to inherent diagnostic errors) from 1.8 to 0.6 per thousand reports. In Six Sigma terminology, that's from 1,800 to 600 defects per million opportunities.

Bear in mind that these rates reflect only errors that were discovered because someone had reason to review the cases after they were released. According to published reports, somewhere between one and five out of every 100 surgical pathology reports cases contain misdiagnoses that remain undetected in slide storage cabinets.

In most industries, inspecting products to remove defects before they are passed on to consumers is standard procedure. Not so in the healthcare industry. An audit of 1.67 million pathology reports performed by the College of American Pathologist's (CAP) benchmarking Q-Probes program showed that even though the practice of confirming diagnoses and inspecting reports before they were issued to patients was associated with fewer diagnostic recalls, only about 10% of the 359 pathology departments participating in the study were doing it.

In healthcare, performance improvement systems designed to reduce medical errors are often modeled along a benchmarking system. Case material is reviewed retrospectively, after diagnoses are released or therapy is initiated. Although benchmarking data provides valuable information, the healthcare industry may be ready to turn the page to a new approach in performance improvement.

As Dr. Richard Zarbo, chairman of the Department of Pathology at Henry Ford Hospital, and former director of the Q-Probes program puts it, "Pursuing nationally accepted benchmarks allows providers to focus on mediocrity." In other words, benchmarking programs may encourage institutions to accept levels of performance that are less than perfect. Persistent errors may be tolerated as health providers implement procedures that inch their way toward benchmark goals. Defects may be discovered after they have had opportunities to harm patients.

High quality, low cost

The manufacturing industry provides a different model, one begun by Toyota, which consistently produces cars with high ratings for profitability, quality, and safety. The ideals to which Toyota aspires, namely products that are high in quality, low in cost, accessible on demand, and safe should be familiar to all of us in healthcare. Third-party payers have been demanding these ideals for decades.

To achieve its ideal, Toyota invented the Toyota Production System (TPS), also referred to as lean production. In a nutshell, TPS involves producing one product at a time just as it is needed.

To accomplish this, Toyota redesigned the standard system of manufacturing. Before Toyota, inventory was pushed to downstream customers at the convenience of upstream providers. Batches of inventory formed bottlenecks as pallets queued up on factory floors at various stages of assembly. This situation is not unlike batches of patients queuing up at hospital registration windows as emergency rooms, laboratories, and clinics become backed up.

By redesigning the system to process one vehicle at a time, Toyota eliminated the bottlenecks and the inefficiencies associated with it. TPS also works in healthcare. At the University of

Pittsburgh Medical Center Shadyside Hospital, chief of pathology Dr. Steven Raab employs lean production techniques to "manufacture" his daily caseload of microscopic slides. According to Dr. Raab and his coworkers, their histology laboratory has significantly increased its productivity.

Constructing a lean production system involves purging all sources of waste in production and building quality directly into the product (or service) as it journeys downstream. Both of these actions serve to eliminate product defects.

Removing waste from the system means removing opportunities to make mistakes. Committing to lean efficiency requires resisting tendencies to work around or camouflage sources of waste rather than eliminate them. For instance, the approach to dealing with hospital bed shortages should be to eliminate inefficiencies that prolong hospital stays, not increase the numbers of hospital beds.

Making defects visible

Companies applying lean processes approach the problem of waste by sketching out a value flow diagram, identifying what provides customers with value and getting rid of everything else. In a tissue laboratory, the diagram might look like figure 1.

Consumers place value on having pathologists select critical tissue for examination and making diagnoses at their microscopes (areas shaded in black). The other steps (areas not shaded) can be viewed as opportunities for misadventure. They must be eliminated or abbreviated. Indeed, Q-Probes studies show that there is less chance of mismatching units of blood with their proper recipients (a potentially fatal error) when blood couriers travel straight from blood banks to patients' bedsides than when they make several stops along the way.

Toyota builds quality into their products by making defects visible. They do this through a combination of standardization, protocols, and redundancy. Parts are color coded. Bolts slip into place one way and one way only. Workers check the accuracy of the previous assemblies before moving on to the next. Human movements are strictly choreographed. How many centimeters an arm moves, how many degrees a body turns, how many steps taken—are all proscribed by strict protocol. Any product defect or discordance along the assembly line immediately throws the dance out of step. Once visualized, defects can be corrected immediately.

These practices function similarly in hospital laboratories. Q-Probes benchmarking studies show that that blood transfusionists are more likely to check patients' vital signs during transfusions when they use standardized checklists than when they work from memory. They are less likely to mismatch units of blood when

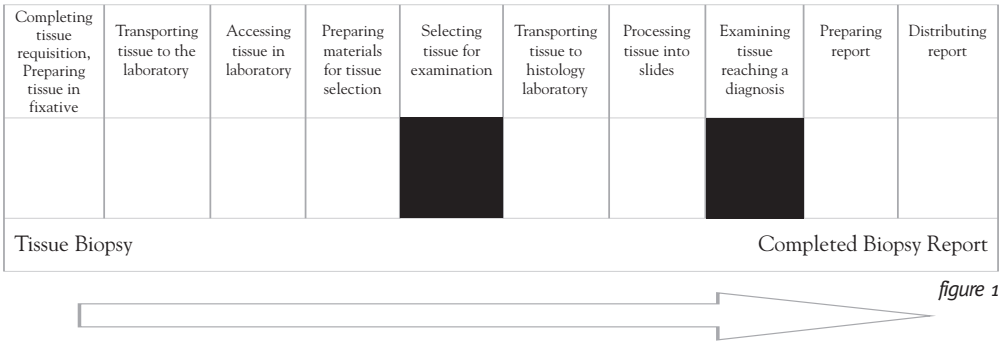


figure 1

assistants confirm their identification procedures than when they go it alone.

Fast correction

Detecting errors is only half the job. The other half is correcting them before customers drive their cars off the lot. At Toyota, defects are corrected as soon as they are discovered, even if that means halting production. This is not done in healthcare. In many institutions, it is not uncommon to find teams of doctors, nurses, and administrators sitting around a conference table discussing the root cause analysis of a problem that occurred four months ago—months during which disasters have had ample opportunities to recur.

Differences in approaches to error reduction may lie in how industries label errors. The manufacturing industry identifies defects in products. The healthcare industry identifies errors in performance. The former invites ownership of problems by everyone responsible for production. The latter invites blame of individuals responsible for segments of production. Making the products or services (rather than the individuals) the targets of strategies designed to reduce errors may be what allows one industry to confront and reduce errors more successfully than others.

Toyota's success in controlling defects is as much about philosophy, people, and commitment as it is about turning wrenches more efficiently. The philosophy of sacrificing short-term profits to achieve long term growth, the investment in the people who propel that growth, and the unflagging commitment to the notion that things are never as good as they could be are what drives quality at Toyota.

The healthcare industry would need a cultural overhaul to duplicate Toyota's successful model. Everyone involved in delivering healthcare services must be of the same mind. Supervisors must begin each day by looking at value flow diagrams and asking themselves, "What non-value steps can I eliminate today?" Employees must begin each day by asking themselves, "What change can I discover today that will reduce errors?"

To create the trust that this mentality requires, employees must be empowered with the resources to institute change. For instance, at Hypertherm, Inc., a thermal cutting tool company that operates using the principles of the TPS, employees are organized into brainstorming teams. To pilot a labor-saving or defect-reducing idea, the only people team members need to convince are fellow team members. Hypertherm manufacturing engineer George Konstantakos noted that last year, 700 employees submitted 2,500 suggestions for improvement; 1,800 were eventually incorporated into production systems.

It may be that pay-for-performance reimbursement schemes will force the issue. Healthcare providers may regard the proven track record of lean production techniques as a way to drive performance outcome metrics (such as amended report rates) to levels yielding greatest reimbursements. If the results are as successful in healthcare as they have been in manufacturing, healthcare consumers may be afforded a level of quality they thought they were paying for in the first place.

Dr. David Novis has practiced laboratory medicine and pathology for 25 years and is a recognized expert in clinical quality, medical outcome assessment, patient safety, medical service delivery, and best practices methodologies. He is a senior consultant for Chi Solutions, Inc. He can be reached through his Web site at www.davidnovis.com.