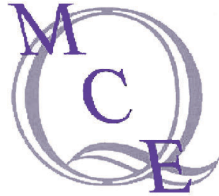


Mayberry Newsletter

The W. E. Mayberry Center for Quality and Performance Excellence

Tennessee Technological University • College of Business • December 2008



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Perspectives on Organizational Performance Improvement: Sector Spread

Dr. Curt Reimann

Introduction

In this edition of the Mayberry Newsletter, Dr. Natarajan addresses a topic of current interest to citizens as well as to analysts of developments in the improvement of organizational performance. In his article—Performance Improvement in Healthcare—Dr. Natarajan outlines some key performance improvement initiatives in healthcare and some challenges that lie ahead. He emphasizes cross-organizational learning and sharing of best practices—two precepts and key purposes of the Malcolm Baldrige National Quality Award and the Tennessee Center for Performance Excellence, and related efforts in the U.S. and around the world. Interestingly, highlighted in Dr. Natarajan's discussion of healthcare improvement are two initiatives—Six Sigma and Lean—arising from, and strongly associated with, manufacturing. In this article, we address such cross-sector spread of organizational improvement practices—the importance of such

spread to the national economy and to organizational learning that bears upon business education. By sector spread here we refer to adoption and possible adaptation(s) of organizational improvement practices across the major components of economies—healthcare, education, government, non-profit organizations, and manufacturing. Our comments are intended to contribute to the dialog on developments relevant to business education—concepts and practices in organizational improvement.

The Importance of Sector Spread

The diffusion of performance improvement practices across sectors of economies is of importance and interest for two quite-different reasons: (1) potential economic/social value of improvements and (2) contributions to organizational learning. Both of these reasons relate to business education, as follows:

(1) If the pace of productivity gains experienced in manufacturing could be realized in other sectors, the economic consequences would be enormous, bearing in

mind that these other sectors account for about 5/6 of the U.S. economy. In this regard, however, it is critical to make an important distinction—the difference between sector performance and organizational performance. Different scopes of “system” and confusion of language arise here, depending on the “unit of analysis”: the individual organization (a hospital, for example) as the unit of analysis, versus aggregates of health organizations, up to and including the so-called U.S. healthcare system. Beyond the individual organization, many organizational improvement practices might still apply, but policies, such as payment schemes, consistent and responsive data systems, incentives, etc., have major influence on improvement and further improvement potential. Many analysts argue that better system design is needed both to realize major improvements and to enable the improvement of practices of individual organizations. It should be noted that major policy and

structural changes at the national economy level would also likely create basic changes in individual organizations' outcomes, work processes, incentives, and practices. In manufacturing, individual companies and many industry sub-sectors have made major gains in productivity. In the last decade, increasing attention has been directed toward improving supply chain performance. Lean systems are playing an important role in this application, which demonstrates the versatility of the concepts and tools.

(2) There is a wealth of potential learning for those who manage organizations, assess organizational performance, perform business and organizational research, and offer business and management education. In particular, from the point of view of organizational learning, other sectors' diversity of purposes, outcomes, governance, financial models, organization, stakeholders, incentives, etc., provides a broad variety of contexts to test, assess, and refine organizational performance improvement practices. For example, the differences between routine operations and professional services are very large. Organizational and professional "cultures" and other human factors play important roles and must be understood and accommodated within performance improvement systems—ones that avoid one-size-fits-all prescriptions and doctrinaire language. Failure to recognize such differences has resulted in the abandonment of many performance improvement initiatives. Often this abandonment occurs when there is a change in leadership.

Direction and Form of Sector Spread

(1) At this point in the progression of sector spread, the main adoptions and adaptations occur outside of manufacturing of concepts and practices originating within manufacturing.

(2) Inside of manufacturing itself, and within other sectors, the primary vehicles of spread are initiatives such as Lean and Six Sigma. Often, such initiatives focus on problem solving, but over time, many organizations have sought to develop more systemic approaches, which drive more deeply into organizations' operations and processes to identify causality, which in turn lead to better design and problem prevention. This more systemic, integrated and standardized use of improvement tools is a positive trend. Although concepts and tools may be similar, adaptations require significant sector-specific expertise and knowledge.

Sector Spread: Parallel Developments

In parallel with performance improvement developments in healthcare, efforts have been underway for a number of years in other sectors such as government, education, and non-profit organizations. Accreditation and performance management in these areas have and are being influenced by organizational improvement concepts and practices, and, increasingly, tend toward greater emphasis on measurements of results and outcomes. For example, the Southern Association of Colleges and Schools (SACS) uses a Quality Enhancement Plan which is "to lead to a course of action for institutional improvement by addressing a question or questions that contribute to institutional quality with special attention to student learning." Elsewhere in education, concepts such as outcomes-based education, national goals, national standards, and assessment of and regular reporting on student progress have been a growing part of the national dialog for at least two decades. These developments reflect a fundamental societal shift toward improvement of outcomes.

In related developments in government, the Government Performance and Results Act (1993) "provides for the establishment of

strategic planning and performance measurement in the Federal Government." It is noteworthy that the newly-elected President has named a Chief Performance Officer.

Over the last two decades, the Federal Government and many state and local entities have created forms of recognition for performance improvement, open to organizations of all types. The basic purposes of the recognition are to focus on performance improvement and to share practices. Some education, government, and non-profit organizations have been recognized by state and national award programs for their progress. These award recipients have also taken part in sharing their practices and experiences with other organizations.

The central thread of assessments of such organizations includes verification of well-defined, systematic practices and demonstration of comprehensive performance improvement results, which compare favorably with appropriate benchmark leaders. It should be emphasized that such assessments and verifications are not based upon prescribed tools or practices—those assessed have flexibility as to such methods, practices, and their organization. Improvement results are expected to be relevant and important to the organizations' basic purposes. The scope of "system" covered by award applications is the overall organization, such as a hospital or school or a grouping of these, which comprise a larger, defined entity. Award applicants' choices of initiatives and practices derived from manufacturing appear to mean that such vehicles are regarded as effective in producing beneficial results. Another common interpretation is that these choices reflect spread via "fad". An important consideration here is how such initiatives and practices evolve over time—are they sustained, do they address the core outcomes of the organization, and are they systemic?

Some observers note that adopting organizations often tend to limit improvement efforts to routine administrative and/or support operations and fail to apply, or even attempt to apply, such practices to their “core” requirements such as healthcare outcomes and student learning. This limited, project orientation was often the case during the very early stages of organizational adoption, and many organizations were unable to progress beyond that stage.

Importance to Business Education

In our continuing work on quality and performance, we seek to “make sense” of developments in organizational improvement with the expectation that this could contribute to academic interest and to effective adaptations to business education. In a previous newsletter article (1), we noted that despite extensive applications of quality and performance improvement tools in organizations around the world, “the subject of quality receives unpredictable and often marginal coverage in business education.”

We noted also that “business educators often view quality as narrow, technical, specialized, and most clearly and appropriately applied to manufacturing, especially to product and production characteristics.” Summing it up, we said: “From an academic point of view, it is likely that educators perceive only the technical core of quality as a well-defined body of knowledge or discipline. The aspects of quality that lie outside the technical core are not yet linked in clear and predictable ways to the technical core. In addition, the aspects of quality outside of the technical core include concepts and practices that many business educators tend to view as too ill-defined, broad, and variable to be accepted and

taught as a coherent discipline or covered effectively in a single offering”. Although many results being achieved in non-manufacturing sectors are encouraging, it is not yet clear how pervasive they are, how they are influencing others in their sectors, and what they will contribute to new knowledge that broadens and deepens our understanding of organizations, organizational dynamics, performance, and improvement. The cultural and human factor aspects become increasingly critical as we move from manufacturing to other sectors.

Observations and Conclusions

(1) Developments in cross-sector spread of performance improvement practices are encouraging in that there are now many parallel, reinforcing concepts and efforts, which have been sustained over about two decades. Most of the organization-level, systemic developments have arisen in manufacturing and retain much of their language and packaging, even when adopted by quite different types of organizations. Despite this persistence, the spread is still in the early stages. Most sharing to date has been one-way, from manufacturing to other sectors. It is not yet clear if this is primarily because of fad-following influence or the unique value the cross-sector learning provides.

(2) Much more is known about cross-sector adoption than adaptation. Without effective adaptation, cross-sector learning is likely to be limited to visible initiatives, such as Six Sigma and Lean, which could leave some important gaps between business and short-term problem solving on one-hand and core outcomes applications on the other. Ignoring core outcomes in performance improvement initiatives tends to limit two-way sharing, and might inhibit the development of sector-specific expertise. More needs to be known about how initiatives such as Lean and Six Sigma apply to

basic outcomes in education, healthcare, and other sectors. Without such knowledge, it is unclear how performance improvement initiatives may be integrated into overall management systems in these sectors.

(3) The pace of cross-sector spread is limited by a minimal contact among professionals from different sectors and meaningful two-way sharing. On the state and national scene, award programs are among only a few forums that bring together experts from multiple sectors with a central focus on organizational performance. Although these contacts are important to award management and to professional growth of participants, and they provide unique and valuable service to their communities, the volunteer nature of the award programs and the limited time they afford, prevent wider sharing and better cross-discipline development.

(4) There are important roles for general business management expertise backed by research and a strengthening of business and executive education. As more and more organizations seek to manage relative to overall requirements in systemic ways, and allocate resources to fulfill all critical obligations, they increasingly need to create integrated strategies that include comprehensive measurement systems that enable and track ongoing performance improvement. The most appropriate base for such work would appear to be business schools. In particular, a critical examination of cross-sector efforts in organizational performance is needed, because it would provide a wealth of examples and contexts to develop and refine the discipline of performance management.

1. “Quality in Business Education,” available at <http://www.tntech.edu/Mayberry/MayberryNews2005.pdf>

Spring Mayberry Lecture

Dr. R. Nat Natarajan

The 2008 Spring Mayberry Lecture was delivered by Mr. Thom Crosby, President and CEO of Pal's Sudden Service. Pal's is a small chain of fast food restaurants in the Kingsport region of east Tennessee. The chain started about fifty years ago and has expanded to twenty different stores. Pal's is unique in the way it runs the business. Its business model and operational excellence has helped it to become a very profitable company with loyal customers. Mr. Crosby spoke about, among other things, what made his company stand out from the competition. The following is a summary of his talk.

Pal's mission is to "Delight customers in a way that creates loyalty." It does not mention profit in this statement because they know if they have a loyal customer, then that will produce the profit in the future.

Pal's business model focuses on three areas: manufacturing, education, and service. Pal's emphasizes manufacturing because some food items are already processed when they arrive at the restaurant and then the employees manufacture the final product to the customers' needs. The kitchen is viewed as a manufacturing plant. The most interesting aspect is that Pal's considers itself to be in the education business as well. One of the key responsibilities of leaders of Pal's is teaching and coaching. It also believes that in an industry characterized by high turnover and minimum wage levels making its workforce smarter and out-training its competition is an advantage.

The company has more than 700 employees in its 20 restaurants but it is run by a corporate office which is very lean. It has only

three officers who are often traveling! Mr. Crosby explained this is possible because of very careful design of the management system and processes. He said it was a very quiet office and they do not deal with any crisis there. Senior leadership does not spend time in fire fighting. This enables them to focus on their three main jobs: 1) assess processes; 2) teach and coach daily; 3) interact one-on-one with customers. The leadership process at Pal's has four different components. *Engage* - set high standards, including everyone and seeking input on improvements and keep the team informed. Pal's engages key stakeholders and business partners in strategic planning. *Educate* - it is one of the most important jobs of a Pal's leader. Pal's leaders lead from the front, focusing first on the certification of skills of the workers and then on their mastery of the tasks. *Empower* - everyone is held accountable for their results. Consider feedback as a gift and celebrate bad news. *Execution* - translating strategy into reality leading to meaningful, measurable, and sustainable positive results. Focus on the real results and on creating value and not on impression of success.

The key business drivers for Pal's are quality, hospitality, accuracy, speed, cleanliness, value, and people. Its core competencies that lead to sustainable competitive advantage are fast service speed, hot food hot, cold food cold, order accuracy, cleanliness, and employees training. Crosby brought home to students the application of some powerful management principles they learn in their business classes. He said the leadership at Pal's does not punish everyone for the mistakes of one bad apple. Rules should not be established for the majority based on a few bad ones. There

must be good consequences for good performance and bad ones for bad performance. Leaders get the behavior they exhibit and reward.

Some of the practices that differentiates Pal's from other fast food restaurants are: placing new employees into the back office doing paperwork, while the more experienced employees are placed up front dealing with the customers, empowering employees to give refunds to customers to ensure customer satisfaction and not offering any coupons or discounts to customers. According to Crosby, when employees feel empowered in a way that they can take care of customers, they will provide better service and be friendly in doing so. This leads to an exceptional high customer loyalty. In the fast-food industry, a frequent customer is defined as someone who visits the store an average of three to four times per month. Customers of Pal's frequent the store over three times per week. Factors that keep these numbers so high are an "always side with the customer" policy, a car through the drive-through every eighteen seconds, and an enthusiastic sales team. For Pal's building customer relationship is more important than the profit from a single transaction. Crosby observed that a happy customer, over a lifetime, will spend \$25,000 in a store.

Pal's strives for operational excellence by paying painstaking attention to details and applying so to speak rocket science, to a low-tech, people-oriented business. Systematic standardization and Deming's plan-do-check-act (PDCA) cycle are used in implementing continuous improvements. The #1 rule for Pal's is the 'No

Exception Rule' - never pass a product to the next step that does not fully meet the standards. All this is supported by an aligned performance measurement system. The results have been outstanding including a 97% customer satisfaction rate, a 96% employee satisfaction rate, low error rates in filling orders (1 out of 3400 compared to the next best competitor at 1 out of 12), the fastest service of any fast food restaurant at the last window with only 18 seconds (compared to about 60 for competitors) and frequent 100% scores on health inspections. Crosby pointed out that these results have not meant rapid expansion of the number of stores. Pal's belief is that expansion must be undertaken carefully without diluting its

unique culture which is crucial for the replication of its practices. Crosby discussed the challenges that Pal's and others in the industry face due to increased competition, high gas prices, rising food and packaging cost and the slowing economy. Because of the success it has achieved Pal's has become a role model company. Many other large corporations have visited Pal's to study and learn the "behind the scenes" secrets of its success. Many ideas which have originated at Pal's are now being used by major fast food restaurants. Pal's shares its best practices with companies all over the world in its Business Excellence Institute. All in all, as recounted by Crosby in direct and down-to-earth style, it is a remarkable success story of a small business from east Tennessee.

Thom Crosby joined Pal's in 1981. During his career with Pal's, Thom has held positions of Owner/Operator, Vice-president/COO, President/COO, and currently President/CEO. Thom also serves as CEO of the Business Excellence Institute, an educational subsidiary of Pal's Sudden Service. Thom has a reputation for building a highly motivated team and then cutting through obstacles and distractions of operating a food service operation to arrive at the very core of excellence as evidenced by the operation producing outstanding results.

Pal's Sudden Service has made history by becoming the first foodservice operation to earn America's highest business honor – the Baldrige National Quality Award from the U.S. Department of Commerce. Pal's set a new record as the only company of any type to win the Tennessee Excellence Award twice.



Mayberry Speaker, Mr. Thom Crosby and Dr. R. Nat Natarajan

Activities and Accomplishments 2007-2008

The Mayberry Center's purpose is to increase awareness and enhance development of performance excellence related practices in business and education on a local, state, and national level. This is achieved by conducting and disseminating research, implementing projects and activities, conducting workshops for practitioners, and instructing students in undergraduate and graduate classes. The Mayberry team, consisting of Chairholder **Curt W. Reimann**, President **Robert Bell**, Mayberry Professor of Management **R. Nat Natarajan**, and Mayberry Graduate Assistant **Troy McNatt** have contributed to this mission during the past year. Activities carried out include:

- Dr. Reimann serves on the Technical Committee for the Juran Center for Leadership in Quality, Carlson School of Management, University of Minnesota.
- Dr. Reimann serves on the Veterans' Advisory Board on Dose Reconstruction by the Defense Threat Reduction Agency, U.S. Dept. of Defense.
- Dr. Reimann serves on the board of Goodwill Industries.
- Dr. Reimann and Dr. Nat Natarajan serve on the advisory board of the TTU School of Interdisciplinary Studies and Extended Education (ISEE).
- Dr. Reimann, President Bell and Dean Dr. Susan Elkins presented a paper at the Excellence in Tennessee conference of the Tennessee Center for Performance Excellence in February 2008.
- Dr. Nat Natarajan presented the paper "Process Management and Innovation," at the 2008 EUROMA conference in Groningen, Netherlands, in June 2008. He serves as VP of Planning of the Indian Subcontinent Region of the Decision Sciences Institute (ISDSI). He attended and presented a paper at the inaugural conference of ISDSI in Gahziabad, India, in January 2008. He also attended and presented a paper at the National conference of DSI in Phoenix, Arizona, in November 2007.
- In January 2008, Dr. Nat Natarajan was a visiting faculty at SP Jain Center for Management in Dubai, UAE. He taught a course on quality management in the Executive MBA program.
- In May 2008, Dr. Nat Natarajan was a visiting Magellan Exchange faculty at the Provinciale Hogeschool Limburg (PHL), in Hasselt, Belgium. PHL is a partner school of TTU in the Magellan Exchange. He taught a three week course on Quality Management.
- Dr. Nat Natarajan serves on the international committee of National Center for Quality Management (NCQM), Mumbai, India.
- Dr. Nat Natarajan serves on the editorial board of the *Journal of Quality Management*.
- Troy McNatt, Mayberry Graduate Assistant, served on the 2008 Board of Examiners of the Tennessee Center for Performance Excellence (TNCPE). In April 2008, he attended the

Quest for Excellence conference in Washington D.C.

- Mayberry Graduate Assistant Troy McNatt was a member of the MBA student team that placed third in the International MBA Case Competition at George Washington University in March 2008.

Mayberry Advisory Board

- The Mayberry Advisory Board met on November 5 and 6, 2007. Board members visited classes as guest speakers. They also participated in a panel discussion organized by the MBA students. Earlier they interacted with COB students during the reception and dinner on November 5.
- Jack Swaim, the chairperson of the Advisory Board was a Distinguished Lecture Series Speaker in College of Business (COB) classes on November 6 and 7, 2007.

The Mayberry Lecture

- On March 27, 2008, Mr. Thom Crosby delivered the Spring 2008 Mayberry Lecture. He is the President & CEO of Pal's Sudden Service. Thom also serves as CEO of the Business Excellence Institute, an educational subsidiary of Pal's Sudden Service. See lecture summary.

College of Business has a new Dean

We welcome Dr. James Jordan-Wagner, who joined the College of Business as the dean at the end of July 2008. Prior to this appointment, he served as chair of Eastern Illinois University's (EIU) School of Business. He was responsible for five majors, an off-campus program, an MBA program with an accounting concentration, and all aspects of maintaining accreditation with the

Association to Advance Collegiate Schools of Business (AACSB). He was a leader in establishing a live trading center for the Finance program at Eastern. Before joining EIU in 1990, he was a fixed income analyst in London. Dr. Jordan-Wagner earned his doctorate in finance at the University of North Texas. We look forward to his support and participation in all the Mayberry events.

Dr. Juran 1904-2008

Dr. Joseph Juran, a pioneer in the quality movement of the 20th century passed away on February 28, 2008. In a long and remarkable life, he made outstanding and lasting contributions to the discipline of organizational performance excellence. Dr. Reimann, who worked with him when Dr. Reimann was the first director of the Baldrige award remembers him

thus: "At a time when the field of quality was often contentious and our new Baldrige effort was still fragile, Dr. Juran was a steadying influence bringing credibility and confidence to our work. His services and leadership within the first Board of Overseers were a key foundation for our early work, enhancing the award's stature in the U.S. and around the world."

Where Are They Now? An Update From Chad Meador!

While pursuing my MBA degree at TTU from 2001 - 2002, I had the opportunity to serve as a Mayberry Graduate Assistant and mentor under Dr. Reimann, Dr. Nat, and the Mayberry Board members in the areas of Organizational Performance Management. The capstone experience to my two year assistantship was learning to teach and apply the Malcolm Baldrige Criteria for Performance Excellence through the role of an Examiner for the Tennessee Quality Award (now known as Tennessee Center for Performance Excellence Award). The MBA degree coupled with this Performance Management experience has had a profound impact on my professional life expanding my range of vision to the opportunities and challenges of driving improvement at an organizational level.

After graduating from TTU with my MBA, I was hired by MAHLE Filter Systems North America, a global tier I automotive supplier, to fill the position of Improvement Specialist Engineer. The Performance Management knowledge base I had developed while working as a TQA examiner and Mayberry Chair Graduate Assistant enabled me to broaden the previous scope of this position from a purely product improvement focus to a corporate organizational improvement focus. During my three years in this position, I had the opportunity to lead cross-function-

al improvement project teams on a regional and global scale. These projects focused on product cost improvements, manufacturing process improvements, and business process improvements to support our company's North American strategic objectives.

After three years in this position, I had the opportunity within MAHLE to broaden my work experience by moving into a position as a Regional Commodity Buyer for plastics. I was responsible for sourcing all new plastics business and developing a commodity strategy to maintain a global supply base of quality, agile, competitive suppliers. My Performance Management experience from the Mayberry Graduate Assistantship helped me to be able to collaborate with suppliers to drive innovation and continuous improvement for mutual benefits within our supply chain. One additional highlight of my time with MAHLE Purchasing was being assigned to a special cross functional project team in 2005 to lead the supply chain integration activities of a newly acquired competitor.

In late 2007, I accepted a new position as a Senior Buyer with Calsonic Kansei North America (CKNA), a Japanese-based tier I automotive supplier. The position is in CKNA's Program Purchasing Management department supporting the cockpit module product line. Buyers in this department serve a hybrid function

between traditional purchasing and program management responsibilities. We are responsible for sourcing parts to support new programs and managing the supply chain of these new components through start of mass production. CKNA's culture places a strong emphasis on continuous improvement through cross-functional teams. I look forward to continuing my career at CKNA and working on these cross-functional project teams to drive organizational improvements. Also, I plan to continue improving my personal supply management skill set by obtaining the new CPSM designation offered by the Institute for Supply Management over the next year.

As I continue to develop my career, my long-term professional goal is to move into a position working in organizational strategic planning and performance management. My experiences while in the Mayberry Center and TTU MBA program largely shaped this career goal. I owe much thanks and gratitude to Dr. Reimann, Dr. Nat, and the Mayberry Board for the life changing opportunity.

Performance Improvement in Healthcare

Dr. R. Nat Natarajan

In the year 2001 edition of the Mayberry newsletter, in an article titled "Do no harm: Can healthcare live up to it," (1), we highlighted the issues relating to medical errors, reviewed the steps that were being taken at the time to prevent/reduce them and assessed the prospects of the success of such measures. Much has changed since in the healthcare industry. Some of these changes like escalating costs are having an impact outside healthcare. They are now threatening the competitiveness and even survival of companies like General Motors, one of the largest purchasers of healthcare in the U.S. The last decade has witnessed increasing attention to healthcare related issues such as widening coverage for access to, cost containment, quality of care, and regulation. Many organizations are implementing initiatives to improve performance. These initiatives are broad in scope addressing not only medical errors and patient safety but other dimensions of performance as well. The importance of the healthcare sector merits renewed emphasis on performance management issues. This article is a brief survey of the type of initiatives, the methodologies involved, the measures being introduced by governmental and non-governmental organizations, the progress that has been made and the challenges that remain.

Good and bad news

The U.S. spends about 16% of its GDP on healthcare. Its spending on a per capita basis is the highest among industrialized countries. Yet, it does not seem to have much to show for all this spending. According to a report published by California Healthcare Foundation in 2007, U.S ranked as last or next to last in 9 out of 10 delivery measures among developed countries. On medical errors, it was ranked last with 34% of the patients "receiving" a medical error. Experts concluded in 2004 that despite all the initiatives and success stories, healthcare system in the U.S. has

fallen far short of a goal set five years earlier to cut in half an epidemic of deadly medical errors. According to Lucian Leape, a surgeon and adjunct professor at the Harvard School of Public Health and author of Institute of Medicine (IOM) reports, "we don't have a national commitment for patient safety." However, trends for certain measures of healthcare within U.S. are encouraging. For instance, the 2007 report on quality published by the Agency for Healthcare Research and Quality shows that of the 40 core measures, 26 have shown improvement, 2 showed significant deterioration and 12 showed no change. The median annual rate of change for these measures is 3.1% improvement and for three consecutive years, this rate of improvement has remained about the same.

Learning from other industries

Implementing principles of lean production has been major thrust of recent improvement initiatives in healthcare. The system which was perfected by Toyota and has now become the de facto standard in the auto industry has found new adherents in healthcare. The objective is to eliminate all forms of waste while maximizing the value of the care delivered to the patient. The main characteristics of the system include creating a flow of activities (value stream) to deliver care which matches the pace at which the service is needed by the patients. When waste such as delays, errors, transportation, waiting, and so forth are eliminated from the flow, the same value can be delivered in less time and with less cost. Scheduling the activities of this flow which additionally smoothes the work load across the resources in the hospital will increase capacity and the utilization of assets. Revenues can be increased without additional investments as more patients can be treated. Such value streams are notably lacking in healthcare. Sitting in waiting room, examination room, or in a hospital bed are all too common.

Steven J. Spear, a senior fellow at the Institute for Healthcare Improvement

(IHI), describes the four capabilities of the Toyota system that deliver operational excellence (2). 1. Work is designed as a series of on going experiments that immediately reveal problems. 2. Problems are addressed immediately through rapid experimentation. 3. Solutions are disseminated adaptively through collaborative experimentation. 4. People at all levels are taught to become experimentalists. Developing these capabilities is the challenge that healthcare faces. The changes called for are systemic both in the physical and organizational sense of the term. For instance, creating the flow may call for changing the layout of doctor's offices and the departments such as X-ray while the care may be delivered by patient focused teams that include members from admission, nursing, physicians, pharmacists, and discharge. The culture of working around problems with short term fixes and that of blaming, naming and shaming have to change.

A legitimate question is whether a system that has worked in auto assembly lines will work in a very complex system like healthcare. The evidence from several organizations seems to suggest that smart adaptation of the Toyota system to the healthcare setting can yield huge benefits such as reductions in infections, time for tests and test results, time spent tracking down materials and information, and length of patient stay (2, 3). We are not arguing that this will work everywhere. The keys are customization, and a focus on the principles and process of problem solving rather than specific solutions. While lean production targets elimination of waste with emphasis on time and flow, Six Sigma as a process improvement methodology and business management system focuses on reduction of variability. Like Lean, its origins are in manufacturing. It has in common with Lean, a rigorous

scientific approach termed DMAIC (define-measure-analyze-improve-control) that emphasizes the use of data to drive improvements. Outcomes similar to that of Lean have been achieved. Six Sigma tools have been used either separately or in conjunction with Lean tools (Lean Sigma) to reduce: medical errors, variability in patient flow, diverts from ER, and length of stay. Emergency Departments (ED) of hospitals—which are usually overcrowded—can benefit by applying process analysis tools for identifying bottlenecks and smoothing the patient flow.

Again, like Lean, Six Sigma concepts have to be tailored to suit the applications. The terminology can create resistance. For instance, nursing staff have a difficult time interpreting the meaning - in the healthcare context - of “defect” which underlies the quality metric of Six Sigma, defects per million opportunities or DPMO. One of the lessons from Six Sigma projects in healthcare is that it is important to engage the physicians in these projects. Physicians may not be aware of how their actions affect other processes such as nursing, billing, pharmacy etc., and even when they are aware, they may ignore their impacts and resist change because change often places more burdens on their processes. There could be other barriers to their participation as well, e.g., when they have practices of their own and are not full time employees of the hospitals.

Healthcare organizations are also borrowing ideas from transportation, aviation, nuclear power, space flight, and military - industries where safety is critical. For instance, Boston Medical Center sought the expertise of an efficiency expert from the transportation industry whose recommendations have resulted in reduced overtime for nurses and better coordination of patient flow. In the future, we are likely to see more such applica-

tions, as the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) in the U.S. is recommending that hospitals use scientific management principles to address the problem of overcrowding in emergency departments. Flight simulators are routinely used in aviation for training and education. Likewise, medical education is beginning to incorporate simulation. By simulating an actual patient during surgery as much as possible, doctors can get quick feedback on if they injected the wrong drug, made incorrect interpretations and other errors. Many complex and realistic clinical crisis scenarios can also be created. Another area where ideas from aviation are making an impact is reporting of medical errors (see below). A majority of preventable hospital mishaps occur because of poor communication and studies have shown that at least half of such breakdowns occur during handoffs. Kaiser Permanente, a health system of California with over 8.5 million members, uses a handoff method (e.g., for transferring patients from surgery to intensive care) based on a change-of-command system developed for nuclear submarines. Automotive industry, apart from being the source of lean production concepts has contributed another idea for improvement - the pit-stop techniques of Ferrari race car-team were used in a U.K. hospital to revamp the procedures for handoffs! The changes have led to reductions in technical errors and information omissions during the handoffs.

Role of technology

Most healthcare providers still currently work with handwritten patient notes, which are often difficult to read, not readily available, incomplete, and prone to alteration, destruction, and loss. Structured, electronic order entry systems that require complete data entry remove ambiguities that arise from incomplete information or illegible writing. Decision-support systems can intercept errors, such as interactions between incompatible medications and the prescription of drugs to which the patient’s electronic medical record notes an allergy. Electronic provider

order management (ePOM) eliminates the possibility that a doctor’s illegible handwriting could result in a patient getting the wrong dose of medicine or the wrong drug entirely. Another system, Electronic Medication Administration Record (eMAR), uses bar codes on individual doses of medications, and on patients’ wristbands, to make sure the right dose of the right drug reaches each patient. Nurses use laptop computers and bar code scanners to match patients and medications. Information technology can also play a very important role in preventing errors in the delivery of clinical care itself. Electronic medical records and interactive decision-support tools have the potential to allow healthcare providers timely knowledge of a patient’s health history and improve clinical care. FollowMe is an online system that any doctor can, in theory, use to access medical records anywhere and anytime.

Despite the availability of such technologies, the healthcare sector has lagged woefully behind other sectors such as financial services, transportation, and manufacturing to adopt information technology (IT) with the notable exception of the departments of federal government. The Veterans Administration (VA) and Department of Defense (DoD) are recognized national leaders in the implementation of electronic medical records and decision-support tools in their hospitals. This seems strange when one considers the investments made by healthcare organizations in clinical care technologies such as MRI and CAT scan. An important barrier is technical - such as lack of interoperability and lack of common standards for exchanging data between different healthcare organizations like pharmacies and hospitals. This inhibits investing in IT that only creates islands of information that cannot be moved around and shared. Another major inhibiting factor is cost. According to experts, depending on the size of the practice and

complexity of the software, an electronic medical records system can cost US\$10,000 to US\$60,000 per physician. Such a system can save labor costs by reducing the number of employees needed to pull records. The more important benefits are due to the improved quality of care by preventing costly complications later.

In manufacturing, automation has been used to replace people and improve labor productivity, but this is difficult to achieve in the clinical side of healthcare, because the processes cannot be easily standardized. Because there is too much variation in clinical processes across physicians and institutions, healthcare has been characterized by some as a “handicraft” industry. Advances in technology like MRI do not replace people but, in fact, generate demand for people with skills who can use and maintain that technology. Reducing costs, therefore, requires a different approach like applying the concepts of Lean Production System.

Sharing best practices

Now there exists knowledge for improving performance in healthcare and the mechanisms to disseminate that knowledge. The Baldrige framework was extended to the healthcare sector in the year 2000. Since then many organizations have used the framework for self-assessment and performance improvement. The number of organizations applying for and winning the Baldrige award has steadily increased. The award criteria requires these organizations to show evidence of systems thinking, benchmarking, and comparative results. Award winners such as SSM serve as role models sharing best practices in the annual Quest for Excellence conference and other regional Baldrige conferences. In Tennessee, the award program of Tennessee Center for Performance Excellence (TNCPE) and its annual conference provide the forum and support for sharing best practices. Within healthcare itself, organizations like

the National Coalition for Healthcare, Leapfrog Group, and The National Patient Safety Foundation disseminate the best practices. Don Berwick, president of Institute for Healthcare Improvement (IHI) launched in December 2004, the “100,000 Lives Campaign.” The goal was specific, to save 100,000 lives in the next year and a half by implementing six best practices in care to avoid preventable deaths. About 3,000 hospitals representing about 75% of hospital beds in the U.S. signed up. About a third of them agreed to implement all six interventions. The campaign exceeded its goal by June 2006. This has been followed by the “Five Million Lives Campaign” for two years. (concluded in December 2008).

In an important development in the dissemination of comparative data, the federal centers of Medicare and Medicaid have developed a massive database, including in it every one of the 17,000 Medicare and Medicaid-certified nursing homes in every state in the U.S. This data is now available online. It provides individual nursing homes a database to benchmark, learn, and improve quality of care. The federal Centers for Medicare and Medicaid Services now requires hospitals to report on 42 quality measures. Hospitals that do not fully report may lose up to 2 percent of their reimbursement.

Reporting errors

In healthcare, efforts by external organizations to monitor medical errors face limitations. For example, JCAHO has experienced significant difficulty in securing hospitals’ participation in its “sentinel events” reporting system because of concerns about legal vulnerabilities or punitive actions. The aviation reporting system, which IOM and others have suggested, as a model that healthcare should emulate, depends on the collection of as much information as possible about close calls as well as errors that actually resulted in harm. In the aviation industry, the identity of those who report and those who are involved in the incident are protected. This encourages people to report errors and

makes the information available quickly.

The Veterans Administration (VA) system formed an innovative alliance with NASA to develop a medical error reporting system similar to the system NASA has operated successfully for the Federal Aviation Administration (FAA) since 1975. Aviation errors are reported by pilots, air-traffic controllers, mechanics, and all others involved in air transportation, to the Aviation Safety Reporting System (ASRS). The NASA/VA Patient Safety Reporting System (PSRS) became operational in April 2002. PSRS is an external, voluntary, confidential, and non-punitive reporting system. Reports are analyzed by a team of NASA patient safety experts, including physicians, nurses, and a pharmacist. VA used it to complement its own internal error reporting system which is also voluntary, confidential, and non-punitive.

In the first two years of its operation the VA’s internal reporting system had many more submissions than the PSRS suggesting a higher level of trust in the internal system. Absence of retribution is an important factor in the success of such reporting systems. According to sister Mary Jean Ryan, the CEO of SSM (first winner of Baldrige healthcare award), she once failed to report her own error in medicating a patient, so SSM has created a “blame-free” zone for reporting not only errors but near-misses. Many improvements at SSM resulted from the reported incidents.

The passage of the Patient Safety and Quality Improvement Act of 2005 has addressed the main barriers to wide adoption of external reporting systems like PSRS, the fear of reprisals from employers and professional sanctions. The Act provides federal protections for confidentiality and places limitations on the use of collected information. The Act

fosters development of Patient Safety Organizations (PSOs) with expertise in the analysis and mitigation of threats to patient safety. Providers that report to PSOs will be able to work together under legal protection to learn from their experience and from that of other providers to improve patient care and promote a “culture of safety.”

Aligning Incentives

The payment system in healthcare often encourages waste, sending wrong signals to the providers in terms of capital expenditures. The payment system of government-sponsored Medicare, which private health plans also use as a template, tends to reward the big capital expenses of buying high-tech machines such as MRIs. The more the machines are used (which could be for excessive testing, a form of waste) the bigger their profit margin. Seattle based Virginia Mason Medical Center, an early adopter of the Toyota production system, receives top marks for quality and patient safety in local and national report cards rating hospitals. It has rerouted patient traffic in its cancer center, cutting the time patients had to wait for chemotherapy from four hours to 90 minutes and reduced excessive high-tech testing, but ended up losing money. The more cost-effective it became the bigger financial hit the medical center took because the payments are based on the quantity of work done rather than the results. In the U.S., insurance companies generally do not pay for improvements, but that is beginning to change and they are experimenting with financial incentives for improved care.

If there are no incentives for doing the right things what about disincentives for doing the wrong things? Until recently under Medicare payments there were no financial disincentives for committing medical errors. That changed as of October 2008, when it stopped paying hospitals for the added cost of treating patients who are injured in their

care. Because Medicare is the largest insurer in the country, its decision to refuse payment for preventable conditions has already influenced others — public and private — to set similar criteria. Some state Medicaid programs have announced that they will not pay for as many as 28 “never events” (so called because they are never supposed to happen). So have some of the country’s largest commercial insurers in seven states. Hopefully, providers will respond by putting the focus on preventing harm.

The Road Ahead

The current level of spending and performance in healthcare is unsustainable from the point of view of the healthcare providers, the consumers, and the economy. On the positive side, the potential for improvements is enormous. For example, according to Spear, if all the hospitals implement Lean practices and cut the medical errors in half, as conservative estimates 22,000-49,000 lives and \$8.5 -\$14.5 billion can be saved (2). The savings would be even more if other adverse events such as central-line infections are reduced in all the hospitals. Don Berwick noted that “every system is perfectly designed to get the results it gets.” If we want better outcomes, we need to design a better system. Change (ranging from physicians routinely washing hands and using simple checklists to practice of evidence-based medicine) has to happen. However, even if the leadership is there - ready, willing, and able - it has to contend with complexity of the system it is trying to change. Healthcare as a system is one of the most complex in terms of its constituent elements (e.g., patients, physicians and other health care professionals, purchasers of health care, payers, insurers, regulators,..), the web of relationships between them, the knowledge, skills, and technologies that are utilized and at the level of individual clinical processes. For instance, a study showed that average patient in intensive care unit (ICU) required a hundred and seventy-eight individual actions per day, ranging from administering a drug to suction-

ing the lungs, and every one of them posed risks. An error in just one per cent of these actions amounts overall to an average of two errors a day with every patient. The medical profession has responded to such complexity by creating super-specialists thus increasing the number of silos in the organization and making it even more complex. More attention has to be paid to the design of how the clinical care is delivered. Traditionally, a lot of resources have been devoted to understanding diseases and developing therapies and treatments. It is equally important to learn how to incorporate these discoveries into effective daily practices. It requires the concerted and judicious application - on a much wider scale - of all the tools, systems, and practices we have discussed. Not only yes we can – to echo a recent campaign theme – do this as a nation, we also must.

1. Available at <http://www.tnitech.edu/mayberry/2001N-DoNoHarm.htm>
2. Spear, Steven J. “Fixing Healthcare from the Inside Today,” *Harvard Business Review*, September 2005, pages 78-91.
3. Graban, Mark. *Lean Hospitals*, CRC Press 2008.

Mayberry Advisory Board



Newsletter prepared by Melissa Scott, Dr. Nat Natarajan, and Dr. Reimann. It is also available on the Mayberry web site, www.tntech.edu/mayberry. Your comments are welcome.

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