



# Unity in Healthcare The Toyota Way

*Can Lean Engineering Fix North American Health Care?*

By John Liebert, MD

In the course of my locum tenens work, I have worked at fifty sites from coast to coast, including multiple Midwestern sites. These sites have varied from a Harvard teaching hospital to remote rural sites in northern Maine and Wisconsin. While working in Seattle, I became acquainted with Project Leapfrog, a consortium of corporate payers attempting to influence both quality and cost of healthcare services for their employees. When I heard of one of their solutions, Lean Engineering, I found myself uninformed of such managerial concepts and did some research. I discovered that Lean Engineering is synonymous with The Toyota Way. So, I decided to study studied The Toyota Way, attempting to understand many of the case management dilemmas encountered through the years within its context. I discovered that much of the literature to date on the transfer of both operational processes and principles of Lean Engineering to healthcare delivery flies in the face of both The Toyota Way and the realities of our contemporary healthcare marketplace.

## Corporate Culture of Unity

Of primary significance in representing application of The Toyota Way to any enterprise is the quintessence of its being a total culture embracing the production of consumer durable goods. Testimonials to transforming just a portion of a healthcare enterprise—like the lab—to “lean” fails to capture the value in enterprise unity of The Toyota Way. Likewise, some very relevant “lean engineering” solutions applied within many integrated healthcare

systems do not transfer to the current marketplace needs of US healthcare. In such markets the payer, if it exists at all, is oftentimes either out of a provider’s network or is unprofitable state Medicaid; patients are either filtered out in the admitting process and diverted or transferred out to avoid financial hemorrhaging. Such US integrated healthcare systems could be very “lean”. They cannot, however, fix North American healthcare via diversion and transfer of unprofitable patients under the euphemistic shield of “Triage” based on financial priorities. Financially-driven Triage, rather than that of Evidence Based Medicine’s classical rules and current knowledge base for true clinical “Triage”, may appear “lean”. It is, however, not The Toyota Way; thus, it is not “Lean Engineering”, even though financially-driven Triage is what drives patient flows today.

The cruel reality of a provider succeeding in US healthcare today is the same as that of the real estate industry. It is more about location, location, location than management. Hospitals are closing, because they are in the “wrong part of town” and cannot control the mix of profitable and unprofitable patients. Bad locations force them to eat the cost of care for a disproportionate percentage of patients and raise security costs. Such exigencies of having located in the wrong part of town destroy providers’ profit margins, regardless of whether they are “for-profit” or nonprofit providers. In the United States, The Toyota Way, therefore, must incorporate into strategic and

operational planning a mission similar to Catholic hospital systems that include varying shares of charity—or, call it “Good Will” for responsible Chief Financial Officers. Such Good Will could be monetized to exchange and trade for financial credits, as in carbon emissions overseas.

Traditionally this goodwill has been absorbed within subsidized teaching programs, now increasingly challenged by liability risk and governmental tightening of reimbursement policies for teaching hospitals. The economic advantage of low paid and overworked trainees treating the poor in exchange for bedside supervision and didactic teaching from higher earning academics is disappearing. Academic centers, like Harvard, that are well enough endowed to cover the red ink of their unprofitable teaching hospitals are the exception rather than the rule today. And, in the realities of the US healthcare marketplace, there is also a limit to Christian altruism; Catholic hospitals in the wrong parts of town also close when profitability disappears. The Vatican cannot afford to pick up the tab again for all charity care in the inner cities and rural America; there is no longer a free lunch for Catholic healthcare services in this day of secularized nursing and costly technology that cannot be sacrificed in treating the poor.

The “Canadian System” is even less relevant to lean engineering than US integrated systems alleging to run lean, although for different reasons. Lawsuits threaten to overturn the

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Constitutionality and moral authority of Canada's politically popular One-payer system, thus fracturing its monolithic culture necessary for unified operations The Toyota Way. Ironically, it is this very culture, unlike US integrated healthcare systems, which nearly did control the marketplace of one developed nation. Unlike US integrations, however, its inability to optimize services in too many clinical disciplines—like “just-in-time” surgical interventions, the cause of action for a successful Supreme Court test in Quebec—paralleled its increasing and wasteful ratio of administrative support personnel to practicing MDs. Furthermore, ease of access to the United States healthcare system for more fortunate Canadians served as a safety valve for excessive supply constrictions in healthcare services imposed by provincial governments. As a whole, then, it could not meet the total needs of its service area—Canada—either, but it came close.

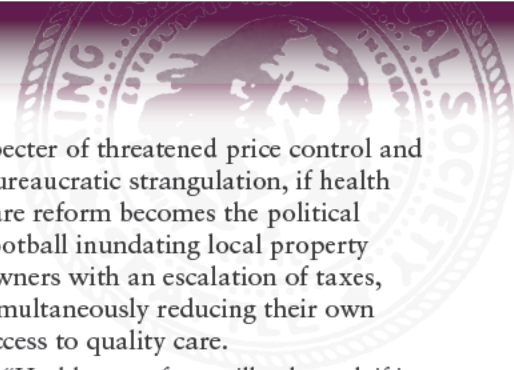
The mystique of the “One-payer Canadian Healthcare System”, in

fact, masks its identity as a clone of the US Medicaid System, wherein all US providers would, by law, be preferred providers for their states of operations. Arguably, politics will always trump The Toyota Way in such governmentally controlled one-payer healthcare systems. On the eve of the 2000 federal elections in Canada, Prime Minister Jean Chrétien dispersed \$23 Billion to provincial healthcare authorities in order to desperately buttress the popular one-payer system with his moral authority. Known as “Green Poulitice”, some of the only traceable new investments from that massive cash infusion included capital purchases of new ice-makers, floor-scrubbers and lawnmowers in beneficiary Provincial capitols. In 2003 he disbursed another \$27 Billion, this time with promises to establish a national healthcare council, home care program and drug insurance program to cover catastrophic drug costs. One year later, none of the commitments of the 2003 Health Accord for service optimization had been met, despite “green poulitice” now amounting to

\$60 billion. The Netherlands and some EU partners which provide Universal Nationalized Health Coverage spend more per citizen than Canada, but can they demonstrate better returns on healthcare investments than Canada? And, even more importantly, do the demographics of these relatively small, homogenous countries even permit meaningful benchmarks for healthcare services in the United States?

Assuming a small window of fiscal and political opportunity still exists, are hospitals and other providers in any position to lead the way to a fix? Probably not on their own; they must follow the money, while navigating the stormy seas of EMTALA; DRGs; the uninsured; the underinsured; punitive damages; conflicting governmental regs; razor thin profit margins and a burgeoning illegal immigrant population. The prices in this uniquely rich healthcare system originate from labor contracts. State and federal governments must keep their spending up there to avoid appearances of depriving the aged, disabled, working poor and disenfranchised. Washington would not finance more than double the per capita cost of healthcare compared to its G8 partners without the lead of corporate America's unique global contract with employees. Conversely, a huge surplus of skilled labor in this country could reduce corporate spending on employee health care, allowing government to follow suit. Corporate financing of health care in this country is not an entitlement; pre World War II conditions could return, as in Detroit today, allowing corporations to get out of the healthcare business in order to become more globally competitive.

And, although there is an interesting literature on “hospitals being stupid”, no author says that the people running them or working in them are stupid. They have lost their cost-plus contracts and are in musical chairs mode, desperately trying to avoid sitting on the wrong chair when the music stops—whether that be Bariatric Surgery or Cardiac Stents. Thus capital and resources are invested where healthcare CEOs think the



money is—i.e. Cardiac Care versus Emergency Services and Psychiatry. The latter two generally appear to hemorrhage red ink and are getting shut down at a fast pace; one-quarter of ERs nationally have been closed since 9/11. Of the 100,000 acute care beds closed during the same period of time, a disproportionate number of them have been psychiatric beds, contributing to the public health crisis in the care of the seriously mentally ill. Is there a provider culture in this country that embraces the need for both inpatient psychiatric beds and emergency services, regardless of their profitability? Perhaps, but the altruism of provider culture in this nation more often than not succumbs to profitability, rather than the true needs of the community served.

Most healthcare providers likely would cherish a long-term, altruistic view of their services. They either cannot, however, do so and survive on razor thin profit margins in “a wrong neighborhood” or do not have the Toyota culture to do so. The keynote address at a recent Governance Institute 100 meeting on Medical Staff Relations was “Survival”. It was presented by USAF Captain O’grady, who was shot down in Bosnia. This was the national meeting for both CEOs and Trustees of 100 leading US hospitals. The guest list read, therefore, read like a Who’s Who of American Hospital Governance. To have told them that they either accept The Toyota Way or close their doors would not have shocked them; they would likely have welcomed such a solution, were it a viable one. All the others are worse. And, worse yet, there is a paucity of solutions with improved benefits for all parties; Massachusetts’s mandating compulsory health insurance for all citizens is a really novel one holding great promise for a state-by-state national solution. There really are not any others today, although the political rhetoric is deafening—as well as deceptive and purely seductive.

Survival of providers in this century’s marketplace requires preparation for

the potentially overwhelming and escalating healthcare needs of an aging population. That includes the highest risk insured citizens and illegal residents—as well as the ballooning population either choosing to “go bare” or being forced financially to do so uninsured. Life Insurance Policies with Death Benefits are now available to a select few until age 120! And, Greenspan has addressed the fiscal and demographic wildcard of medical/surgical innovations that unexpectedly emerge to both enhance health and extend life in these ballooning populations. Such innovation, although in many cases serendipitous, still depends on medical R&D investment. These investment, in turn, is extremely sensitive to expectations for reimbursement of healthcare services. Clinton’s Universal Healthcare Plan, for example, significantly reduced Medical R&D investment. Porter, Teisberg and Brown discuss this likely

specter of threatened price control and bureaucratic strangulation, if health care reform becomes the political football inundating local property owners with an escalation of taxes, simultaneously reducing their own access to quality care.

“Health care reform will only work if it supports innovation. In 1993, for example, \$500,000,000 in public and private stock offerings of medical-device and drug firms were canceled because of the threat of price controls....Innovation cannot happen in America under tight government regulation and oppressive, self-serving bureaucracies that outlaw economic competition in the provision of health care....a \$1,000,000 investment in modern imaging systems can prevent needless exploratory surgery, and new drugs can reduce hospital stays as much as 10 days.....Drugs and devices are not the only way to innovate; services can be revolutionized too. Special head-trauma centers have been shown to lower cost and quicken rehabilitation for example”.<sup>1</sup>

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<sup>1</sup> Porter M, Teisberg E, Brown G: Innovations: medicine’s best cost-cutter. New York Times, February 17, 1994.



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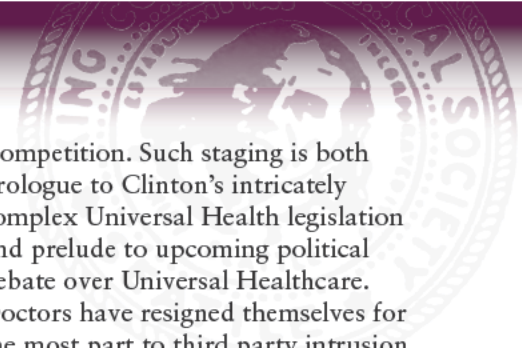
The political survivor of Clinton's administratively top-heavy healthcare debacle, contemporary "Managed Competition", has stimulated product introduction of a plethora of costly new diagnostics and treatments. But, resultant ethical dilemmas for their demand management of medical necessity jeopardize any form of insurance underwriting. Moral hazard for insurance underwriting is rife in the healthcare marketplace. Thus, more of the "less sick" have increasingly more healthcare products and services to consume. The resulting moral hazard extends claims made across the spectrum of insured lives, threatening to marginalize the healthy young who subsidize the at-risk aging. And the "seriously ill" have more costly products and services to consume, intensifying claims made. All of this uniquely obfuscates underwriting costs and the insurance benefits derived from such underwriting. Plastic surgery of the eyelids to spare vision, for example, would extend paid benefits across the spectrum of the aging healthy, while sophisticated heart centers would intensify them among the aging sick. The epidemiology of high utilization of primary care services reveals that 10% of sick Americans are responsible for the utilization of 90% of primary care services. And, of that 10% of high utilizers, one-half are primarily psychiatric patients who are either in the wrong clinical pathway or, if on the right one, are wrongly diagnosed or inadequately treated. The other half

of high utilizers are either critically or terminally ill and rotate between nursing homes and expensive ER admissions; service optimization with this seriously ill population has also been proven to reduce costs and improve quality of care via innovative partial care and day care programming. This knowledge has enough power to either save the underwriting of private health insurance or explain its demise in the future. Much could be accomplished, both in improving care and reducing costs, for high utilizing patients. There are many explanations and reasons for relative provider neglect of high utilizing patients, but certainly, provider culture is one major resistance to concentrating investment and innovation on this patient population.

In short, the vast majority of corporate healthcare providers are not blessed with the Toyota family's culture, one radiating a family's intergenerational gold standard of consumer durable manufacturing. Certainly, a powerful culture also engulfs healthcare—i.e. previously cited economic survival, pervasively heightened sense of risk in customer transactions and desire for good treatment outcomes for all. But, this existing culture in the health care industry is far from the binding culture that evolved from the production of Toyota's first product, a steam-driven weaving loom, the primary condition for Lean Engineering.

Healthcare is a culture, however, that, because of its staying power, adapts in response to new technologies and sources of financing—i.e. outpatient laparoscopic surgery and DRG's, respectively. (DRG's are fixed Third Party reimbursement based on Diagnostic Related Groups, rather than the traditional cost plus reimbursement of services performed). It would adapt again and even transform itself, if the medical staff, Directors and administration both agreed to adopt lean management from top to bottom. A show-and-tell with just one moving part of the system, such as high margin Cardiac Centers, is not lean management, although competitive providers may wrongly publicize it as such.

The Toyota Way, as applied to healthcare—or, Lean Engineering—is an empowering culture driving a seamless system in unison from the top down. It emanates, therefore, from the BOD through the CEO and Medical Chief of Staff, as well as the bottom up, starting from the ER. It also emanates from the center out to outpatient affiliates, suppliers and medical and allied healthcare staffs. Right from the crown of The Toyota Way—hospital governance through clinical staff—Lean Engineering must fly into the headwinds of ominous political tensions. These conflicts are generally caused by the divergent goals of doctors trying to survive economically, while hospitals have to survive both



politically and economically. Marcus and Dorn recently pointed out:

“the real challenge for health professionals is to create a viable health care system that fairly and satisfactorily balances the many interests of the many parties that have a stake in its success. A system that can accomplish a meaningful balance of interests will not only resolve its many paradoxes, it will create the buy-in from its main constituents that will in the long run be its most important asset. In other words, if we can learn to create an arrangement by which we share power and control; offer mutually beneficial gains in pursuit of a complex set of goals and create a vision of health care service delivery that adequately balances all these different needs, we will have a system that is better able to synchronize and coordinate its parts to meet the needs of our patients”<sup>2</sup>

Such a balancing act could suffuse healthcare providers with a culture compatible with The Toyota Way. Doctors with their pens, however, control 75 % of the one-and-one-half Trillion dollars of per annum healthcare spending. It is imperative, therefore, that physicians be brought

on to the governance boards of medical centers and hospitals. Lay dominated boards of trustees have inadequate clinical knowledge to autonomously govern both medically necessary revenues generated from physicians’ orders, as well as the contingent allocation of capital and resources necessary for their support. Dr Marcus, PhD., Director of Harvard University’s Program for Health Care Negotiation, said:

“if physician groups and boards are going to succeed together, they have to renegotiate objectives that are in alignment.... Boards also must be educated to understand the survival tools for physicians. Even now, with everyone agreeing on the importance of shared information, subtle unintentional message filtering and communication lapses still occur”<sup>3</sup>

What Marcus is announcing to us here is likely a beginning to the final act for 1990’s era of Managed

Competition. Such staging is both prologue to Clinton’s intricately complex Universal Health legislation and prelude to upcoming political debate over Universal Healthcare. Doctors have resigned themselves for the most part to third party intrusion from the Managed Care industry. They remain highly ambivalent to it, however, as they experience shrinking incomes, increased patient loads and no relief from—and even increases in their liability exposure—within all but a couple of states successfully capping malpractice judgments. Being highly competitive, crisis oriented and “CEO’s” of their own practices by nature of their training and professional roles, physicians do not fit without tension into governing board power centers. These governance boards must meet the perceived health delivery needs and demands from communities to be served over the

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2 Marcus, L. with Dorn, B., Kritek, P. Miller, V. & Wyatt, J. 1995. *Renegotiating Health Care: Resolving Conflict to Build Collaboration*. San Francisco: Jossey-Bass, Publishers.

3 Marcus, L. with Dorn, B., Kritek, P. Miller, V. & Wyatt, J. 1995. *Renegotiating Health Care: Resolving Conflict to Build Collaboration*. San Francisco: Jossey-Bass, Publishers.

longer term, whether that community be a nation like Canada or an area of urban or rural USA.

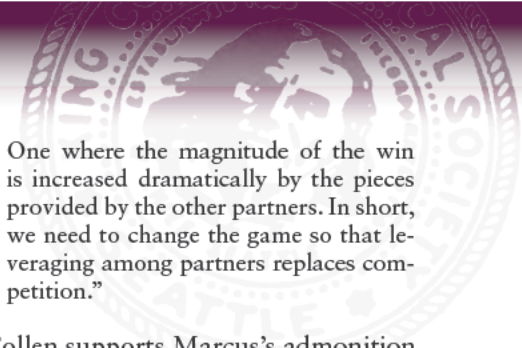
Now, add to those intrinsically divergent thrusts of interests between lay administration and physicians the growing regulatory power of federally subsidized information technology, and the seedlings of make-it-or-break-it Information Technology are well beyond germination; they are growing like weeds. Nurses are downloading therapeutic data from patients' wristbands into central databases using bar code readers. The majority of that order-driving physician cohort, generating nearly a trillion in revenues, is now routinely using handheld devices to support their clinical work. Additionally, an increasing number of them are downloading patient records on wireless hand held devices—then forwarding them to colleagues. Hospital pharmacies, labs and radiology that are not digitized seem rare now, while digitization of clinicians' documentation and reports remains widely divergent in format,

communications and coordination. Web-based data storage and both WAN and LAN access is proliferating, and the medical centers' database system, like their sister E-commerce database systems in less ambiguous business industry sectors, inevitably become more and more critical for providers' survival.

Healthcare Providers, however, significantly lag Las Vegas Casinos in profiling their patient customers for both individual health-needs data; outcomes vs. costs and both micro (LAN) and macro (WAN) epidemiological trends. Conflicting demands of HIPPA confidentiality restrictions and service optimization restrain both the development of patient profiles, as in The Electronic Health Record that is patient centered—and distributing it amongst patients' providers. These providers, although broadly more sophisticated in IT, remain as widely divergent as ever in computer and net capabilities. Nonetheless, medical computing solutions are available that provide

safe storage of the Electronic Health Record while distributing it to any provider with Internet access. Such Data Storage and Internet Distribution capability exists today, regardless of whether or not a provider even has an Electronic Medical Record; a computer with Internet connection is all that is necessary. Only the rare provider today lacks that basic IT technology. Yet, provider culture is more that of a fortress in protecting its patient information, rather than reducing redundancy of work-ups and leveraging past medical history from other providers.

These patient databases generated by the Electronic Medical Record will be more valuable to providers with the shrinkage of both indemnification health insurance coverage and government-controlled reimbursement. They not only hold clues to customer—or, patient—retention, but patterns of practice and morbidity affecting financial and legal risk too. The tradition of currently acceptable “subtle unintentional message filtering



and communication lapses”, while not having stopped healthcare systems from functioning before, now become unacceptable. Both government and other third party payers are putting unrelenting pressure on providers to invest in modern healthcare information technology.

In light of the lack of evidence to support EMR vendors’ testimonials for reducing either healthcare costs or fatal medical errors, do Governing Boards and administration promote unspoken ambiguity by purchasing clinically counter-productive functionality? Such bias in IT selection could favor data from the Electronic Medical Record that provides physician practice profiles and DRG coding and performances preferred by third party payers, rather than clinical quality? Or, does administration unambiguously direct IT departments to install effective clinical informatics solutions supporting both higher validity in diagnostics, as well as financially unbiased Evidence Based Medical interventions having parity

with administrative IT needs for financial data and patterns—i.e. a doctor’s average compliance with LOS determined by DRGs? Most particularly, do they back up that clear and unified administrative and clinical IT direction with budgetary dollars to enhance clinicians’ clinical decision-making and effective sharing of critical data for patient care? Let’s examining the current culture of healthcare within context of popular IT fixes, Morris Collen, MD states:

“The time has come for healthcare providers, the health information technology industry, and health Informatics to come together to enable people to use information to improve health. Better cross talk among the parties could establish a bridge, but such a bridge is not likely to be sufficient to harness the collective strength of potential partners to accomplish audacious goals. The priorities of the moment are too great. We may need a new business model to achieve effective alliance—one where we identify the core competencies of each potential partner. One where we develop scenarios showing that each partner can win by focusing on putting their piece of the puzzle in place.

One where the magnitude of the win is increased dramatically by the pieces provided by the other partners. In short, we need to change the game so that leveraging among partners replaces competition.”

Collen supports Marcus’s admonition, shifting the paradigm for both sharing of power and unfiltered information within the Health Services Industry to the realities of Information Technology’s increasingly pervasive and deeper penetration into healthcare services. The systemic effects of such penetration will catalyze either cultural deterrents of change that empower service optimization in health care or a balkanization that portends a crash. Neither of these investments or administrative commitments, whether they be financial success or clinical effectiveness, is mutually exclusive, of course. But, the goals of IT directors become critically important now. They need to be the catalysts for resolution, rather than one more aggravation and deterrent, of physician and governance tensions that cause traditionally

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filtered communications and— increasingly—overt conflict between administration and clinical staff. Such aggravated conflict will likely lead ultimately to either politically directed patient care controlled by “wealth maintenance organizations”—or to what European pundits call “a bunch of useless parasites in glass towers telling doctors how to do their jobs and saying ‘no’ to sick people”. What is needed is informatics support of clinically effective care that is both economically and politically supportive of lay governance needs and objectives; neither the \$60 billion of Chrétien’s Green Poulitce from Nationalized Healthcare or \$1 billion of back-dated stock options from United Health’s CEO are acceptable crowns for lean engineering American health care The Toyota Way.

The start could be in design of a user-friendly dashboard for mobile clinical computing. An architect who designs a family’s dream house without buy-in from both husband and wife is a fool and will not last. So, why should the dashboard for mobile computing be designed without the buy-in from all parties having to both depend on an Electronic Medical Record and use it as condition of employment or staff privileging? There are not that many constituencies to satisfy with such a design in order to maximize computing power for all of them, while optimizing their services. For example, time-consuming nursing documentation and EMR training are necessary, but so are bedside nursing functions that can be supported by mobile clinical informatics. Likewise with physicians; nurses and doctors must be able to read each other’s documentation, but their IT needs are as different as their professional roles in patient care. And, accounting needs valid coding for both diagnosis and clinical interventions for financial survival of the provider. Medical Records needs a finished chart with signatures. Pharmacy needs control over formulary and dispensing—etc, etc. Are all these professionals either so dumb or fratricidal as to need



off-the-shelf dashboard design to empower IT functionality? If so, as not so subtly inferred by EMR vendors, then no patient is safe anywhere. Truth is; in-house multidisciplinary and multispecialty dashboard design can facilitate lean engineering by facilitating—rather than aggravating—ambiguous messaging so intrinsically dangerous within the current healthcare culture

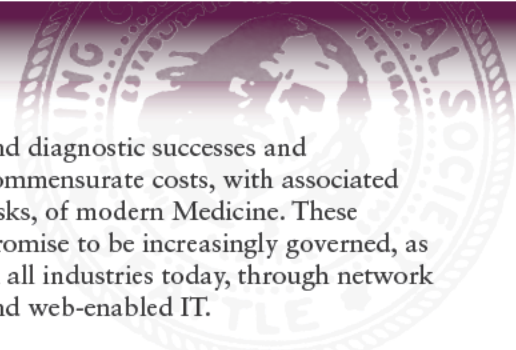
Boards and administration are also fighting to survive in a stormy sea with unpredictable weather expected for some time to come. In North America, both healthcare systems are about to start a political season and get kicked around like footballs—privatization north of the border and universal healthcare south of the border. Would it not be preferable for politicians to quietly discover the successes and failures on both sides of the border and actually implement them via their financial power, rather than set up trial balloon public commissions like Canada’s 27-member National Health Council; Clinton’s doomed Teton Conference and Ottawa’s National Forum on Health. The last, like Roy Romanow’s critique of the one-payer system in Canada, was largely ignored in Canada? North American governments will continue to be the largest customers for North American healthcare in the foreseeable future, regardless of what policy ultimately prevails.

And, what do failures of the past in IT integration of legacy systems that hook administrations financially into perpetuating them for years to come

**... the whole idea in lean management of One Unit processes; avoidance of excess inventory and stopping the production line for errors is intriguing ...**

have to do with massive disruptions amongst longstanding and world-famous freestanding medical centers? That answer is not available yet, but, likely, the answer will prove, Plenty! Westberg and Miller summarize the challenge for medical center IT directors for both finding and integrating clinical applications into a provider’s system to facilitate—rather than disrupt—political unity for lean engineered healthcare operations. Medical computing is complicated by rapidly evolving technology. Such complications include both the constant alteration of platforms, as well as functional limitations of Q&A templates. The latter, with automated linkages to proliferating answer resources, as embedded in the proposed patient’s electronic healthcare record, are challenged to maintain uniform taxonomy across institutional divides.

“Each advance in technology produces new ways of sharing and using information but at the same time burdens end users with the task of staying current and knowing which resources are best suited for a given need. Equally challenging is the task of evaluating existing information resources in light of newer resources, which may be more useful but also more costly. Indeed, management of these information resources in digital form has been heralded as one of the ‘grand challenges’ in health care Informatics. State-of-the art technology is not ideal for addressing all information needs in primary care at this time, but the pieces of an eventual solution are coming together as continual advances in technology provide fertile ground for development of more sophisticated information systems. Triage to human resources (librarians, case managers, clinicians who screen and forward



e-mail questions to sub specialists) of information requests that do not seem to map well to electronic resources may provide adequate backstopping capabilities until technology advances. (Finally), academic health care centers that leverage their resources to provide valuable information services among regional networks in primary care will probably gain a competitive advantage in the market place.”<sup>4</sup>

A case can be made for the trial period of managed competition coming to an end under the next presidential administration. Barring the most catastrophic distractions, such as war or severe economic recession, patient care will be on the front burner very soon, and politically palatable solutions will be demanded. David Burnett, M.D., Vice-President and Director of The Clinical Practice Advancement Center, University Health System Consortium, Oak Brook, Ill., describes the operation of a successful health care network as the logistical equivalent of Operation Desert Storm.

“For each network, there are thousands of doctors and tens of hospitals and other providers; for each hospital and other provider, there are ten to a thousand contracts; for each physician, there are 10 to 100 contracts and 1,000 to 2,000 patients; for each physician contract, there are different payment levels and methods and differing levels of risk; for each plan there are different authorization and reporting requirements; and so on, Given this level of complexity, it’s no wonder that a key goal of network management is “alignment”: get everyone to agree on common goals, set objectives that have everyone pulling in the same direction, and design strategies that encourage everyone to cooperate”.<sup>5</sup>

Just as Burnett’s Desert Storm metaphor remains valid for modern healthcare needs, the Net centric Warfare solution of Gulf War II offers a solution with its real-time, dual seamlessness and selective restriction for Battlefield Management. Everyone can both share in seeing and participating within such a Medical Communications and Coordination Platform, while selectivity of who sees what and when is part of the negotiated pact for cultural transformation. For example, Hospital

Maintenance does not require real-time access to Radiology sites on a routine basis, but, if there is a Code Black, they do. Network Centered Operations did not exist for the first Hospital Administration MA programs of the mid 20th century. These post graduate programs were derivative of Hotel Management, because hospital beds did not host “covered lives” exposed to both high technology clinical interventions and, ironically, the concomitant financial enforcement of rapid turnover. Escalating expectations for high tech promises and the costs of meeting them were actions causing inevitably contentious reactions from torts and third party payers, respectively. And the pay was modest too in comparison to the mega salaries of CEOs for healthcare providers today. In many ways, they are victims of both the undreamed of therapeutic

and diagnostic successes and commensurate costs, with associated risks, of modern Medicine. These promise to be increasingly governed, as in all industries today, through network and web-enabled IT.

Assuming that technologies can become the empowering catalysts of cultural change in overcoming the traditionally intrinsic divergence and unspoken ambiguities of agendas. And, assuming that this will lead providers to unify mission critical service optimization, who is the customer? In studying The Toyota Way, one must translate manufacturing processes of durable consumer goods in the Automotive Industry to those of healthcare. HR Departments of Corporate America and governmental healthcare authorities pay the bills

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4 Westberg E, Miller, R. Medical diagnostic decision support systems—past, present, and future: a threaded bibliography and brief commentary. *J Am Med Inform Assoc.* 1: 8-27; 1999

5 Phillips, D. The doctor is “In”, renegotiating health care: still working with doctors. The Barry Dorn, M.D. and Health Care Negotiations Associates Lecture to The Annual Governance Institute 100 Chairman and CEO Conference 1999, Scottsdale

and are responsible to greatest degree for assuring that their employees and clients, respectively, get satisfactory care at reasonable costs. For purposes of applying Lean Engineering to the delivery of healthcare services, they are therefore the customers.

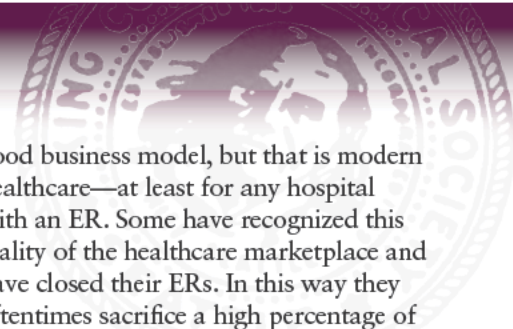
Individual Americans—even with mature health savings accounts—could never afford unsubsidized modern healthcare. And, the Feds, like in Canada and the EU, would merely reduce services, while both subsidizing and politicizing universal health care with some variant of “green poulitice;” that simply is politics. Corporate America’s unique underwriting of its employees’ healthcare risks sets the highest standards of care, both in history and in the world. Twice as much is spent on healthcare per citizen in the US than in either Canada or The Netherlands. When national economics and politics begin to change in this decade, these corporations are ultimately going to demand better accountability from contracted providers. Nobody in

his right mind would claim that US employees are twice as healthy or clinical interventions in the US twice as effective than in other G8 societies; in fact, such serious clinical outcomes as infant mortality and morbidity are worse in the United States!

Project Leapfrog, a consortium of corporations having huge healthcare exposure for both employees and retirees, was formed to do just that. It has promoted lean management with modern Information Technology for its providers. So far, however, its members are still passively absorbing inflating healthcare costs while outsourcing financial risk exposure at considerable administrative cost for demand management at the margins of medical necessity—i.e. pre-authorization and length of stay. If, however, this consortium took its business exclusively to the provider system that is actually practicing The Toyota Way, then it could create critical mass, state by state, for compulsory health insurance. The alternatives to such a sea-change transformation in

healthcare, assuming even more federal intervention with universal healthcare after the next Presidential Election, are all seemingly worse. Arguably, the insured public with expanding private health insurance could be experiencing a shortage of in-network doctors, but outsourcing Managed Care firms are not short of doctors! And, what will happen if most Leapfrog members get into trouble, like GM did, and simply cannot justify their healthcare costs to Wall Street or their Directors? And, if the Federal Government becomes the payer of last resort, Canadian-style politicization and publicized waste are likely to capture the headlines south of the border too. Neither of these are extremist scenarios; they are considered future reality by most healthcare economists.

Let us assume, then, that Project Leapfrog succeeds in obtaining lean managed operations with high tech solutions that optimize service—rather than feathering the nests of one healthcare constituency or another. And, let’s assume that



government can afford equitable care for the disenfranchised patient within such a system—i.e. contemporary Massachusetts. What, then, is the product?” It could be conceptualized here as therapeutic response and therapeutic remission—or, Tertiary Prevention as in Cardiac Bypass Surgery. It could also be early identification of reversible disease—or, Secondary Prevention, such as screening like Mammography. Finally, it could be Primary Prevention, as in exercise, diet and smoking cessation to reduce risk for many debilitating diseases. The internal customers of any healthcare enterprise, of course, are simpler to conceptualize within The Toyota Way and would include Imaging, IT, Finance, Nursing, Medical Staff, Surgery, Clinical Pathology, Security etc, etc.

The revenues of a hospital, a major provider, are based on value added to a bed. As such, they are more like a Southwest Airlines than any other business model one can conceptualize outside of healthcare. But, instead of

having to buy a ticket before lining up for boarding Southwest Airlines, all anyone has to do under EMTALA is to walk into any US Emergency Room and wait; diagnosis and treatment must be delivered equally without any qualification, such as citizenship or proof of ability to pay for all necessary services. Room occupancy is based on need; i.e. getting sufficiently sick or to the bedside of a relative—rather than having a ticket. And, to extend the airlines industry analogy, the closure of over 100,000 hospital beds in this country is more likely to cause a shortage, rather than bring parity to a growing and aging population. The plane, in other words, could always be full. Hospital Administration can only hope, therefore, that enough of its “seats” have been paid for to keep most flights in the black.

Every seat can have value added—like games, TV and enhanced food service to subsidize all the non-paying customers lying in the highest cost beds in the world. Running an airline like that would not be any investor’s idea of a

good business model, but that is modern healthcare—at least for any hospital with an ER. Some have recognized this reality of the healthcare marketplace and have closed their ERs. In this way they oftentimes sacrifice a high percentage of profitable admissions in order to control their admitting selectivity with less costly gateways. Billboard advertising is one means; non urgent and high tech workups for second opinions in sub acute or chronic Cardiac Care is another way. ERs are the most technologically costly and labor intensive waiting rooms in the world; for that reason, 25% of them have been closed in this country since 2001! Tragically, this trend has run counter to the increasing needs of Disaster Medicine for Emergency Services since the events of 9/11.

### **One Unit Processes**

Then, the whole idea in lean management of One Unit processes; avoidance of excess inventory and stopping the production line for errors is intriguing when applied to a hospital.

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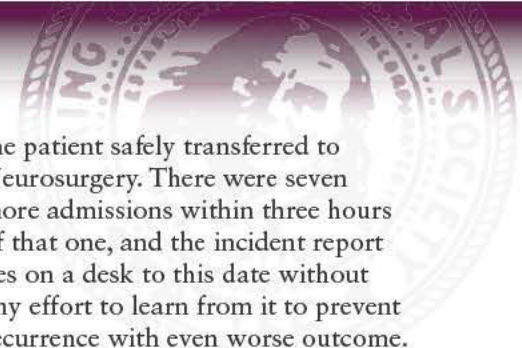
Currently, nurses are incentivized for Thru-put—that is to move patients quickly from ER beds and “thru” and out of the hospital. Thru-put can be used as the healthcare paradigm for an assembly line. Currently, such incentivization is so strong and assembly lines so overloaded and undermanned relative to ER push, that patient movement always threatens to supersede quality. But, DRGs pay the bills by reimbursing a fixed amount for any one diagnostic code; providers either keep costs within fixed payment

to profit or break even, or they must eat their costs when exceeding any reimbursed length of stay. Absent DRGs for managing demand for beds and services, third party payers have an army of physicians who can deny additional lengths of stays with minimal liability exposure to themselves.

Although it is against the law under EMTALA to dump a patient on another hospital, if the ER doctor “should have had knowledge” that there was an adequate inpatient

bed to care for that patient, there is no law against internal dumping. And, internal dumping happens all of the time—every day and every night in every hospital that serves its community. And, such open-door “push” generates life-threatening crises during every nursing shift. Currently, all that is routinely done is to write up an incident report when a patient is misrepresented to the admitting staff of a unit and dumped—i.e. the common internal dump of a medically ill patient on to the psychiatric ward because of “agitation” or “confusion”. Or, morbidly obese patients requiring special lifting capacity without receptive outpatient residential caregivers can be dumped almost anywhere in the hospital, following paths of least ward staff resistance. Oftentimes these are liability transfers, because “all units of a hospital” are supposed to have doctors and nurses; in the course of internal dumping, one can only hope that there will not be a sentinel event—i.e. fatal medical error due to inappropriate inpatient disposition—or a case going sour with compensable damages. Some hospitals reach collegially informal compromise on internal dumping with all units “taking their fair share” of custodial care extending beyond reimbursement and awaiting other placement. Although less contentious than most, that still is not The Toyota Way. The less adequate the unit’s functional bed capacity—i.e. those with Telemetry and poor medical backup support—the less equity there will be; because of EMTALA, acute inpatient operations are oftentimes a closed system. For such providers, there can be no Toyota Way of “lean management”—merely testimonials; the culture must be changed to equalize and individualize risks and benefits among internal customers of the enterprise. Those include the ER, ICU, General Medicine, Psychiatry and Rehab, to name just a few of the usual constituencies.

Or, many times an honest mistake is made and a patient under-assessed, requiring emergency transfer to the Intensive Care Unit. If one applies The Toyota Way in such cases, hospital admissions should be halted. Charge



nurses, backed up by attending physicians, “stop the assembly line of patient flow”—or, “Thru-put”—until the problem is solved and thoroughly understood. And through this lean engineering process, all units that are involved generate learning for the entire system in order to prevent it happening again. That is The Toyota Way; that is Lean Engineering.

But, no way, in today’s environment; these incident reports, more often than not, simply stack up until somebody is forced to do something or a case sours—fatal error or no contest malpractice. “We will track this type of problem for a while with incident reports”, is an all too common operational protocol steeped in group psychological denial.

“Ben was admitted to Psychiatry in the middle of the night, because he was severely agitated. He was under Neurosurgical care for cervical disk disease and was in a Halo pending further surgical intervention. Inpatient Psychiatry is organized for ambulatory patients, and the patient staggered down a hallway, hit the wall and displaced his halo. Neurosurgery refused to see the patient, because he was under the care of associates in a neighboring and unaffiliated hospital. When the patient’s Neurosurgeon was located the following morning, he was furious about the admission and requested the patient be transferred to his ER. Medic One had to be called to the Inpatient Psychiatric Unit to prevent imminent quadriplegia, and the patient was safely transferred to the neighboring hospital, where he was admitted to Surgery and treated for his agitation in a safe hospital bed. An incident report was written by Psychiatry but never discussed with any of the parties involved in either hospital. No attempt was made to utilize this inappropriate and dangerous admission for enabling the system to learn. In fact Thru-put was prevented from being stopped by the House Supervisor in order to keep the “assembly line of factory medicine” running. The ER remained uniquely active that night and coerced the on-call Psychiatrist to accept a total of nine new patients that night without any consideration of nursing staff capability. Although all parties, including Medic One and both hospitals and their ERs had Clinical IT Systems—the latter receiving hospital having a very advanced one—none could be used for Medical Communications and Coordination to light up the

clinical field for all participants to see all that was necessary to see. Bitterness resulted between administrative factions, Psychiatry, Nursing, Neurosurgery in two different hospitals and Emergency Medicine. As the Director of Emergency Medicine put it the following day, “just a game, nothing personal.”

An unstable cervical spine with displaced halo caused by agitation—thus requiring psychiatric admission?!!!. Medic One had to respond from the outside to get

the patient safely transferred to Neurosurgery. There were seven more admissions within three hours of that one, and the incident report lies on a desk to this date without any effort to learn from it to prevent recurrence with even worse outcome. Nor were antidumping rules generated from this incident in order to allow the concurrent reduction in flow of patients that, under lean engineering, allows staff to both accommodate to this internal dump and resultant crisis

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next time—or ever. Had clinicians, in fact, taken initiatives to interrupt Thru-put—thus stopping admissions and transfers throughout the enterprise, they would have been disciplined and likely eventually dismissed. Berkeley Rice, Editor of *Medical Economics* states, “All too often, physicians who protest patient safety problems at their hospitals risk being fired for “disruptive” behavior. What’s an ethical doctor to do?”<sup>6</sup>

The medical staff chooses its battles these days with hospital administration, and administration, try as it may to keep harmony among various constituencies—or, its internal customers served—oftentimes maintains Thru-put via incentivization of nursing supervisors. Supply constrictions within the system oftentimes force patients to be “freely” moved around the enterprise without clinical barriers of evidence-based Triage rules. Resistance to such rules is deeply embedded in a culture that still

moves patients around via seat-of-the-pants intuition rather than evidence based rules of triage. Such rules could result in disincentivizing house supervisors from cracking the whip from shift to shift. Rules are not there for admission, transfer or discharge to and from where—i.e. ER to ICU; Psyce to ER or General Medicine to Urgent Care. By not embedding classical, evidence based rules (EBM) for triage within a provider’s culture, the provider assures that no rules will be broken to keep the assembly line moving. EBM rules for Triage, therefore, would only be for expert witnesses when the case sours for being in the wrong bed at the wrong time; one could call this “reverse risk management”, similar to routinely avoiding culturing wound infections—unthinkable!

Such disunity in authority for running an assembly line cannot ever be The Toyota Way. It can, however, be misrepresented as such within the

guise of “Thru-put” driven by average daily census, average length of stay and the CFO’s accounting. Thru-put may frequently be falsely promoted as Lean Management, but, unless it provides for clinician discretion for stopping the assembly line of patient flow throughout the enterprise, it is as euphemistic as “surgical strikes” in combat. Thru-put that ignores clinical staff discretion in moving patients in, about or out is then purely an administrative operation enforced by nursing administration to please the master of numbers and spread sheets. It is neither Lean Engineering nor The Toyota Way; worse yet, it causes disunity, rather than organizational unity required for Lean Engineering.

Under The Toyota Way, Thru-put should have ceased until the admitting error with the Cervical Spine Halo was resolved and the incident report acted upon. Although it would have been legal for the ER to divert patients to other hospitals under these circumstances, the PR of such

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<sup>6</sup> Rice, B. Is Whistleblowing worth it? *Medical Economics*, January 20, 2006.

a move would have been considered intolerable for administration's public relations. "No", beds cannot be shut down and Thru-put stopped just because one patient was dumped into the wrong unit and nearly ended up a quadriplegic as a result. Although legal under EMTALA antidumping laws to divert due to "excessive acuity for current resources", it is intolerable PR these days.

## Visual Control

Thru-put has no feedback mechanism today for medical error or physiological crises; pathophysiology and its crises, regardless of cause, are the raw material of hospital services. There are no ambulance diversion programs for either this problem or for Disaster Medicine. Hurricane Katrina caught New Orleans with its pants down, but nothing has been done since to unify the healthcare system to accommodate delays or outright stoppages of Thru-put. Network Centric Operations provides an Internet means of "Seeing", so important to lean engineering of both production lines and contemporary military operations. Not everyone has to—or should—be able to see everything all of the time, but, with NCO, everyone who needs to see and share in a clinical or administrative situation real-time is enabled to do so. That could have prevented ambulance drivers from bringing patients to hospitals whose elevator shafts were flooding in the Wake of Katrina. That could bring the Medical Assistant teams and all responsible parties immediately to the scene of critical incidents in a hospital—even on call staffs off campus or consultants who are remote.

In a Toyota World, of course, all hospitals and their ERs would have to pick up the inventory of "under and un-treated pathophysiology" caused by Hospital X's shutting down Thru-put. Shutdowns of this nature would create the ideal opportunity for a Medical Communications and Coordination System for Computerized Ambulance Dispatch and Diversion (CAD)

Systems Platform. But, ambulance diversion is the last thing—yet an absolute necessity of this post-9/11 era—that hospitals in the black want from hospitals in the red! Community coordination of Ambulance Dispatch and Diversion reduces each hospital's control of admission—hence, its bottom line in the treacherous financial marketplace of modern US healthcare.

Single Unit as applied to a hospital is really a challenge and makes one realize that the excessive compartmentalization of inpatient care creates interdepartmental barriers generating unnecessary and burdensome bureaucracy. What if the ER, ICU, CCU and Psychiatry really did operate as a single unit? They do not today. What if diagnostics were a single unit and beds were organized by clinical severity and need vs. specialty, such as ortho or neuro, as is usually the case now? Walking through a hospital today is a challenge—just to keep from getting lost. They all are just built and rebuilt with little architectural foresight into real function—form(s) should follow function, but in healthcare it too often does not. More often than not, function follows form(s), whether obsolete treatment plans from another era of long length of stays and obsolete techniques, or reams of medico legal junk imposed by risk adverse administrators and disparate regulatory oversight.

Single-unit "Thru-put" determined by The Toyota Way is extremely challenging and only brings to mind the defunct plan of Healthsouth/Oracle's futuristic hospital planned for Birmingham, Alabama. It disappeared with Healthsouth's scandal. But, at least it was an effort to start over from the beginning to get things right—in this case, all providers and suppliers in the same database—Oracle's, of course. Although designed around IT, it shows that hospitals could shed their mystique and promote design for function over form(s). Does the hospital lobby really need a fountain and Nordstrom's Piano Player?

Hospitals of old were places to go and die, but now there is always hope for remission or therapeutic response. But, people and third party payers do not expect to be enjoying the experience of going to a hospital, as if they were shopping at Nordstrom's rather than Costco. Or, maybe John Doe does, but should not. Should hospitals, as gathering places for everyone sometime in his/her life, divert resources to creating shopping experiences similar to airports?

## Standardization and System Learning

Lean Engineering principles of Standardization, "Seeing" and IT within The Toyota Way are also of interest. In fact, nursing was mentioned in The Toyota Way chapter on Standardization.<sup>7</sup> Nurses, it says, need to have wide latitude and discretion in caring for patients at bedside, without reams of protocols to follow during crises—the rule rather than norm in an acute inpatient care unit. Too much of charting today is "dumb" and more form than function. Nurses need to be out on the floor, along with physicians, actually seeing what is going on. The hype over the Electronic Medical Record as the solution to healthcare's problems completely ignores this principle; computers take valuable floor time from nursing care due to technicalities of data entry "off the floor"—rather than at bedside. Also, computer training is a major cost and diversion of nursing resources at a time when there is a shortage of nurses. Too often IT directors buy in, clinical staff either adapts or doesn't, and IT vendors end up being the tail that wags the dog. It works this way; more training, more upgrades, more maintenance, etc.—"The Hook". It is rare to see the expert physicians and nurses who gave their testimonials at time of an EMR sales pitch on campus again when their system goes down; they are always a part of the sale but too uncommonly a part of the solution. Help is not on campus, but outsourced

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7 Liker, J. 2004. The Toyota Way. New York: McGraw-Hill, Publisher.

and, more often than not, remotely and, oftentimes inaccessible 24/7; and, the raw material of acute care medicine is pathophysiology that does not respect 9–5 office hours.

Standards are needed for who goes where when and for what—thus intelligent and safe Thru-put. “Just-in-time” principles of lean engineering, as applied to patient flow, require evidence based rules of Triage patients that provide both wide latitude for clinical judgment, while simultaneously facilitating organic growth of knowledge within the IT database. Information from such an evolving database is essential for creating and maintaining best practices. Clinical Decision Support of Triage, therefore, fits the criteria of an IT tool supporting The Toyota Way for healthcare providers. Few, if any, EMR vendors can provide such IT solutions today; most of those which do are homegrown and untested for either cost effectiveness or impact on medical errors. And, the homegrown ones that attempt to gain buy-in from clinical staff prove that The Toyota Way for healthcare IT can be an effective tool without disrupting either the vital processes of critical care or routine work for clinical staff.

Documentation is essential to support best practices, but documentation is justification for clinical intervention—not in and of itself the *raison d’être*. Clinical IT systems are always going down at critical times with varying levels of programming support; no vendor can testify to dependence on such IT as enhancing patient safety, when they are not consistently operational 24/7. If hospitals knew at the time of sale that IT support would be so weak, unavailable and draining on already thin hospital IT staffs, these massive purchases would, in my opinion, usually be reversed; oftentimes, an initial purchase is “the hook” that either locks providers into ineffective IT staffing or guarantees staff turnover in IT departments. With such administrative investment—“the hook”—and a troubled electronic clinical healthcare information system,

the ambiguity of administrative authority and clinical authority become even more strained; standards of care are diluted to support the EMR and are not improved; the system must learn under The Toyota Way. In this way standards improve, but IT solutions should be installed to improve standards—rather than becoming the standard in and of itself. Can MDs who become computer engineers without extensive clinical experience really establish the standards for clinical care? Maybe such engineers could represent themselves as “lean”, but not The Toyota Way.

Clinically-informed IT solutions that have grown through institutional learning of standards for practice can be powerful tools for enhancing service optimization. For example, one could enter queries that elicit answers to such questions as, “how many podiatry visits per year are necessary for good foot care for the diabetic patient?” Or, “how does the prescribing of certain antidepressants, such as Cymbalta, influence the quality and cost of care for various pain syndromes?” By continuously resetting the standards for Triage patients, standards of care are optimized with concomitant reduction in risk. Clinical judgment is not, therefore, replaced by robotic decision-making. Intelligent enhancement of rules for which patient goes where, when and for what then supports standardization and system learning—rather than bureaucratic stasis. An example of the former would be the justification of additional staff or materials, while the latter is purely monetary—i.e. “does Cymbalta increase or decrease the use of more profitable pain management procedures such as frequent imaging and is it on all the payers’ formularies without problematic rules for exception?”

The Toyota Way could prevail in healthcare, if the medical staff and hospital administration both bought into it—and that does not mean just the Office of the Medical Director. That office is too often overly influenced by management in unbalanced and

dysmorphic systems. Rather, most of the active medical staff serving the hospital has to buy in, and the rest must be able to follow—i.e. the ER simply cannot say, “you go ahead, but count us out due to EMTALA threats unique to us”.

Although clinicians and most informed patients hope for the healthcare revolution to silence with a victory announcement for successful “alignment” beneficial to physicians and lay administration alike, such an ideal negotiated sharing of power, catalyzed by maximizing the power of the Net, is very far from certain. Healthcare insurance became a benefit for workers only when our defense industry could not recruit very scarce, good workers during World War II. As a recruiting enticement, health insurance was offered to labor during the war. Corporations have retained this financial responsibility and risk for the remainder of this century, but they are beginning to challenge health benefits as the sacrosanct rights of all—or, even—any, of their workers. Health insurance evolved, therefore, within corporate benefit packages as an anomaly of World War II labor shortages. This essence of a social contract in the United States is, therefore, more intrinsically binding to the ailing automotive and defense industry of Detroit, rather than that of Silicon Valley. Whether Silicon Valley has provided the technology for productivity nationwide to justify healthcare costs more than twice the per capita rate of other G-8 partners is not predictable, but skeptics far outweigh optimists among health finance authorities. And, Lean Engineering will surface as the solution. Lean, however, does not mean either shorting staff or clinically blind patient Thru-put; lean engineering is The Toyota Way. There are many testimonials today for lean solutions in health care, but they either apply to parts rather than the whole. Or, worse, they hide imbalance and disunity in the whole.

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