# Engineering a Learning Healthcare System: A Look at the Future – Day 2
# Session 5: Observations on Initiating Systems Change in Healthcare
# Institute of Medicine of the National Academies
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**MIKE:** Professor, the president and CEO founder of the Institute for Health Care Improvement and a global leader, not just a national leader, in the field of health care improvement, a position recognized by the British government with his awarding of the knighthood. He is an honorary knight commander of the most excellent order of the British Empire. Besides that he is a very good friend, member of the IOM, a good friend to all of us and a leader for all of us, Don, thank you very much for being with us. [Applause]

**DONALD M. BERWICK, M.D., MPP:** Thank you Mike and thank you all for the chance to spend some time with you. Unfortunately I was overseas until this morning and unable to attend this meeting. I feel much worse about that now than I did even before, even than I did yesterday having heard the richness of these conversations and those reports contain tremendous promise.

I apologize for meeting the bulk of the meeting and I am very much indebted to Mike and to you all for giving me the opportunity to share my thoughts anyway. I want to take a moment also to express my personal sense of grief at missing Sherry Grossman at this meeting, a giant of a thinker, a man of enormous energy whose work informed mine for many, many years and I acknowledge my debt to him in bringing us all together.

I have the luxury of being able to talk and completing what you said except for the last few reports and so I apologize for undoubtedly the amount of repetition that will be in my remarks. Mike asked me to reflect a bit on the topic of observations on initiating the system changes that we have heard about in health care and I will do so.

The settings of my remarks are of enormous optimism. I personally believe the potential benefit of deepening systems knowledge and action based on that knowledge in health care is enormous. In my own opinion it is equivalent to the see change we saw in health care with the entry of a formal statistical theory and experimental design, really in the mid 20th century and the health care evaluation with the leadership of people like Fred Mosteller and Tom Chalmers and Ian Chalmers and so many other great courageous leaders.

They changed the way we think to enormous benefit technically for patients. I think we have the same kind of opportunity with the kind of wetting of the fields that is being explored at this meeting and in the work that Mike is leading. The potential for the IOM and the NAE as leaders is phenomenal.

In fact, I think at the end of my remarks I will restate my view that there are very few other agents of change that could carry us through the transitional barriers that this

intellectual enterprise will encounter, is encountering. The major challenges lie across the board with the status quo in technique, in culture, in training and economics and we will not be able to realize those benefits without confronting some of those obstacles as any major intellectual transition, in any field, always encounters.

The core notion behind this work is that every system is perfectly designed to achieve the results it gets and that the secret of better performance in most complex environments is redesign of systems. A car has a top speed. Health care has a safety level and equally those two facts are equally characteristic of the systems. The care has a top speed as a property of the car. Our error rates, our costs, our defects are properties of the system currently designed.

The scientific view of systems as the explainer of performance, performance is a characteristic of a system, has contrary views opposed to it, black box views of how things get better. I am quite extremist on my skepticism about those black box views which include some that are quite hegemonic today in public discourse, the reliance on incentives, the reliance on motivation, on encouraging effort, the reliance even on markets, I think is fraught in the fields we face. We have a design problem much more than a marketing problem.

Dr. W. R. Denning used to say that trying harder is the worst plan and I deeply believe that and most of the current dominant theories of public policy in an effort to get health care to perform better are try harder plans and I think they will come up bankrupt.

The market mechanisms particularly worry me when applied at the level of individuals because another important principle I think of our work is that the work force is trying pretty hard now, the slogan I once heard from Don Norman in the human factors world is honor thy user. The worst thing to do when human factors are at play is to blame a human for the factors.

One has to work such as to construct dice around the properties of a human being in order to have systems perform better than they do and equal to what those humans really wish they could accomplish. Therefore, there is little leverage in trying to mold individual behavior to achieve excellence, the own ness of improvement in my view by squirreling on the soldiers of leaders of systems rather than individuals within the work force.

I am going to refuse seven challenges which I thought of before I came here but I have been listening to the conversations and seeking by their informing or confirming evidence in your thoughts for these but I think they stood the

test of scrutiny. You can make your own choice. One challenge I am not going to put in the list of seven because it is so basic and that is the challenge at aim.

Denning used to say in times I have heard him speak that without an aim there is no system. I kind of flip that on its head which is a more positive view that aim creates a system and I actually believe one of the really serious barriers to the wedding of engineering science is in health care lies outside either field, that is the absence of aim, a country that cannot decide to be safe or efficient or effective or patient centered or timely or equitable in health care will not get there.

So that is the different kind of problem. That is a political problem. It is a problem of leadership. Without aim there is no system and so all our exploration of systems thinking we have come up dry without that. That is a leadership issue. We can return to that.

Given even aim though there at least seven challenges I can think about as I think about the wedding of these important fields of intellectual enterprise. The first is the importance in systems thinking of infra sizing interdependence. Romantic views of professionalism emphasized personal responsibility, hierarchy specialization and professional autonomy. That is evidence everywhere in health care, in architecture we have

doctors' conference rooms and nurses' conference rooms, we have patient bathrooms and staff bathrooms for Pete's sake, we have discipline specific spaces. It is evident in training.

Our schools are separate. Our experiences that we offer young people to develop their self images are separate. We emphasize separateness in the preparation of professionals, not interdependence. It is evident in ethics. We have ethical statements for each discipline and they are not unified.

We have no unified statement of the ethical center of health care for everybody, from a physician, to a reality tech, to a manager. We have the Hippocratic Oath and nurses take pledges and therapists take pledges but not all together. It is evident in the lack of compensation for coordinated mechanisms. We pay for interactions but not for coordination as a habit in the payment system. It is evident in institutional boundaries.

I am engaged in great debate right now in one of the committees I serve on as to whether hospitals should be attributed mortality rates which extend beyond the hospital walls. Is it fair to characterize a hospital mortality rate? Within even 30 days of discharge hospitals are saying no, no, we are not responsible. They have left our building. That is a fragmentation and a failure to understand interdependence.

We fail in chronic care handoffs. It is embedded in our language.

I often think, maybe this sounds weird, that the word discharge is a very peculiar word that it somehow entered our thought that there is an admission and a discharge as if it were effluent and the patient is gone from our hands is a symptom of lack of sensitivity to interdependence. Systems of the type you are talking about here in health care will place interdependency and its management at the top of the hierarchy of professional deeds and that is not our current culture.

The second challenge is the visibility of process, especially process from the viewpoint of patients. My colleague Paul Betel once said to me health care lacks catwalks. It is extremely difficult to see processes hovering above the work to see the work flow because of the way we have chopped up space and time. When we do see processes it is not always successful because we see them from the supply side. We describe our work as we perform the work, not as our patients and their loved ones experience work. The immediate effect of that is very toxic which is that we then expect patients to adjust to our processes instead of molding our processes to the patient's need, even at the level of the individual.

This is actually a vicious cycle. The more we force patients into processes that do not fit them as individuals,

the more we experience their expectations is unreasonable and our capacity is constrained. So possibilities derive only from redesign of a process, not from studying our current processes.

I think the first step in that is to make the processes visible from the viewpoint of the people served. I have been recently studying to my enormous benefit I hope with Amory Lovins, the founder of the Rocky Mountain Institute and one of the world's scholars about energy and the environment. Lovins, in 1976, proposed a focus on what he called end use efficiency as the hallmark of proper energy design and policy and use efficiencies exactly what we need in health care instead of centralized efficiency which is not going to meet the needs of the patients we serve. We lack the mechanisms for coordination and commitment to make processes visible.

Tièche Ono said in his first book Toyota production process something that I always thought this was really important but nobody else thinks so, but try it out. [Laughs] I think it is the essence of what I am talking about. He said when waste is at a minimum, every customer can be seen as an individual. When waste is at a minimum, every customer can be seen as an individual.

I think that is right whereas the health care ethos being not process minded thinks exactly the opposite than when

one tries to meet the needs of the individual, it drives costs up. It does not. It drives costs down when done properly.

The third barrier is to come to the recognition of the importance and the value of dynamic learning and local adaptation as scientific learning processes. The non-linearity of system dynamics in health care like in any non-linear systems weakens the learning power of many formal and classical methods of evaluation and inquiry.

Some formal methods of inquiry tend to be insensitive to contacts, to mechanisms and recursion and meaningful stratification. They also weaken the contributions of local knowledge because they are trying to protect against bias. Health care lacks habits and norms of inquiry now that capitalize on processes and knowledge growth in non-linear context. That is actually the side effect of an achievement.

The achievement was to establish a hierarchy of scientific investigation for certain kinds of problems of which we placed randomized trials at the top where they belong. They do not belong at the top of the learning processes for non-linear complex systems, especially when most of the learning is occurring in local and individual settings and we simply do not have the ways to harvest the knowledge that are occurring, your innovation and local settings.

A side effect that I think this enterprise suffers from is a schism between pragmatic engineering sciences which I think are very sensitive to non-linearities and local learning for example, and system improvement methods which joined them in that on the one hand and the current hegemonic hierarchies of evaluation on the other hand. Journals have not opened up to the former kind of knowledge. We continue to place for example the randomized trial at the pinnacle of methodologies in sightings which simply cannot learn for us what we need to learn.

I recently was sent an extremely discouraging e-mail from a very discouraged leader of improvement, a quite senior physician at a major medical center. I will not name it, who sent to me the instruction that he was sent from his chief of medicine ordering “no further PDSA cycles will be tolerated in this department.” The schism is enormous and the cost is very high.

The fourth barrier has to do with the issue of knowledge of and action on waste. One early harvest of proper system use is knowledge of the presence of the degree of and the forms of waste, the Japanese muda. Often I think waste is the manifestation of system failure and system illiteracy. In the non systemic view, when you are mired in that, waste feels productive. It feels necessary and one who attacks waste, even

if the attempt is to avoid suboptimization, those attacks feel ill motivated, sinister.

For example, the following can be feel very, very risky and assaulted in a fragmented system using someone else's laboratory findings instead of repeating it, trying not to repeat anything, eliminating inventories that buffer against poor flow can feel toxic, using capital fully can feel unrealistic, avoiding ring fencing resources, the neurosurgery operating room never touched by the ortho pods, the ortho pods never allowing the neurosurgeons to use their room. This is silly management and capital and yet one would usually regard it as absolutely necessary to excellence in the current setting. Automating processes felt to be sinister and more.

The forms of waste in health care are just as vast as they are in other industries. Rework, scrap, inventory, queues, motion, unused space and equipment, idle capital, excess information, records of no value, loss of ideas, and most of all demotivating the work force through insult, indignity and defect itself.

The economics of health care today are founded on waste. Waste means jobs. It means profit. It means income. It means habit, familiar habit, comfort. Waste levels I am absolutely sure exceed 30-percent in our industry, 30-percent of the $2.6 trillion. I actually think it exceeds 60-percent

but I would have a harder time proving that. If you really were to use formal value chain analysis it might even be more. This also involves by the way a major as yet unexplored research agenda. There is no formal research agenda in our country in health care to discover an out waste.

The fifth barrier to me, the fifth challenge, as several of these last presenters talked about which is the missing platform for proper multidisciplinary research and development in this intersection. My career benefitted enormously from leaders at Harvard, Howard Hyatt the first among them, who built a platform for the intersection of quantitative analysis methods and health care delivery. That was my career. As Mike said, I studied with Howard Rafa and other on evaluative sciences and was allowed because there was a platform to bring that part of my brain to the other part of my brain which was learning to be a doctor.

The intersections for this work are insufficient and they are not dignified yet, that is they are not given dignity for the most valuable potential forms of collaborative research and development among engineering sciences, system sciences, of health care. The barrier, interestingly I think, is dyadic and symptomatic of the history of a discus. Engineers I think feel unwelcome, unfamiliar, intimidated in the health care setting.

They become silent as all people do out in the cathedral of health care.

Health care leaders are not aware of the disciplines or they are suspicious about their afficability. This is being broken down slowly. Dale is one of the leaders of this, his institution, but we have a lot further to go. Bridge building here will be expensive. It will take time but boy will it pay off.

The recent examples we see of Stacy Spear's work in health care or Gene Lindsay's work, Gene Litfact's work, stunned me in terms of the potential already paying off handsomely in local settings. To this challenge, the IOM and others is to forge these intersections. I love the idea we have here, a master of sciences, engineering and health systems, although we should look back to the old days when industrial engineers were very common in health care settings and somehow that never grew into the truly fertile interaction that it might have.

I would like to know what stalled it out. The idea of more physician engineers intrigues me. We have physician information technologists. We have physician bioscientists and molecular biologists who are physicians. We need more engineers who are physicians. Kate Sylvester is a leader of such training in the UK I work a lot in the UK Kate I think

almost single-handedly has revolutionized the ante weights in that entire country in a very difficulty political setting and she did it with deep knowledge of systems.

The sixth barrier or challenge, they are not barriers, just things we have to figure out, the sixth challenge as several of the teams before me mentioned, that is implications for professional development.

As an example, an important example, take the current level of requirements and habits that are required of physicians and nurses for training on safety sciences and safety practices. The answer is none. Medical schools are just starting to map these subjects into their training. You would not think of a physician emerging from training today who had not heard of Osler, or Watson and Crek, or the Creb Cycle, and yet we graduate thousands of physicians every year who never heard of Jim Reasoner, W.R. Denning, or Carl White or even frankly Bob Brook or Jack Winberg who are right within our field and nor have their teachers, which is probably the reason students don’t hear about it.

The preparation of professionals currently today dismisses system sciences through its silence. Moreover I think the siloing of professional preparation itself dismisses, de-emphasizes the role of interdependency in the work of patient care. I trained four plus three plus two, you know,

nine years before I was a fully qualified physician. Not a day, not a single day of that training, not one day was spent in the company of a nurse in training.

The seventh challenge is the biggest in some sense contextually and that is the needed institutional rearrangements to take advantage of what you all have been talking about these two days. If we were to increase process literacy, process knowledge and investment in processory design, the institutions that we have created to serve the current fragments would become visibly inadequate and the spaces between them would appear larger and larger.

Systems knowledge inevitably leads to the desire for integrated design. It is not at all clear to me that we would emerge from that exploration needing hospitals or offices or insurers or professions in anything close to their current forms. One of the reporters cautioned us against this kind of grandiose thinking about redesign but it might be that the science would lead us there. That, not political, not financing rearrangement, that would be the true manifestation of what we ought to call health care reform.

It would be care reform, not financing reform or insurance reform or coverage reform and yet you see none of that discussed in the current political debate. I frankly doubt that we have the political or the social will to go there

yet. If we did, if we ever did, I am absolutely confident, perhaps more confident than I should be that the current nuts we face financing coverage costs would melt, they would begin to melt anyway. Hospitals would look different though. I have one test; call it Berwick's test for system ness in the field. Here is my test.

Hospitals in the system minded health care world would seek to be empty, not full, and just think about that, to have a system in which the job of a hospital was to be empty instead of full and then think about the current meetings that are happening in every board of trustees holding every executive accountable for every hospital in America today for occupancy level, not down but up. We have mis-defined success. That gives you some idea at the level of institutional rearrangement we would have.

With that rather dower point, let me close instead on some good news. This does make sense. What people are talking about here is it does make sense. It makes a lot more sense than the status quo. The value of systems thinking and knowledge is manifested already in lots of other areas of human endeavor than health care and I am sure that someday, someday it will seem to be too promising for health care to ignore it anymore. Thank you. [Applause]

**MIKE:** We can take a couple of minutes for questions if you have immediate follow-up. Don, you are also going to get another crack at Don because he is going to moderate the next panel but questions or comments? It was really superb, Don, thank you so much, and I did not mention although he alluded to it in passing, we have a special bit of gratitude because he made an effort to get back from Paris late last night and then come here this morning. Questions, comments?

**LOU DIAMOND:** Lou Diamond from Thompson Waters Health Care, the picture you have painted for us is very compelling and instructive. In another world, in another room that some of us are living in, the sharp and blunt end, the discussion is all around measurement, public reporting, and related activities, both more measures, etc, how would you integrate I think is the word the thoughts that you have shared with us today with this other world that is, it is literally another world I think, although we are all part of it.

**DONALD M. BERWICK, M.D., MPP:** I think it is a Zulu of saying that weighing a pig does not make the pig fatter. We are weighing the pig right now and this festival of measurement of which I am part of, I believe is misdirected, it is wishful thinking. It is the only thing left to do when the people who give the care cannot change the care.

Then only the outsiders can act and they can only act through measurement but you really need to understand that measurement itself is cost added. It is very weighty. It diverts attention from what may be important. I think George Box said all models are wrong, some models are useful, all measurements wrong, some measurements useful, but it is only useful in the context when there is clear aim which is much more narrative than the measurement and when there is change linked to it so I think it is pushing a bit on the string.

I happily get to serve now on a national quality forum committee with Helen Darling and others trying to rationalize this a bit, the priority partners committee. We are trying to come up with a very short list, a very high level measure which I think might help a bit because they essentially would be images of aim instead of long lists.

**MIKE:** Why don't we ask the other members of the panel to come up for the -

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