# A National Web Conference
## Evaluation of Massachusetts eHealth Collaborative
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Dr. David Bates is Chief of the Division of General Medicine at Brigham & Women's Hospital and Medical Director of Clinical and Quality Analysis for Partners Healthcare System.  He is Professor of Medicine at Harvard Medical School and works in the Division of General Medicine at Brigham & Women's Hospital where he is a member of the Center for Applied Medical Information Systems Research and a practicing general internist.  Trained as an epidemiologist, his main interest has been in the use of computer systems to improve patient care.  Working with Brigham & Women's Hospital, they have developed a computer order entry system which has the potential to substantially reduce the number of preventable drug complications.  It also has had a major impact on improving the efficiency of drug use through decision support.  Dr. Bates was also Principal Investigator of a  recently completed study on improving efficiency and quality using information systems, focused largely on the use of ancillary tests.

He has published on the application of information systems to improve the use of ancillary tests on predictors of bacteremia and evaluation of patients with suspected sepsis and the potential use of novel therapies in this group and on medication errors and injuries due to drugs.  And he has also received many awards.  Dr. Bates is a graduate of Stanford University and the Johns Hopkins School of Medicine.  He began his fellowship in general internal medicine at Brigham & Women's Hospital in 1988 and he received a Master of Science degree in Health Policy and Management from the Harvard School of Public Health in 1990.  Dr. Bates will address the Massachusetts eHealth Collaborative, which is a multi-stakeholder effort to promote the adoption of electronic health records and the implementation of clinical data exchange in Massachusetts.

First there will be a little bit of background, followed by the formation of the Massachusetts eHealth Collaborative, followed by the evaluation plan.

Massachusetts is a state that includes about six and a half million people. One thing that's important about it is it includes relatively few payers and they're all not-for-profits.  We had about a half million uninsured people before implementation of the recent plan, which provides insurance for everyone in the state.  There are about 80 hospitals, 18,000 physicians, roughly 6,000 offices.  Before this effort started about ten percent of the hospitals we estimated had computer order entry, 20 percent were implementing.  And among the office practices, we estimated that roughly ten to 15 percent had electronic records when the Collaborative started, although that was not a solid figure.

The Collaborative was a joint effort and it really got started through the efforts of the American College of Physicians (ACP).  And Dr. Allan Goroll, who at that time was the Governor of the American College of Physicians, was approached by the Governor of the State of Massachusetts, Mitt Romney, who asked Dr. Goral if there was something that could be done to improve the safety of patients in the outpatient setting in Massachusetts.  And Dr. Goroll then approached Lucian Leape from the Harvard School of Public Health, who suggested talking to me.  And we came up with the idea of putting together a program to dramatically increase the rate of adoption of electronic health records.  ACP convened and basically sponsored us to put together a business case for this effort and Steve Simon and I did that.  We then presented that at a meeting convened by the ACP some time ago now, in which we invited all the key stakeholders in this area, including the payers, the purchasers, providers, consumer representatives.  And to our surprise, everyone showed up and there was consensus that this was a good area to move in.

At the same time, Blue Cross in Massachusetts was thinking about this area as well.  And they put forward $50 million to help support this effort.  So that gave us a tremendous shot in the arm in terms of moving ahead.  Blue Cross clearly recognized that the state had a systems problem and they were especially focused on the need for more decision support in the way that care is delivered.

So the Collaborative was launched in September 2004.  It's a not-for-profit.  Micky Tripathi, the CEO, came onboard in January 2005 and it's backed by a broad array of 34 Massachusetts stakeholders.  And those stakeholders include representatives from all the main domains, from the hospital association

domain, governmental agencies, health plans, purchaser organizations, some health care professional organizations and some consumer, public interest and at-large organizations.

The strategy was to basically undertake several pilot projects.  Our feeling was that there were lots of barriers to implementation of heath information technology and we needed to learn about those.  We also believe that it was important to develop models that we could replicate and sustain, and we believed that a systems approach was going to be important.  The intent eventually is to move to state-wide implementation of electronic health records and also implementation of clinical data exchange state-wide. So the end game of this effort is create a community of communities to rapidly proliferate the pilot results, assuming they're successful, to share the pilot program infrastructure state-wide and then to generate additional funding for broad-based implementation.

The three pilot communities were chosen from six finalists. All of them were really superb.  The criteria that we used to make the selection were that the community had to demonstrate broad community participation, they had to demonstrate a dedicated local project leadership and they had to have diverse patients, practices and locations. And we really didn't know at the beginning of this how it would turn out. We got roughly 30 applications and I was extremely impressed with the quality of all the applications.  It's clear that there's a tremendous amount of interest in this area.  And many of the communities are frustrated that they couldn't get in on this in the initial round.

In the pilot projects, we're focusing on three areas: evaluation, connectivity and implementation of electronic health records with all the things that that implies.  We had the summit that I told you about in early 2004.  The Collaborative was launched in the summer of 2005.  We then issued a vendor RFP, had the communities pick vendors, recruited physicians that implemented electronic health records or just now implementing Health Information Exchange, and the evaluation has been going on throughout this whole period.

The three communities that we ended up picking were North Adams, Newburyport, and Brockton.  And they're all interesting and will provide useful information in important ways.  North Adams is a very rural community. It's way up in northwestern Massachusetts.  Newburyport is up on the New Hampshire state line. Brockton is just south of Boston, and it represents a large and very diverse community.

So here are the practices in the communities.  First North Adams, there's a cluster but then there's some practices off in Williamstown and Adams.  In Newburyport, again, there's a cluster in Newburyport and in Newbury, but then there's a scattering of other practices throughout Essex County.  And Brockton is by far the largest of these communities.  And there are quite a number of practices, again the majority of them are in Brockton but others are scattered all around.

With the electronic health records selection, the way things were done was that an RFP was distributed to vendors in May of 2005.  We got over 30 responses.  The vendor selection committee validated six vendors to go forward.  The communities then did a down-select.  Our intent was to get to three to four vendors per community.  Then there were individual vendor fairs and each community developed a model of physician choice.  Some vendors were selected as preferred and then the communities did this down-select and they picked vendors.

The way that this turned out has been interesting.  Newburyport has the least centralized approach in individual physicians chosen from down-selected vendors.   In Brockton, community organizations narrowed physician choice.  In North Adams they ended up choosing eClinical Works for the whole community and we're excited about that because that will make doing the clinical data exchange part of things really easy in North Adams.  We're also pleased that Newburyport and Brockton ended up picking multiple vendors because that will enable us to try out clinical data exchange and see how well it actually works.

There are about 450 physicians who care for roughly 500,000 patients in approximately 200 offices. Most of the providers are in Brockton, which is quite a bit larger than the other two communities. Here's where we are with respect to implementation. So by the end of May all the providers will have adopted. We're close to full adoption now. There have been a few bumps in the road. For example, in North Adams it turned out that they had to put in a new cell phone tower on Mount Graylock and that has slowed things down a little bit, but implementation has gone well. There have been some challenges getting all the providers to sign the contracts, for example, but overall this has gone extremely smoothly. And this has attracted some local press. A story from "The Globe" isn't really true that the communities are going to be the first ones that are wired, but that's a little journalistic prerogative. But it's been nice to see the recognition that this effort has received.

With respect to Health Information Exchange, a lot of work has been done on this, led by Micky. It's taken some time to sort out the model that we'll use, we're using an opt-in model. Fortunately, patients have been opting in at a very high rate, which is great. The Health Data Exchange architecture has been set up. There's also a tool that is set up which enables referrals management and eventually there's also going to be a patient portal, which will be part of this.

Some of the things that we've learned early on from this is that this kind of thing can get done on a large scale, it can be done collaboratively. Building the program had some more challenges than some of us thought. And the collaboration that's involved takes time but our belief is that it builds a stronger foundation. We think that there are a lot of fixed costs that we can leverage going forward. It's clear that affordability is not the only barrier to physician adoption, that there are many cultural issues that need to be addressed.

We think that the Collaborative is offering the greatest value in several areas. One clearly is funding, so it's made records affordable and it's forced rapid change that would not have occurred, particularly for small practices for which it's not clear how much economic sense this would make if the Collaborative weren't paying for it. It's also helped with behavior change at the community and practice level, so it's generated a community-wide sense that everyone is going to move ahead. The Collaborative has put in place facilitators and navigators at the practice level who have been really helpful. And in each community there is a community catalyst who's been a change agent. In addition, we don't think that these communities would have gotten the Health Information Exchange with anything like the speed that they've gotten to it without the Collaborative.

Our overall goal with this evaluation is to provide the Collaborative with key business information that it will need to move to the next level. And we want to inform the national debate, gather information both about electronic records and clinical data exchange and also clearly add to the scholarly work in this area. The whole effort is supported by AHRQ with matching funds from the Collaborative. General principles that we're using is to try to collect as much electronically as possible just for cost reasons, and when that's not possible, to sample. We've tried hard to minimize the burden to practices, which is not insignificant. We're trying to closely integrate with the working groups that the Collaborative has and with the Massey Health Collaborative staff. The practices had to agree to the evaluation to participate in the pilot and that's required from them a high degree of transparency. And most of these practices are not used to participating in research. Actually, virtually all of them are not used to that and that has provided some challenges.

Next is the evaluation plan, key components, and key questions, some of the evaluation elements that we're looking at, some of the individual data elements and then what the Collaborative will be able to say at the conclusion of this. The components that we're looking at are, first of all, usage data elements including things like use of technologies and the number of data elements that are moving around in the Clinical Data Exchanges. In addition, we will be addressing barriers to, and facilitators of, adoption. There's a study that Steve Simon is leading that's looking at implementation tactics. There's a study that

Eric Poon is leading which is looking at the effects on quality. Rainu Kaushal is leading an evaluation of the impact on medication safety of this effort. There will also be an economic evaluation.

On the technology front, one question that we've asked is, what's the current or baseline status of electronic health record usage in data exchange in Massachusetts overall and in the three communities, and then how do they change over the pilot period. On the technology front, we're trying to address what the before and after use of electronic health records is, but not just do people have an electronic health record, because it's obvious that just having one doesn't necessarily mean that you're using it well. In addition, we're trying to get at the expense of usage within practices. And in particular, we're using as indices for that are people prescribing electronically, are they using clinical decision support. We've had to work with the vendors to make sure that some of the decision support that we think should be included is actually included in these records. Then we'll be looking at the proportion of practices that are exchanging data. And the key categories that we're going to look at include the laboratory, radiology, prescription data, referral date and hospital data. And then among the exchanging practices, what is the proportion sending and receiving some of the key elements. And then we'll be counting those key elements.

The current model of the system has information with connections between lots of different entities but no connections between many of the entities. And the hope is to build the Health Information Exchange that is a central place that information can go so that it just moves much more smoothly and efficiently between all these different entities that use health care information.

So where are we today? We've finished our baseline state-wide survey. We've also finished the pilot baseline community survey. The state-wide analysis is complete. That was led by Steven Simon and there are a couple of manuscripts that have been published about that. On the barriers and facilitators of adoption front, we're asking what are the characteristics of physician's practices, the vendor's characteristics and implementation strategies that are more or less successful in getting providers to adopt electronic health records and implement data exchange. And there, we have done a state-wide and pilot community survey of physicians and electronic health record data, asking questions about what are key physician characteristics, what are some practice characteristics, how receptive are physicians to - and how much are they using - electronic health records and data exchange. And then we're also characterizing implementation strategies in vendors. We've done the baseline state-wide survey. The pilot survey is complete. The state-wide analysis is complete and the first manuscript on that survey is published.

This is some preliminary data about electronic health record use in the community and this looks at 32 Brockton physicians in the Collaborative who went live before January 2001 and looks at just the average number of encounters recorded per day for specialists and primary care providers in that community. You can see that some of the heavier users are primary care physicians, but there is one specialist who is a very heavy user.

Regarding the survey results, in the 2005 physician survey that we did, this was led by Dr. Stephen Simon. We sampled 1,829 practices, which is 30 percent of the state. And we did the survey within strata. So first we looked at primary care versus specialty. Another stratum was urban versus rural, another was large versus small practices. And we only included physicians who had ambulatory practices. There was an eight-page mailed survey. There was a $20 incentive, which was quite effective. The overall response rate was 71 percent, so consider building in incentives if you're doing surveys like this. And what we found in terms of EHR adoption - 23 percent of office practices were actually using electronic health records. The future was 25 percent for primary care, 23 percent for multi-specialty, only 20 percent for single specialty but not big differences there. But where you do see big differences is by number of physicians in the practice. So for practices with seven-plus physicians, the adoption rate was 52 percent whereas it was only 14 percent for one physician practices. And it was 15 percent for two to

three physician practices. And that is quite important since a very large number of the physicians practicing nationally still are in quite small practices.

This looks at a couple of additional variables, so adoption rates were higher in teaching than in non-teaching practices. There wasn't much difference urban versus rural. There was quite a lot of different hospital based versus non-hospital based but that's fairly highly correlated with teaching versus non-teaching. Overall, on a physician level, a total of 45 percent of physicians in Massachusetts had electronic health records and that was quite a bit higher than any of us in the evaluation team had expected. And among the practices with electronic health records more than half, or 53 percent, reported having electronic health records in their practice for more than three years. So that was, again, a higher proportion than we had expected.

Next we looked at barriers to HIT adoption or expansion and here we compared EHR adopters to EHR non-adopters. And adopters differed from non-adopters in terms of feeling that they had a lack of time to acquire knowledge about systems. Non-adopters were more likely to be skeptical and non-adopters were more likely to believe that the lack of standards was a problem. And they were also more concerned about both start-up and ongoing financial costs and they were more concerned about loss of productivity. Some factors that did not seem to be important included technology limitations of the systems and lack of computer skills or lack of technical support. We also asked them what were their future plans for adoption. And notably, 52 percent said that they didn't imagine doing this in the foreseeable future, which is a little discouraging. Only 13 percent said they were planning to do this within the next 12 months. 24 percent said they would do it within the next year or two and 11 percent were sort of pre-contemplative.

We also tried to get a percent of practices with electronic health records that had each functionality, and we looked at a number of functionalities. Most practices had lab test results and visit notes, as well as radiology test results but some other things were much less frequent, in particular e-prescribing transmittal, lab order entry, and notably alerts, warnings and reminders. A lot of the benefit that's associated with using electronic records is associated with that decision support, so that's something that will have to be looked at down the road.

Another thing that we asked about was practice concerns and satisfaction. And high users were a little less likely to be isolated. The stress levels were similar. High users did say they were more likely to work long hours than low users, although that wasn't statistically significant. And non-adopters were more likely to be demoralized than the other groups.

Another study that is also being led by Dr. Stephen Simon focuses on implementation tactics. And the Collaborative is already planning some pretty intensive help for people who adopt, but we're trying to ask, does intensive educational outreach, or academic detailing which targets practice-specific and physician-specific barriers to adoption, promote electronic health record adoption and minimize loss of productivity more effectively than a standard program of implementation. Our work and some other's work, including Dr. Miller's from U.C.S.F. suggest that concerns about that productivity drop are important, at least in the minds of physicians. So here what we're actually doing is delivering an intensive outreach program which is focused on specific adoption barriers. We're trying to see whether that works better than the standard program. The outcomes that we're evaluating include the proportion of notes that are electronic, the prescriptions that are electronic, and the number of problems that are documented, among others.

So with this, we're done with the protocol development and we're in the process of conducting the implementation. We're also evaluating the effects on quality. And this has clearly been a key question for a long time. Here, we're trying to ask the question, what is the effect of electronic health record implementation and data exchange on the quality of health care. The parameters that we're looking at were selected from the AQA measures, from the docket measures, from HEDIS measures and some others. And what we're comparing is how providers are doing, both before and after implementation rates. We're trying to correlate the results that we get with results from the electronic records and we're

also looking at provider satisfaction.  And to do this, the Collaborative has worked to set up a quality data warehouse, which is something that we needed.  So basically all of these vendors are providing data to a central site, which is being run jointly by CSC and the Mass Health Quality Partnership.  And that will produce a set of measures that we'll be able to help evaluate how providers are actually doing and whether quality is getting better in these communities.

So where we are so far is we have all the baseline state-wide data from the Mass Health Quality Partnership.  It has been just a tremendous asset having MHQP already in the state.  It includes all the payers in the state. And they came together and agreed about what quality measures they consider important and they agreed to represent them in the same way.  And from the provider perspective in Massachusetts, it's just enormously valuable to have an entity like MHQP to do that standardization.  In the past, we would have different groups. One group would be asking about outcomes at 28 days, somebody else would be asking about outcomes at 30 days and it just was not very rational.  We've identified all the electronic health record data elements. We're working with vendors to standardize electronic data collection.  We have our initial results and again, CSC and MHQP are providing the quality data warehouse function.

On the medication safety front, we are asking what are the effects of electronic health record implementation on medication errors and medication safety.  And this is being led by Dr.Rainu Kaushal. In a sample of practices what we've done is collect before and after data using duplicate prescription pads in the before period and we're measuring rates of medication errors, near-misses, preventable adverse drug events, and then we'll be counting how often later alerts go off like allergy alerts and drug/drug alerts.  And we'll see how many overrides there are.  This was a study that was a little hard for some of the communities to get their heads around in that they are just not used to having someone from the outside come in and measure how many errors they are making.  But we've been able to do this.  27 physicians from Brockton are participating and we're done with the baseline data collection.

On the economic front, we're trying to ask, what are the costs, savings, and return on investment related to electronic health record implementation, interoperability and clinical data exchanged.  And where we are with this is that the RFP for this has been drafted.  It will be distributed soon. We'll probably do several specific chunks.  One will be to build a model looking at the community-wide benefits of putting in place electronic health records and clinical data exchange.  Another will be to get claims data from these communities and see how much benefit was actually realized.  And a third approach will be to count some of the individual things that we saw some benefit with, and then put those together and build up a benefit estimate, bit by bit.

The Collaborative has been as successful as it has for a number of reasons.  One of these is that there was strong leadership from the beginning from the physician organizations that were involved and the physician community more broadly. And ACP has played a big role in this.  The Massachusetts Medical Society has also been very strongly supportive.  There is a real kind of community flavor to this effort.  In addition, I think we had a clear vision about what the main components of the plan were.  And those were to get providers to start using electronic health records and to set up interoperability.  And we did not focus a lot on things that did not relate to those two main goals.  Another real key to success was some of the prior collaborative work and some of the structures that were already in place in Massachusetts.

And there is a long track record in Massachusetts of successes which have built trust that a collaborative effort could work.  One of these efforts is called NEHEN, this the New England Healthcare Electronic Network. And basically the way that this works is that it's used for administration data, not clinical data. But in eastern Massachusetts what happens is a claim is sent in electronically to a central place and it's processed.  And then it is sent to the insurer.  And that's driven down the process of dealing with claims from an average of about $5.50 to around 50 cents.  So that's really been a big win, both for the payers and for the providers. And everyone really feels good about that.  Another long-standing entity in Massachusetts which laid an enormous amount of groundwork is an entity called the Massachusetts

Health Data Consortium. And that was originally led by Elliott Stone, who sadly died recently. But that group basically has been aggregating for some time data about health in the state. And they did a lot of work around privacy, in particular, that was very helpful to the Collaborative in terms of getting going. The Massachusetts Health Quality Partnership, led by Barbara Rabson, has been an enormous asset. And another entity is the Massachusetts Coalition for the Prevention of Medical Errors, which has sponsored a series of collaboratives in the state that many hospitals have participated in. And that's been extremely successful.

Another key was strong support from the state government. And this has really been a bipartisan sort of thing. Governor Romney has provided very strong support for this effort. He's a Republican. Now there's a new governor, Governor Patrick. Governor Patrick's administration is also supportive. Another key, particularly when one compares what's happened in Massachusetts to some other states, is that we have in Massachusetts a group of payers which was all very public-spirited and willing to come in together. And that's been enormously helpful. And finally, it goes without saying that the major financial commitment by Blue Cross, the largest payer in the state, made this happen when it probably would not have otherwise.

In conclusion, our goals really are to provide the Massachusetts eHealth Collaborative with some of the key business information that it needs to move to the next level and to assist the impact of both electronic health records and clinical data exchange. We expect to learn different things from different communities. North Adams, for example, has adopted a very different Health Information Exchange model than the other communities. Brockton is by far the most diverse community and includes a lot of community health centers. So that will be very valuable. I think that our early progress has been outstanding but it's still early on in the evaluation. And we have a very good plan but we're going to have to see how things turn out. Our hope is that Massachusetts can be an exemplar for the rest of the country. We have engaged Governor Patrick and our hope is that other states may be able to emulate some of this work.

The initial funding of the business plan was actually supported by the Massachusetts American College of Physicians chapter, but Blue Cross really has been the primary source of revenue, although we recognize that we will need to get support more broadly to move forward.

In answer to a question of what the average cost per installed network node was, the exact amount is unclear but all of the cost was covered by the Collaborative funding. And physicians and hospitals did not have to have skin in the game early on. There was a lobbying effort at the beginning to set up a model in which providers were given incentives to see what it would actually take to get them to sign up. But the Collaborative made the call to pay for everything early on. And we need to learn about how much skin in the game hospitals and providers will need to have down the road. In the long run, the Collaborative is not going to be paying for everything.

In answer to a question of how the Collaborative relates to Massachusetts Share, the two entities are unrelated but the Mass Share is the Massachusetts RHIO, it's the Massachusetts Regional Health Information Exchange effort. And Mass Share will link up the data exchanges in the communities.

In answer to a question of how disparities and security readiness of network nodes and sharing of data types across nodes, we're relatively early in the clinical data exchange part of things.

In answer to a question about an ongoing business plan and whether that's been developed it has been. The details are not available yet but it's one of the key things to sort out how to set it up and who should pay. We think we've come up with a model that's going to work but that clearly has to be tested and that's the million dollar question.

In answer to a question about 90 percent of the practices have chosen eClinical Works from the six or seven vendors and it looks like at least one community kind of chose it preferentially, which may have

influenced the numbers, and what was good from that vendor that made it have a high adoption rate, since a lot of providers chose them. That's the one that has the largest proportion of practices. It's not quite 90 percent but it's pretty high. The key factor that was attractive to people was that it's very user-friendly and the usability characteristics are quite good. It's the least expensive of the vendor products and providers were not being asked to pay but they still ended up most often picking the product that was the least expensive, which was interesting and a surprise. Not much was known about that vendor before the effort was undertaken.

The key things to encourage Blue Cross to donate the money that they did was that they recognized that there are a lot of inefficiencies in the way that care is delivered today. And they believe that implementing electronic health records would address many of those. Some of the work that Arnie Millstein has done has suggested that there is 20 to 30 percent waste in the health care system today and there's an awful lot of redundancies. Work that the Center for IT Leadership (CITL) has done suggests that implementing clinical data exchange could save very substantial resources nationally in part by eliminating some of the redundant things that are done. So Blue Cross was focused on that. The analyses that CITL has done suggest that most of the benefits that accrue don't go to the providers, they actually go to payers and also to purchasers. And Blue Cross looked at that and said, "Look, we recognize that we have to be a part of this and it will be in our financial interest in the long run to do this." They also are just committed to seeing the best care delivered and they think that use of electronic health records will improve care.

Manuscripts that have been published in the "Archives of Internal Medicine" in the last year and JAMIA, the "Journal of the American Medical Informatics Association", can be located by searching on Simon, S. and Bates, D.W., and can be found very quickly. Those citations will be posted on the Web site.

In answer to a question about when a patient is opting in, are they opting in for just the information from that provider that they're seeing to be shared with other providers in their community, or are they opting in universally so that they're opting in once only with one provider and all their information through all the providers being seen in that community being shared with each other - an enormous amount of time has been spent on this. There are a million options and it's been one of the most challenging things. We considered various models, an opt-out model which couldn't be done, and an opt-in model. What people are opting in to is to have their information shared among providers in the community. And at this point it's all their information, with certain exceptions like certain material that would be protected such as HIV test results or certain psychiatric information. They are not asked to opt in or opt out of having their provider using electronic health record. The provider uses an electronic health record whether or not they opt in, so the opt in is around having their information exchanged within the community at this point. There was a tremendous amount of work done going though this and sorting out a plan that was acceptable to everybody. One fear is that after this was done, only 80 percent of people or less would opt in, and that would really limit the value of clinical data exchange. But in fact, in North Adams, the proportion has been very high, which is really encouraging.

In answer to a question regarding how data exchange is being done, whether it's going federated, centralized or a mix and also how the data harmonization is being handled from the different systems, we're using a centralized approach. Initially we thought we would use a point-to-point but we elected not to do that after considering what would actually be involved. It's still relatively early on, so we haven't had to do a lot of harmonizing. The data exchange that is up is the North Adams one and they're all using the same system, so there's not a lot of harmonization to do. But that will be an interesting challenge as the other exchanges come up.

In answer to a question about use of various parts of the systems by providers and the quality and comprehensiveness of the entries into the medication and problem list, nothing has been done to date. Work will probably be done on it down the road but nothing so far has been done. The issue arises since the use of alerts, warnings and reminders was so low in comparison, it seems like that would flow from inadequate medication and problem list that had been recorded. You can have really good medication

entries and still not use too much in the way of decision support. It turns out that the problem list is not that central to delivering good decision support, although it helps some, particularly for chronic diseases. But many of the vendor applications do not include necessarily a lot of robust decision support. A lot of the time it is left as something that is optional for the provider to turn on or turn off. Many providers just don't turn it on. We need to learn more about that. Some observations of providers in Australia revealed that providers there nearly all had decision support that was available to them, but they virtually all had it turned off.

In answer to a question about how low users and high users were defined, the manuscript details those thresholds.

In answer to a question of if other states are doing anything similar, Rhode Island is active and so is western Tennessee in the Memphis area -- they're doing things with information exchange around laboratory tests. Indianapolis is very far along in this area and there's been a lot that's gone on in Indiana. There are a number of other efforts around the country like this, although the ingredient that we have had that most other states have not had was the big donation to get going.

In answer to a question of plans to include long term care and continuing care communities in future initiatives, that's something that was talked about early on. Definitely there are plans to include them in the future. It was too much to include them in the pilot, so we elected just to narrow the scope to limit that for now.

In answer to a question related to getting the IRB approvals done for the evaluation study and, if there were any difficulties, and how they were overcome -- it's been enormously complicated when you start involving practices that are not used to doing research. There has been a long saga, including a TRIP grant, and even then all the investigators who studied mini practices had difficulties. The way things were managed in this study was to get the IRBs of the communities to approve the work. We have actually had no trouble getting the partner's IRB, which is used to thinking about research to approve the work. But for community hospitals, it's been challenging. One of the communities had not had their IRB meet in a couple of years, so they had to get together to evaluate this and they had a lot of questions and concerns. But eventually we've been able to work with the IRBs to get all the various chunks of research that we're doing approved. It's much more labor intensive and time intensive than it would be if we were doing the studies in a different set of settings. And we've had to get approval for each of the communities from each community. That continues to be a challenge and it's a lot slower than working with entities that are more used to doing research.

In answer to a question regarding the tool allowing the practice to check for prior authorization, it does not, but NEHEN does allow it.

In answer to a question regarding how the Mass eHealth Collaborative going forward will relate to new round of ONC in-hand RFPs, that's something that we'll just have to see. When that set of RPFs is released, we'll be taking a look at it seriously.

In answer to a question of the commitment enabling access to and from personal health records, that is still being worked out. We're early in the stage of enabling access to personal health records. The call has not been made about whether it will include access to all patient information. It most likely will not but that remains to be worked out.

The answer to a question regarding the opt-in model is referred to Micky Tripathi on the Massachusetts eHealth Collaborative Web site at www.maehc.org.

In answer to a question relative to the time frame of the economic evaluation being done, it is hoped to be done within a year to a year and a half from now.

In answer to a question relative to the EHR response rate, we got a 70 percent response rate, so we're quite confident that a 45 percent figure was valid. We were surprised that it was that high, but that's what it is.

In answer to a question relative to whether all the electronic health records are connected to all payers for formulary and other information, it varies by EHR  In the Partner's EHR which is not part of the Collaborative, things are set up so we have all the formulary information included but that's not the case for most of the vendor applications within the Mass eHealth Collaborative.

In answer to a question about plans to bring other providers, beyond electronic medical record users, into the HIE process, actually hospitals are already part of the HIE process. So each community had to being a hospital into the equation and they are involved already. There is a clear intent to bring long term care in later.

In answer to a question about obstacles with respect to interoperability of systems and especially in communities that chose the most system IT vendors, there are issues; for example, you do have to do some data harmonization. If you pull in a CBC, it's not necessarily represented in exactly the same way if it's brought in from different entities. We did require all vendors who participated to represent all the key types of data in standard ways. But as most people know, just requiring data to be represented in a standard way is easier than actually making sure that it is. And even if something is represented as an HL7 message, it doesn't mean that it can be read as easily as one would want to.

In answer to a question of who the vendor doing the connectivity is in the other two communities, referral is made to the Mass eHealth Collaborative Web site. It may have been announced.

In answer to a question about the centralized model for the Health Information Exchange, how consensus was achieved on having a centralized model with so many distinct stakeholders and whether there are any recommendations on how to promote a centralized Health Information Exchange model where people may have concerns about privacy, security and control over information in that environment, a lot of discussion went on. There were good arguments in both directions.  A centralized model makes it easier to deliver some of the benefits that one would like to be able to put forward, for example doing all the quality measure analysis. It was helpful to people that even though a centralized model was used, the place that it's centralized is within the community. So it's not that the data is going away to a remote data center in North Carolina from Massachusetts, it's staying local.  And that, people found to be reassuring. We're still relatively early in  implementing this and it will be important to continue to monitor how it goes.

In answer to a question concerning any legislation needed to allow the Health Information Exchange to happen, there was no legislation needed.  Consideration is being made to ask for legislation to provide subsequent funding for the Collaborative.  And the Collaborative works fairly closely with the state government. But basically to set up the HIEs, that did not require specific legislation. A conference call will be held in two weeks with the contractor that's been working on the state privacy laws and barriers to implementation of Health Information Exchange.

In answer to a question relative to, given the low percentage of electronic health records that have electronic prescriptions, how it affects the study of medication errors, it doesn't affect that. The data were for the whole state. Within the Collaborative, 100 percent of the providers being studied have electronic prescribing. That's not to say they will use it all the time but hopefully they will.

In answer to a question as to whether electronic pharmacy connectivity was a requirement in vendor selection, it was.

In answer to a question as to why the payers united to form the Massachusetts Health Quality Partnership, it was that there was pressure from the providers in the state to come together in this area because basically the payers were driving everyone crazy with so many disparate recommendations.

In answer to a question whether there had been any failed implementations, or de-installs, within the Collaborative there has only been one. That's a pretty good track record so far. Basically, all the implementations have worked.

In answer to a question whether information has been shared between the specialists and the hospital if they have different software systems, information can only be shared if they have one of the vendors who are in the Collaborative. There were almost no other providers that were using other systems in the communities, but it was felt connecting to different software systems couldn't be handled.

In answer to a question about how long the duration of support is that the participating agencies are offered and whether it's contractual, the support is for five years, or a defined period, and is contractual. A lot of the effort in developing the collaborative was in doing all the legal work that was needed to do this. Referral is made to Micky Tripathi or Steve Bernstein, the lawyer who's worked on this for the Collaborative and who has done a lot of great work.

In answer to a question about cultural issues that were encountered, those have been substantial. Many providers had specific concerns and were reassured about things like how medication error data that was collected would be handled. A lot of providers are concerned about security and privacy. And the communities have done a lot of processing around those areas. There are community groups that meet and talk about these types of issues. To do something like this is a societal sort of thing that will result in a lot of change. There are many issues around privacy and confidentiality that the whole society needs to work on.

In answer to a question about whether data standards for the data exchange is an HL7 interface, it is. For the specific types of data is all the standard things such as LOINC for labs, for example, so no surprises there.

In answer to a question about how collaboration was fostered around competing practices and neighboring practices which may perceive competitiveness, that is a very interesting topic. For example, there were two hospitals in Brockton which historically had fought like cats and dogs. And as part of getting funded through the Collaborative, they needed to come together, which they did. They realized that everybody in the community of Brockton would be better off if they could get beyond it. The same was true among practices in varying communities. This is something that practices should not be competing around. They should compete around other areas, but competition in this area is a problem. It is recognized that that will be a hard thing to get beyond in all situations.

In answer to a question what amount of support can be expected? There was $50 million for 450 doctors, which is $90,000 per physician. It is suspected it will be very substantially less expensive than that and an evaluation is being performed to try to think about how much it will be to do the whole state. Within Partners, it has been possible to implement electronic health records for around $8,000 per physician but that's a different situation in that providers are practicing in a much bigger network and there are certainly costs that are not included. Even though there is a data exchange within Partners, which is an integrated delivery system, the actual costs are certainly higher than that. It is expected that costs in Massachusetts will be very reasonable. There was a lot of startup involved here that will not be needed in the future.

In answer to a question of whether the Stark Act had much of an impact on adoption of the model, it did not. The Stark Act is particularly important for large networks and it is not as important for communities that have a lot of small practices. Relaxation of the Stark law is a good thing that will help promote adoption.

In answer to a question about how the opt-in was actually done, it was done in the individual physician office.  So the provider typically sat down with the patient and talked them through it. In most instances, the provider's assistant would hand patients information and they would go in and talk with the patient.

In answer to a question about physician offices implementation of these software programs and whether the practices implemented it individually or was there a central ASP implementation so all the data is going to a central place and whether individual physician offices are responsible for the backup and disaster recovery, it is largely individual and they are responsible for backup and disaster recovery.  The Collaborative is still involved so if a big disaster were to occur, there is someone to call, which is different than the situation you might be in if one did this totally on their own.

In answer to a question how this ties in with the opt-in, if the patient opts in and signs, the data that is going into their local EMR is also copied to the central repository for any type of exchange activity, the answer is an extract is produced.

In answer to a question whether anyone having a treatment relationship with that patient is allowed to go in an access the information that is the case.

In answer to a question if there is an emergency department involved so they could go in and look up patients in that repository, that also is the case.

In answer to a question about how the Collaborative dealt with expert IT support, the Collaborative has delivered a lot of that support.  Although it can only be there some of the time, it has been there more than would be the case for a typical vendor implementation.

In answer to a question whether a priority of the whole project was for use of the data other than patient care, a priority was to improve quality broadly and to measure the impact.  It wasn't found to be a deterrent for providers, who were quite wiling to accept this.

In answer to a question whether all the health consumers were Blue Cross/Blue Shield, the answer is no. It included all payers in the state.

In answer to a question whether the electronic record was populated from provider interactions, and whether the payer contributed information, it was populated from provider interactions.

In answer to a question about whether insurers have reimbursed practices for using the technology or for importing quality outcome measures, there is a lot of pay for performance measures in the state broadly. Although within the Collaborative, there is not much pay for performance operating in the communities. The intent is to utilize pay for performance down the road in getting providers to adopt.

In answer to a question where personal health records fit into this, there is a personal health record that's up in North Adams, although it's a relatively small part of the overall effort.  A call was made that it was something we definitely wanted to do, but we couldn't do it right at the beginning.

In answer to a question whether the CCR data exchange model is being used, it is not although there is a clinical data extract that one can get from this that would be much like what you can get from the CCR. The total number of physicians in Massachusetts is roughly half primary care versus half specialists.

In answer to a question about whether the patient portal is a big incentive to opt in, the thought is that it isn't.  A patient portal exists in our own network and about 20 percent of patients opt in.  And here we're getting 98 percent of patients that are opting in to having their data exchanged.  Patients really recognize

that there is value in having, for example, their specialists be able to access the same data that their primary care provider has.

In answer to a question about if the patient chooses to opt out whether the patient's health information can be exchanged non-electronically, it can.

In answer to a question whether the ePrescribing offers formulary access with cost and preferred drugs, it will. It doesn't yet in all instances. The data about the proportion of use of ePrescribing is for all providers in the state, not in the Collaborative. It is thought that use of ePrescribing within the Collaborative is going to be pretty high.

In answer to a question whether the initial costs of the purchase of the AMRs was funded out of project funds, it was.

In answer to a question about how ongoing costs will be met and in particular, will providers be responsible for ongoing costs, they will be responsible eventually for ongoing costs of the systems that they have selected. There will be support for these costs through pay for performance and payer-supported models. We're working closely with the payers to develop a long term model that can be used for this.