

Advanced Technologies to Lower Health Care Costs and Improve Quality



EXECUTIVE SUMMARY

"There are advanced technologies which can dramatically lower health care costs and improve quality. The technologies are proven. The associated benefits are known. But there are barriers in the system which impede their implementation. We can change that."

Mitchell Adams – Executive Director, Massachusetts Technology Collaborative

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Massachusetts is home to a life sciences "Super Cluster" consisting of an extraordinary aggregation of the world's leading institutions and companies in biomedical research and education, health care delivery, medical devices, biotechnology, pharmaceuticals, and information technology. It is the envy of the world, and an essential element in our region's future economic vitality.

But while we have what is arguably the best health care available, the cost of services is very high, and

annual increases have recently returned to the double-digit range. It is a national problem. Growth in health care spending in the United States has outpaced all other major sectors and threatens to reach crisis levels. In 2001, \$1.4 trillion was spent on health care ¹ – an amount that represents 14.1 percent of gross domestic product (GDP) and an increase of 8.7 percent over 2000. It is expected that health care costs could grow to 17.7 percent of GDP by 2012. ² And the expenditure category presenting the greatest stress on state budgets currently is health care costs.

"The return of double-digit health care inflation threatens employers' ability to preserve jobs while maintaining good benefits, and has a severe impact on the Commonwealth's industrial competitiveness."

Richard C. Lord – President and CEO,
Associated Industries of Massachusetts

At the same time, the quality of our health care system suffers as a result of medical errors, fragmented care and inadequate systems. Widely cited estimates from the Institute of Medicine report, *To Err is Human*,

indicate that the cost of medical errors in terms of human life is substantial. Other studies have shown that the financial cost is huge. The total costs associated with these events – including all health care costs, disability, lost productivity and income – could reach \$29 billion. ³

There exist advanced technologies which can dramatically lower health care costs and improve quality. While capital expenditures for equipment and training are required, the cost savings associated with implementing these technologies going forward can be much greater, such that substantial net financial benefits are possible. These technologies cross a spectrum of disciplines including biotechnology, medical devices and information technology.

This report focuses specifically on a set of seven advanced technologies that have demonstrated substantial net financial benefits and improved quality of care and health outcomes. They were selected from among a wide array of technologies for their demonstrated ability to simultaneously reduce costs and improve quality. They represent only a sample of all of the technologies that could benefit health care in Massachusetts. Technologies with the potential to yield dramatic administrative savings but no direct clinical benefit, for example, have not been addressed here. There are a host of non-information-based technologies that also have dramatic effects. (See Appendix A for a more complete list.) The seven selected information-based technologies are highlighted here and discussed in more detail in subsequent sections of the report.

1. **Electronic communication between patients and their physicians** has been shown to measurably decrease overall claims costs while improving patient access and communication and enhancing practice efficiency. As a result, at least six payers – including, locally, Blue Cross Blue Shield of Massachusetts – have undertaken pilots to reimburse physicians for their use of electronic communication tools with patients for the delivery of non-urgent care.
2. With over one billion prescriptions worth \$154 billion written in the United States in 2001 and three million preventable adverse drug events associated with outpatient prescriptions alone, ¹ there are significant opportunities to reduce drug costs and the errors associated with the largely manual process that takes place today. More importantly, medication errors account for one out of 131 ambulatory deaths and one out of 854 inpatient deaths. ³ **Electronic prescribing** (or e-prescribing) tools that provide up-to-date payer formulary information at the time a physician writes a prescription, and that support the electronic transmission of that legible prescription to a pharmacy, can markedly reduce drug costs and improve patient safety associated with the prescription process. A coalition in Rhode Island is currently piloting an e-prescribing solution for statewide implementation, ⁴ and Tufts Health Plan has announced the expansion of its e-prescribing pilot across Massachusetts.
3. **Ambulatory computerized physician order entry** (CPOE) systems that facilitate physician orders at the point-of-care for medications, laboratory and radiology tests provide significant opportunities for improving quality while reducing costs. It is estimated that the use of advanced ambulatory CPOE systems nationwide could eliminate more than two million preventable adverse drug events. ¹
4. Similarly, point-of-care tools that provide **inpatient CPOE** can reduce errors, improve health care quality, and lower costs in the hospital setting. Preventable adverse drug events are a leading cause of death in the United States (exceeding deaths attributable to motor vehicle accidents, breast cancer, or AIDS). The total costs associated with such events represented four percent of national health

expenditures in 1996. [3](#)

5. Coordinating patient care across a community when patients are seen at multiple provider organizations – especially when many of these institutions do not have electronic patient records – can be paper-intensive and fraught with rework and delays. Several communities across the country have been piloting efforts to share electronic patient information by secure means. The results from these two early **regional data sharing** initiatives (in Santa Barbara, California, and Seattle, Washington) have shown some early success in improving quality and reducing health care costs in the community. A similar effort is just now being proposed for Massachusetts.
6. A recent mandate by the Leapfrog Group (a consortium of 140 public and private employers and organizations that provide health care benefits) requiring hospitals to maintain a board-certified intensivist onsite 24x7 to monitor intensive care units (ICUs), represents a significant investment for smaller hospitals with lower volumes of ICU patients. [5](#) New technology allows physicians to fully monitor patients remotely, thereby reducing costs by expanding the ability of one intensivist to cover multiple ICUs using remote monitoring or **e-ICU** applications.
7. There are a wide range of tools that support the management of chronic diseases. Not only have **disease management** applications been shown to increase patient involvement and therefore satisfaction with their overall care, but the most sophisticated tools integrated with a physician practice's core clinical systems have been shown to effectively improve the quality of care for these patients and reduce costs for populations of patients across a community.

Published research and current uses of these technologies at leading health care organizations across the country have demonstrated their ability to reduce costs and improve quality. Indeed, if Massachusetts were to increase adoption of these technologies statewide, there would be an opportunity to significantly reduce health care costs for employers throughout the Commonwealth while simultaneously improving the overall health care of its citizens.

For Massachusetts alone, the potential for savings is enormous. It is estimated that \$2.5 billion could be saved if the Commonwealth were to widely adopt all seven of these information technologies. Given the significant concentration of nationally-recognized health care organizations, the power of the political infrastructure, and the demonstrated history of success in collaboration, Massachusetts is certainly poised to undertake the planning and collaboration necessary to increase adoption of these technologies. Given the importance of a vibrant business economy to the long-term future of Massachusetts, the Commonwealth can ill afford not to increase adoption of these technologies.

The following table highlights the financial benefits that each of these technologies represents for Massachusetts, calculated for the purposes of this analysis at a likely best-case adoption rate of 75 percent.

Table 1: Summary of Projected Net Savings for Massachusetts from Emerging Health Care Technologies [6](#)

Emerging Technology	Projected Net Annual Benefit (Assuming 75% Adoption Rate)
Electronic Patient-Physician Communication	\$ 167.8 million
E-Prescribing	\$ 140.7 million
Ambulatory CPOE	\$ 290.3 million
Inpatient CPOE	\$ 966.0 million
Disease Management	\$ 710.0 million
Regional Data Sharing	\$ 23.8 million
E-ICU	\$ 177.4 million
Total	\$ 2.48 billion

Barriers that Impede the Adoption of Emerging Information Technologies in Health Care

Compared to other industries, spending on information technology in health care lags. Despite growing evidence of the effectiveness of electronic medical record systems for outpatient practice, it is estimated that less than one-in-five primary care physicians use them. Less than ten percent of primary care physicians use even more basic systems that support electronic prescribing. ¹ And fewer than five percent of hospitals are using computerized physician order entry systems, ⁵ although the benefits associated with the use of these systems have clearly been demonstrated.

Barriers to the adoption of these technologies include:

- **There is a lack of information about true costs, benefits and experience associated with these technologies.** The resulting uncertainty is a major barrier to organizational adoption.
- In many cases, the **purchase and implementation costs** for these advanced technologies are significant – especially when the competition for capital dollars is tight and operating margins are shrinking at most health care organizations.
- For many of these advanced technologies, **the benefits do not accrue to the purchasers who use them.** While measurable financial savings from population health management and the improved formulary compliance accrue to payers, for example, the provider organizations that must actually use advanced technologies to achieve these improvements are unlikely to invest their limited resources to purchase them, especially when they receive no reimbursement, no reward and little direct benefit for doing so.
- **Performance standards** detailing best practices and outcome expectations in most cases have not been established.
- The **cultural resistance and inertia** against physician adoption of these advanced technologies can be

great if use of them takes more time or represents significant change in the way a physician practices. Training and education are necessary.

- In many cases, the **vendor products are immature**, making the selection of a vendor riskier and implementation more complicated.
- In the case of several of these advanced technologies, **legal and regulatory barriers** – e.g., those associated with patient privacy and use of the Internet for transmitting personal health information, or requirements for actual as opposed to electronic signatures on prescriptions – have prevented more rapid adoption.
- Finally, the required **infrastructure and data/terminology standards** necessary for the interoperability of some of these advanced technologies are not yet present. Unlike other industries that long ago established technology standards, connecting disparate systems and exchanging information across multiple entities in health care is still an extremely complicated endeavor.

Recommendations: A Call to Action

Increasing the adoption in Massachusetts of these advanced health care technologies will require vision, leadership and collaboration among key stakeholders from across the Commonwealth. While a number of pilots and demonstration projects are already underway, (see “Case-in-Point” highlights), the success of these efforts must be publicized and their wider adoption nurtured if they are to take hold. Similarly, getting newer, yet-to-be-piloted technologies off the ground will also require vision, leadership and collaboration. In both cases, leaders in Massachusetts must facilitate the creation of rewards and incentives and eliminate key barriers so that current initiatives can proceed more effectively and new efforts can begin.

There are some specific actions that could be undertaken to help spur adoption.

1. Organize the initiative, foster collaboration and eliminate barriers by:

- **Charging a statewide public/private task force, or series of focused task forces** to develop specific recommendations for action within three to six months; and
- When the work is done, convening a statewide summit to share the vision with key stakeholders and generate commitment and energy for the new agenda.

2. Establish early funding, reimbursement and other incentives by:

- **Implementing bonus incentives** for provider organizations that adopt certain technologies, or base a portion of their capitation payment on IT adoption;
- **Reimbursing physicians for using technology** on a per-visit or per-transaction basis;
- **Developing collaborative arrangements between payers and providers** to share in the costs of implementing these advanced technologies (i.e., **eliminate the disconnect by aligning the cost burden with financial benefit**);
- Using the state Department of Public Health **licensing process** to encourage

hospitals and physician practices to adopt certain technologies; or

- Working with the “Leapfrog Regional Rollout Committee” to **speed up the adoption timeline and associated requirements for CPOE**. Accelerated implementation should be accompanied by financial assistance to meet capital needs where necessary.

3. **Secure capital funding** by:

- **Seeking private foundation and grant funding** to design, test and implement pilots of emerging technologies across the Commonwealth;
- **Seeking sources of public funding** for specific IT initiatives in Massachusetts (such as that proposed nationally in at least one instance to provide physician reimbursement for the adoption of technologies such as e-prescribing);
- **Providing low- or no-cost revolving loans** to provider organizations for the adoption of certain technologies (such as one Federal proposal being urged by several national health care IT organizations);
- **Reallocating financial savings** to those who implement these advanced technologies but for whom significant benefits do not accrue (i.e., **eliminate the disconnect**); or
- **Sharing technology resources** across stakeholder entities.

4. **Establish a “trusted third party”** to complete studies to provide data and standards to identify the technologies that can reliably lower cost and improve quality. This addresses one of the significant barriers – the lack of information about true costs, benefits and experience.

This Initiative in Context

It is not news to many of the state’s health care leaders that there are advanced technologies that can lower costs significantly and improve quality. In fact, there are a number of important projects and pilots underway in Massachusetts right now in which the power of these technologies is being put to work. Some examples are identified in the report, in particular those highlighted in box frames entitled “A Case-in-Point”.

The contribution of this initiative nonetheless may be substantial. This report shows that there is very significant financial benefit to Massachusetts if the adoption of these technologies can be hastened, that there are systemic barriers impeding their adoption, and that a collaborative effort to eliminate the obstacles can be undertaken.

Download the pdf of the full report,

[Advanced Technologies to Lower Health Care Costs and Improve Quality](#)

Endnotes

- 1 "The Value of Computerized Physician Order Entry in Ambulatory Settings," Center for Information Technology Leadership, 2003.
- 2 "Health Spending Projections for 2002-2012," Health Affairs, February 2003.
- 3 Institute of Medicine, Committee on Quality in Healthcare in America. To Err is Human: Building a Safer Health System, Washington, D.C., National Academy Press; 1999.
- 4 See the Rhode Island Quality Institute. www.riqi.org
- 5 The Leapfrog Group estimate, January 2002. www.leapfroggroup.org
- 6 There are several important considerations and assumptions incorporated into the analysis for these calculations:
 - First year costs were calculated to include the purchase of necessary hardware and software for each advanced technology plus any additional costs associated with implementation. The projected net annual benefit reflects ongoing annual costs beyond Year 1 once implementation has been completed.
 - The projected net benefits were calculated for most technologies at aggressive but achievable levels of adoption (typically 75 percent). The actual benefits achieved may not always be fully realized given some of the adoption challenges discussed in this report. Higher levels of adoption will yield higher levels of net benefit. The costs and benefits of systems that are already installed in Massachusetts are not included in the projected net savings.
 - This report assumes the deployment of software applications with specific capabilities. In many cases, there is a range of vendors that can provide varying levels of capability, plus a range of hardware tools and devices that deliver and enable the capability for the end use. The solutions and approach can vary for each technology, and each approach may be associated with different levels of benefit.As stated previously, significant gaps currently exist in the available research evidence regarding the costs, benefits and usage for some of the recommended technologies – especially given that their adoption is still early. Financial projections for this report were based on the most widely cited, sound evidence available today.

Working Group

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