

Health Information Technology

An Assessment of  
Maryland Hospitals



MARYLAND  
HEALTH CARE  
COMMISSION

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## **About the Survey**

The Maryland Health Care Commission (MHCC) worked with hospital Chief Information Officers (CIOs) to develop the *2008 Hospital Health Information Technology Survey* (survey). The survey assesses health information technology (health IT) adoption and planning efforts in seven key areas among Maryland's acute care hospitals. Widespread adoption of health IT is viewed as essential to transforming the health care system.<sup>1</sup> Health IT can improve the efficiency, cost-effectiveness, quality, and safety of health care by making best practice guidelines and evidence-based information immediately available to providers at the time of care.

MHCC invited hospital CIOs to take part in the survey around the end of calendar year 2008. Information contained in this report represents key findings from the survey and the overall adoption and planning efforts related to health IT in Maryland hospitals. In addition, the report presents findings related to hospital size, geographic location, and hospital affiliation in the seven key areas.

## **Report Limitations**

Information contained in this report is aimed at providing an analysis of health IT adoption and planning. Survey data that was used in developing this report is based on a self-assessment by the hospitals. Responses were likely influenced by the respondents' perception of the question and the lack of standardized definitions of technology functions. In the future, MHCC intends to work with CIOs to more narrowly define certain questions and establish a more consistent definition of technology functions within the survey.

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<sup>1</sup> Health Information and Management Systems Society, "Fact Sheet: Transforming Health Care for All Americans," (2004). Available at: <http://www.himss.org/asp/ContentRedirector.asp?ContentId=50742>.

# Hospital Health IT Adoption

The Maryland Health Care Commission (MHCC) developed the *2008 Hospital Health Information Technology Survey* (survey)<sup>2,3</sup> to assess the level of health information technology (health IT) adoption in Maryland acute care hospitals (hospitals) in the following seven key areas: computerized physician order entry (CPOE); electronic health records (EHRs); electronic medication administration records (eMARs); barcode medication administration (BCMA); infection surveillance software (ISS); electronic prescribing (e-prescribing); and electronic health information exchange (HIE). This survey is similar to several surveys administered nationally that assess health IT adoption; however, it is unique in that it includes planning questions in an effort to better understand the future of health IT adoption.

Chief Information Officers (CIOs) from all of Maryland's 47 hospitals provided input into the survey design. Three hospitals that are part of local health systems combined their responses to the survey; thus, findings from the survey are based on feedback from 44 hospitals. The data was not impacted by this combination of responses because of the similar attributes of these hospitals. The survey reports on health IT adoption within hospitals by primary care units (PCUs).<sup>4</sup> Planning questions included in the survey were aimed at identifying initiatives that are either underway or anticipated to begin within the next 12 months.

Widespread adoption of health IT is considered a vital component in transforming the health care system.<sup>5</sup> Health IT can improve the quality of care, prevent medical errors, and reduce health care costs.<sup>6</sup> Effective use of health IT has the potential to significantly increase the efficiency of health care by helping providers manage information. Patient outcomes are enhanced from the electronic prompts to providers about appropriate preventative medicine and standards of care.<sup>7</sup> Exchanging patient information electronically eliminates the existing paper and digital silos that exist today with the potential to decrease patient mortality by helping providers manage complex chronic conditions and identify harmful drug interactions or possible allergic reactions to prescribed medicines.

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<sup>2</sup> See Appendix B for *Survey Questions*.

<sup>3</sup> See Appendix D for the *2008 Hospital HIT Survey Results*.

<sup>4</sup> See Appendix B for list of primary care units, which is located within the *Survey Questions*.

<sup>5</sup> Ibid.

<sup>6</sup> Department of Health and Human Services, "Health Information Technology." Available at: <http://www.hhs.gov/healthhealthIT/>.

<sup>7</sup> Institute of Medicine, "Preventing Medication Errors," *National Academy of Sciences*, (July 2006).

## Computerized Physician Order Entry

Hospitals with computerized physician order entry (CPOE) have the capability to mitigate most adverse events associated with medication errors.<sup>8,9,10</sup> An estimated 8 to 15 percent of the nation's hospitals have currently implemented CPOE, an increase of 3 percent since 2003.<sup>11,12,13</sup> Approximately 55 percent of Maryland hospitals report having CPOE, with roughly 39 percent having fully implemented CPOE in all PCUs. Around 41 percent of the hospitals without CPOE are either assessing or implementing this technology.

CPOE Implementation (n=44)		
Fully	Partially	
17	7	
Planning		
Assessing	Implementing	Undecided
9	9	2

CPOE with clinical decision support (CDS) increases the potential to reduce complications, decrease costs, and lower mortality rates.<sup>14,15,16</sup> According to a study by the American Hospital Association (AHA), roughly 51 percent of hospitals reported using drug interaction alerts, which is nearly doubled from what was reported in 2005.<sup>17</sup> Statewide, approximately 71 percent of hospitals with CPOE report having CDS for medication prescribing, such as drug to drug; drug to food; contraindication/dose limit for diagnosis, allergies, age, weight, results; etc. About 42 percent report having CDS for diagnosis, standards of care (SOC), and chronic conditions.

Medication CDS (n=24)	Diagnosis/SOC CDS (n=24)
17	10

<sup>8</sup> Patricia Sengstack and Brian Gugerty, "CPOE Systems: Success Factors and Implementation Issues," *Journal of Healthcare Information Management*, 18(1), (2004): 37.

<sup>9</sup> CPOE is a software application where providers enter orders into the system [see *Survey Glossary* in Appendix C].

<sup>10</sup> Although computerized order entry has been utilized in hospitals for decades, this survey focused on CPOE where it is the ordering provider that enters the patient care orders directly into the system.

<sup>11</sup> Howard Anderson (ed.), "CPOE: It Don't Come Easy," *Health Data Management*, (January 2009). Available at: [http://www.healthdatamanagement.com/issues/2008\\_60/27494-1.html](http://www.healthdatamanagement.com/issues/2008_60/27494-1.html).

<sup>12</sup> Eric Poon, David Blumenthal, Tonushree Jaggi, et al., "Overcoming Barriers to Adopting and Implementing Computerized Physician Order Entry Systems in U.S. Hospitals," DOI 10.1377/hlthaff.23.4.184 ©2004 Project HOPE, *Health Affairs*, 23(4), (July/August 2004): 184-190.

<sup>13</sup> The George Washington University, Massachusetts General Hospital, and Robert Wood Johnson Foundation, "Health Information Technology in the United States: The Information Base for Progress," (2006). Available at: <http://www.rwjf.org/files/publications/other/EHRReport0609.pdf>.

<sup>14</sup> Ruben Amarasingham, Laura Plantinga, Marie Diener-West, et al., "Clinical Information Technologies and Inpatient Outcomes: A Multiple Hospital Study," *Archives of Internal Medicine*, 169(2), (January 26, 2009): 108-14.

<sup>15</sup> Oregon Health & Science University, "Welcome to CPOE.org," (2008). Available at: <http://www.cpoe.org/>.

<sup>16</sup> Clinical Decision Support is a computer application to assist in clinical decisions by providing evidence-based knowledge in the context of patient-specific data [see *Survey Glossary* in Appendix C].

<sup>17</sup> American Hospital Association, "Continued Progress: Hospital Use of Information Technology," (2007). Available at: <http://www.aha.org/aha/content/2007/pdf/070227-continuedprogress.pdf>.

## Electronic Health Records

EHRs have the potential to improve the quality, safety, and efficiency of care delivery and save the health care system billions of dollars annually.<sup>18,19</sup> Nationally, about 68 percent of all hospitals report having an EHR, with approximately 11 percent fully implemented and roughly 57 percent partially implemented.<sup>20</sup> In Maryland, hospital adoption of EHRs was reported at around 77 percent. About 52 percent of hospitals have fully implemented EHRs in all PCUs and roughly 25 percent have partially implemented EHRs. Approximately 11 percent are assessing or implementing this technology.

EHR Implementation (n=44)		
Fully	Partially	
23	11	
Planning		
Assessing	Implementing	Undecided
4	1	5

## Electronic Medication Administration Record

Hospitals with an eMAR are able to reduce the potential for medication errors by mitigating illegibility associated with the handwritten, paper-based medication administration record.<sup>21</sup> The *New England Journal of Medicine* reports that approximately 62 percent of all hospitals have eMARs; roughly 45 percent have fully implemented eMARs in all PCUs and roughly 17 percent have implemented them in at least one PCU.<sup>22</sup> Approximately 55 percent of all Maryland hospitals currently utilize eMARs and roughly 23 percent have fully implemented them in all PCUs. About 32 percent report having implemented an eMAR in at least one PCU. Almost 41 percent are assessing or implementing this technology.

eMAR Implementation (n=44)		
Fully	Partially	
10	14	
Planning		
Assessing	Implementing	Undecided
5	13	2

<sup>18</sup> Minal Thakkar and Diane Davis, "Risks, Barriers, and Benefits of EHR Systems: A Comparative Study Based on Size of Hospital," *Perspectives in Health Information Management*, 3(5), (August, 2006).

<sup>19</sup> An EHR is an electronic record that contains patient health information [see *Survey Glossary* in Appendix C].

<sup>20</sup> Ibid.

<sup>21</sup> An eMAR is an electronic record of medications administered to a patient during their hospital stay [see *Survey Glossary* in Appendix C].

<sup>22</sup> Ashish Jha, Catherine DesRoches, Erick Campbell, et al., "Use of Electronic Health Records in U.S. Hospitals," *The New England Journal of Medicine*, 10.1056/NEJMsa0900592, (March 25, 2009). Available at: <http://content.nejm.org/cgi/content/full/NEJMsa0900592>.

## Barcode Medication Administration

Hospitals that use a BCMA are able to improve the quality and safety of administering medications.<sup>23,24</sup> Currently, around 5 percent of hospitals nationwide have implemented BCMA.<sup>25</sup> Statewide, BCMA adoption was reported at roughly 32 percent. Approximately 2 percent of hospitals reported having implemented BCMA in all PCUs, and nearly 30 percent in at least one PCU. About 50 percent are assessing or implementing this technology.

BCMA Implementation (n=44)		
Fully	Partially	
1	13	
Planning		
Assessing	Implementing	Undecided
4	18	8

## Infection Surveillance Software

Infection surveillance software can assist in the prevention and management of infectious diseases.<sup>26,27</sup> The *2008 Most Wired Survey and Benchmarking* study indicates that roughly 24 percent of hospitals nationwide have implemented fully electronic infection surveillance software, nearly 58 percent are partially electronic, and about 10 percent are manual.<sup>28</sup> In Maryland, about 43 percent of hospitals have implemented infection surveillance software. Approximately 34 percent are assessing or implementing this functionality, and almost 23 percent are undecided about implementing this technology.

ISS Implementation (n=44)		
19		
Planning		
Assessing	Implementing	Undecided
7	8	10

<sup>23</sup> Diana Manos (ed.), “AHRQ Report Shows How Barcoding Medication Improves Quality and Safety,” *Healthcare IT News*, (January 22, 2009). Available at: <http://www.healthcareitnews.com/news/ahrq-report-shows-how-barcoding-medication-improves-quality-and-safety>.

<sup>24</sup> BCMA is technology that uses an infrared scan of the barcodes on the patient’s bracelet and medication package [see *Survey Glossary* in Appendix C].

<sup>25</sup> Ibid.

<sup>26</sup> Centers for Disease Control (CDC), “Public Health Focus: Surveillance, Prevention, and Control of Nosocomial Infections,” *MMWR*, 41(42), (1992): 783-787.

<sup>27</sup> ISS electronically monitors infectious diseases within the hospital [see *Survey Glossary* in Appendix C].

<sup>28</sup> Hospitals and Health Networks, “Infection Surveillance: A Better Way to Beat Bugs,” (January 2009). Available at: [http://www.hhnmag.com/hhnmag\\_app/jsp/articledisplay.jsp?dcrpath=HHNMAG/Article/data/01JAN2009/0901HHN\\_FEA\\_Technology\\_SB1&domain=HHNMAG](http://www.hhnmag.com/hhnmag_app/jsp/articledisplay.jsp?dcrpath=HHNMAG/Article/data/01JAN2009/0901HHN_FEA_Technology_SB1&domain=HHNMAG).



## Electronic Prescribing

Electronic prescribing is considered a viable solution to counter the shortcomings of the current paper-based prescribing process.<sup>29</sup> Most hospitals are interested in being able to electronically prescribe discharge medications to community pharmacies.<sup>30</sup> Statewide, roughly 9 percent of hospitals are able to transmit prescriptions written at the time of discharge to a community pharmacy. Approximately 27 percent are assessing or implementing this capability, and nearly 64 percent are undecided about implementing this technology.

e-Prescribing w/ Community Pharmacies (n=44)		
4		
Planning		
Assessing	Implementing	Undecided
8	4	28

## Data Sharing with Providers

The ability to share patient data electronically with other providers is important to ensuring that essential information about the patient is available at the point of care.<sup>31</sup> Data sharing enables greater access to information, improves workflow processes, and promotes continuity of care. The AHA reported that nearly 65 percent of hospitals nationally are exchanging some patient information electronically with community providers.<sup>32</sup> In Maryland, almost 39 percent are exchanging electronic patient information with providers in their service area. Around 20 percent of hospitals are either assessing or implementing data sharing, and roughly 41 percent are undecided about implementing data sharing.

Data Sharing w/ Community Providers (n=44)		
17		
Planning		
Assessing	Implementing	Undecided
6	3	18

<sup>29</sup> e-Prescribing is the electronic transmission of discharge medications to a community pharmacy upon patient discharge [see *Survey Glossary* in Appendix C].

<sup>30</sup> eHealth Initiative, "Electronic Prescribing: Becoming Mainstream," (June 2008). Available at: [http://www.ehealthinitiative.org/assets/Documents/eHI\\_CIMM\\_ePrescribing\\_Report\\_6-10-08\\_Final.pdf](http://www.ehealthinitiative.org/assets/Documents/eHI_CIMM_ePrescribing_Report_6-10-08_Final.pdf).

<sup>31</sup> Data sharing with providers is the electronic exchange of health information with outpatient care providers of the patient [see Health Information Exchange in the *Survey Glossary* in Appendix C].

<sup>32</sup> Ibid.

# Hospital Size

Hospitals were evaluated on seven health IT functions based on the number of inpatient beds. Academic hospitals were classified as those with more than 500 beds, large hospitals at 250-500 beds, medium hospitals with 100-249 beds, and small hospitals with less than 100 beds. Key findings from the survey indicate an average health IT adoption rate of about 71 percent for academic hospitals, roughly 48 percent for large and medium hospitals, and about 24 percent for small hospitals. Academic hospitals report implementing EHRs, large hospitals report almost 88 percent EHR adoption, which is nearly 9 percent more than medium size hospitals and about 17 percent more than small hospitals. Academic hospitals report full CPOE adoption and approximately 63 percent of medium size hospitals, about 56 percent of large hospitals, and around 14 percent of small hospitals have implemented this technology. Around 50 percent of academic hospitals have adopted technology to e-prescribe to a community pharmacy, almost 11 percent of medium size hospitals and about 6 percent of large hospitals have this capability; this functionality was not reported by small hospitals. Academic hospitals report having the technology to exchange some patient information electronically with service area providers, large and medium size hospitals report about 38 percent, roughly 9 percent more than small hospitals.

## Academic

Academic hospitals account for nearly 5 percent of the total number of Maryland hospitals. Nationwide, almost 74 percent of these hospitals report moderate to high health IT use.<sup>33,34</sup> Locally, these hospitals have implemented EHRs, CPOE, and eMARs. Academic hospitals remain divided in adopting e-prescribing and BCMA technology. These hospitals report electronically exchanging some patient information with service area providers.

Health IT Functions	Number of Hospitals (n=2)	Planning Activity – 12 Month Projection		
		Assessing	Implementing	Undecided
Computerized Physician Order Entry	2	-	-	-
Electronic Health Record	2	-	-	-
Electronic Medication Administration Record	2	-	-	-
Barcode Medication Administration	-	1	-	1
Infection Surveillance Software	1	-	-	1
e-Prescribing	1	-	-	1
Electronic Data Exchange	2	-	-	-

## Large

Roughly 40 percent of all Maryland hospitals are considered large. Nearly 71 percent of large hospitals nationwide report moderate to high use of health IT.<sup>35</sup> Locally, almost 88 percent of large hospitals have implemented EHRs. Approximately 56 percent have adopted CPOE and about 38 percent are assessing

<sup>33</sup> The AHA defines hospital HIT by the number of clinical IT functions; fully implemented with moderate to high use indicates that the hospital is utilizing at least eight functions.

<sup>34</sup> Ibid.

<sup>35</sup> Ibid.

or implementing this technology. Less than 7 percent report e-prescribing to a community pharmacy and the bulk of these hospitals remain undecided about implementing this capability, roughly 69 percent. About 38 percent report adopting BCMA and almost 50 percent are currently implementing this technology. Almost 38 percent of large hospitals are capable of exchanging some data electronically with service area providers, and the same number is undecided. Roughly 25 percent are assessing or implementing this functionality.

Health IT Functions	Number of Hospitals (n=16)	Planning Activity – 12 Month Projection		
		Assessing	Implementing	Undecided
Computerized Physician Order Entry	9	3	3	1
Electronic Health Record	14	1	-	1
Electronic Medication Administration Record	11	1	4	-
Barcode Medication Administration	6	-	8	2
Infection Surveillance Software	5	2	5	4
e-Prescribing	1	2	2	11
Electronic Data Exchange	6	2	2	6

## Medium

Approximately 43 percent of all Maryland hospitals are considered medium sized. Nationally, about 58 percent of these hospitals report moderate to high use of health IT.<sup>36</sup> Around 79 percent of medium size hospitals in Maryland have implemented EHRs. Nearly 63 percent have implemented CPOE and 32 percent are assessing or implementing this functionality. Roughly 11 percent report having the capability to e-prescribe to a community pharmacy and nearly 63 percent remain undecided. Around 37 percent report exchanging some patient information electronically with service area providers and about 47 percent remain undecided. Roughly 42 percent have adopted BCMA and about the same percent are implementing this functionality.

Health IT Functions	Number of Hospitals (n=19)	Planning Activity – 12 Month Projection		
		Assessing	Implementing	Undecided
Computerized Physician Order Entry	12	4	2	1
Electronic Health Record	15	2	1	1
Electronic Medication Administration Record	10	2	6	1
Barcode Medication Administration	8	-	8	3
Infection Surveillance Software	10	3	3	3
e-Prescribing	2	4	1	12
Electronic Data Exchange	7	3	-	9

<sup>36</sup> Ibid.

## Small

Almost 16 percent of Maryland hospitals are considered small. Approximately 32 percent of small hospitals nationwide report moderate to high health IT activity, according to the AHA.<sup>37</sup> Statewide, about 71 percent have implemented EHRs. Around 14 percent have implemented CPOE and almost 86 percent report assessing or implementing this technology. Roughly 57 percent of small hospitals are undecided about adopting e-prescribing to a community pharmacy, and about 43 percent report assessing or implementing this technology. About 29 percent report exchanging some patient information electronically with service area providers, and the same number are assessing or implementing this capability. Small hospitals did not report adopting BCMA, and over 71 percent indicated they are assessing or implementing this technology.

Health IT Functions	Number of Hospitals (n=7)	Planning Activity – 12 Month Projection		
		Assessing	Implementing	Undecided
Computerized Physician Order Entry	1	2	4	-
Electronic Health Record	5	1	-	1
Electronic Medication Administration Record	1	2	3	1
Barcode Medication Administration	-	3	2	2
Infection Surveillance Software	3	2	-	2
e-Prescribing	-	2	1	4
Electronic Data Exchange	2	1	1	3

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<sup>37</sup> Ibid.

## Urban, Suburban, and Rural

Hospitals were evaluated on the seven health IT functions by their location in urban, suburban, and rural areas.<sup>38</sup> Key findings from the survey indicate an average health IT adoption rate of about 49 percent for urban hospitals, around 46 percent for rural hospitals, and about 45 percent for suburban hospitals. Rural hospitals report EHR adoption at about 94 percent, almost 18 percent more than urban and suburban hospitals. CPOE in urban hospitals, at about 64 percent, slightly exceeds suburban hospitals and surpasses rural hospitals by nearly 20 percent. Urban hospitals report e-prescribing to a community pharmacy at about 18 percent, which is nearly 5 percent more than rural hospitals; suburban hospitals did not report adopting this technology. Roughly 55 percent of urban and nearly 50 percent of rural hospitals are able to exchange some patient information electronically with service area providers, and suburban hospitals are around 18 percent.

### Urban

Nationally, urban hospitals report health IT adoption at approximately 56 percent.<sup>39</sup> Urban hospitals account for around 25 percent of all Maryland hospitals. Most of these hospitals, roughly 73 percent, report EHR implementation. Roughly 64 percent of urban hospitals have implemented CPOE and the remaining 36 percent are assessing or implementing this technology. Nearly 18 percent of urban hospitals are capable of e-prescribing to a community pharmacy, and about 73 percent are undecided about implementing this functionality. More than half of these hospitals are able to exchange some patient information electronically with service area providers, nearly 55 percent. Urban hospitals report adoption of BCMA at roughly 18 percent; nearly 55 percent are either assessing or implementing this technology.

Health IT Functions	Number of Hospitals (n=11)	Planning Activity – 12 Month Projection		
		Assessing	Implementing	Undecided
Computerized Physician Order Entry	7	3	1	-
Electronic Health Record	8	1	-	2
Electronic Medication Administration Record	7	-	3	1
Barcode Medication Administration	2	1	5	3
Infection Surveillance Software	6	1	2	2
e-Prescribing	2	1	-	8
Electronic Data Exchange	6	1	-	4

### Suburban

Suburban hospitals comprise almost 39 percent of all hospitals in Maryland.<sup>40</sup> Approximately 76 percent report adopting EHRs. Almost 59 percent of suburban hospitals have implemented CPOE and nearly 41 percent are assessing or implementing this technology. Suburban hospitals did not indicate the ability to e-prescribe to a community pharmacy; about 29 percent report assessing and implementing this technology, and nearly 71 percent remain undecided. Electronic data sharing of limited patient

<sup>38</sup> See Appendix B for *Geographic Distribution by County*; Maryland Department of Planning.

<sup>39</sup> Ibid.

<sup>40</sup> National comparisons limited assessment to urban and rural.

information with service area providers was reported by approximately 18 percent; roughly 24 percent are assessing or implementing this functionality, and about 59 percent are undecided. Roughly 35 percent of suburban hospitals report adopting BCMA, and around the same percent report implementing this technology while about 29 percent were undecided.

Health IT Functions	Number of Hospitals (n=17)	Planning Activity – 12 Month Projection		
		Assessing	Implementing	Undecided
Computerized Physician Order Entry	10	3	4	-
Electronic Health Record	13	2	1	1
Electronic Medication Administration Record	10	3	3	1
Barcode Medication Administration	6	-	6	5
Infection Surveillance Software	6	2	4	5
e-Prescribing	-	4	1	12
Electronic Data Exchange	3	3	1	10

## Rural

Rural hospitals account for about 36 percent of all hospitals in Maryland. Approximately 33 percent of these hospitals nationally report moderate to high health IT adoption.<sup>41</sup> Almost 94 percent of rural hospitals in Maryland have adopted an EHR. Approximately 44 percent of rural hospitals report having CPOE, and nearly the same number of hospitals are assessing or implementing this technology. Roughly 13 percent report e-prescribing to a community pharmacy; about 38 percent report assessing or implementing this functionality, and 50 percent remain undecided. About 50 percent are able to exchange some patient information electronically with service area providers, and about 25 percent are assessing or implementing this technology while the same percent of hospitals remain undecided. Nearly 38 percent report adopting BCMA and around 62 percent report assessing or implementing this functionality.

Health IT Functions	Number of Hospitals (n=16)	Planning Activity – 12 Month Projection		
		Assessing	Implementing	Undecided
Computerized Physician Order Entry	7	3	4	2
Electronic Health Record	15	1	-	-
Electronic Medication Administration Record	7	2	7	-
Barcode Medication Administration	6	3	7	-
Infection Surveillance Software	7	4	2	3
e-Prescribing	2	3	3	8
Electronic Data Exchange	8	2	2	4

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<sup>41</sup> Ibid.

# Hospital Affiliation

Hospitals were reviewed by in-state, out-of-state, and standalone hospital affiliation for the seven health IT functions. Key findings from the survey indicate an average health IT adoption rate of about 50 percent for standalone hospitals, around 43 percent for in-state hospitals, and nearly 24 percent for out-of-state hospitals. In-state hospitals pertain to those affiliated with other hospitals within the state. Out-of-state hospitals were characterized as Maryland hospitals with an affiliation to a hospital in another state. Hospitals considered as standalone are not affiliated with another hospital. In-state hospital adoption of EHRs, at about 87 percent, slightly exceeds standalone hospitals nearly 83 percent adoption rate and surpasses out-of-state hospitals by nearly 54 percent. CPOE adoption was reported at about 67 percent for out-of-state hospitals, roughly 61 percent for standalone hospitals, and nearly 48 percent for in-state hospitals. About 43 percent of in-state hospitals and nearly 39 percent of standalone hospitals report exchanging some patient information electronically with service area providers; out-of-state hospitals did not report data sharing. Approximately 17 percent of standalone hospitals report e-prescribing to a community pharmacy, the other hospitals did not have this capability.

## In-State

Hospitals with in-state affiliations account for nearly 53 percent of all Maryland hospitals. Roughly 87 percent of these hospitals have adopted EHRs. Approximately 48 percent with in-state affiliation have implemented CPOE, and about the same number are assessing or implementing this technology. About 4 percent are able to e-prescribe to a community pharmacy, roughly 17 percent are assessing or implementing this technology, and approximately 78 percent remain undecided. Almost 44 percent of hospitals with in-state affiliation report sharing some data electronically with service area providers. Roughly 13 percent are assessing or implementing data sharing and about 43 percent remain undecided. BCMA has been adopted by about 17 percent of hospitals with in-state affiliation, and roughly 65 percent are assessing or implementing this capability.

Health IT Functions	Number of Hospitals (n=23)	Planning Activity – 12 Month Projection		
		Assessing	Implementing	Undecided
Computerized Physician Order Entry	11	4	7	1
Electronic Health Record	20	2	-	1
Electronic Medication Administration Record	11	1	11	-
Barcode Medication Administration	4	2	13	4
Infection Surveillance Software	13	3	3	4
e-Prescribing	1	2	2	18
Electronic Data Exchange	10	2	1	10

## Out-of-State

Hospitals that are affiliated with an out-of-state hospital account for about 7 percent of all hospitals in Maryland. Just about 33 percent of these hospitals have adopted EHRs, and approximately 67 percent report having CPOE. The majority, roughly 67 percent, remain undecided about implementing technology to support e-prescribing to a community pharmacy. Hospitals with out-of-state affiliation are

not currently exchanging patient information electronically with service area providers, and roughly 33 percent report assessing this capability. About 67 percent of these hospitals are implementing BCMA, while about 33 percent remain undecided. Approximately 67 percent of these hospitals have adopted eMAR technology.

Health IT Functions	Number of Hospitals (n=3)	Planning Activity – 12 Month Projection		
		Assessing	Implementing	Undecided
Computerized Physician Order Entry	2	1	-	-
Electronic Health Record	1	1	-	1
Electronic Medication Administration Record	2	-	-	1
Barcode Medication Administration	-	-	2	1
Infection Surveillance Software	-	1	1	1
e-Prescribing	-	1	-	2
Electronic Data Exchange	-	1	-	2

## Standalone

Hospitals without an affiliation to another hospital account for nearly 41 percent of all hospitals in Maryland. About 83 percent have adopted EHRs, approximately 61 percent of these hospitals report adopting CPOE, and around 33 percent are assessing or implementing this technology. Roughly 17 percent of hospitals without an affiliation report having the technology to e-prescribe to a community pharmacy, while nearly 39 percent report assessing or implementing this functionality, and around 44 percent that remain undecided. Almost 39 percent of standalone hospitals report exchanging some patient information electronically with service area providers, and nearly 28 percent report assessing or implementing this technology. Approximately 56 percent of these hospitals have adopted BCMA and nearly 28 percent are planning to assess or implement this technology.

Health IT Functions	Number of Hospitals (n=18)	Planning Activity – 12 Month Projection		
		Assessing	Implementing	Undecided
Computerized Physician Order Entry	11	4	2	1
Electronic Health Record	15	1	1	1
Electronic Medication Administration Record	11	4	2	1
Barcode Medication Administration	10	2	3	3
Infection Surveillance Software	6	3	4	5
e-Prescribing	3	5	2	8
Electronic Data Exchange	7	3	2	6



## Remarks

This is the first year that Maryland hospitals have provided information on health IT adoption. The *2008 Hospital Health Information Technology Survey* was developed through consultation with hospital CIOs. Results from the survey suggest that hospitals have made sizable investments in health IT and most are planning to build upon existing functions. Notable findings include the rate of adoption for CPOE, EHRs, and eMARs, all of which exceed 50 percent. Implementing data sharing between hospitals and service area providers is relatively new for most hospitals. Almost 39 percent report adopting technology to exchange some patient information electronically with providers in their service area. Generally speaking, Maryland is viewed as a leading state in health IT adoption.<sup>42</sup>

Most hospitals are responding to the demand for improvement on performance, quality, and patient satisfaction through the adoption of health IT. The unprecedented amount of funding available to hospitals under the *Health Information Technology for Economic and Clinical Health Act* (HITECH Act), a component of the *American Recovery and Reinvestment Act of 2009* (ARRA), should help to increase health IT adoption. Details regarding the distribution of the funds still require clarification from the Department of Health and Human Services.

One of HITECHs most important characteristics is the focus on improving health care quality, efficiency, and population health using health IT as an enabling tool. HITECH strengthens privacy protections by expanding the requirements under the *Health Insurance Portability and Accountability Act of 1996* (HIPAA), privacy and security provisions to vendors not previously covered by the law, requires health care organizations to notify patients when an information breach occurs, and limits the commercial use of patient information. Addressing and mitigating the risk to privacy and security is essential to encourage public acceptance of the increased use of health IT.

Hospitals statewide embrace health IT and recognize that implementing technology is an inherently complex endeavor. Achieving this transition and the potential efficiencies and quality improvements promised by widespread adoption requires consideration of business processes and privacy and security protections. These policies can encourage provider acceptance and patient trust of electronic health information.

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<sup>42</sup> Ibid.

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# Appendix A

## Geographic Distribution by County

### Urban

Baltimore City

### Suburban

Anne Arundel County

Baltimore County

Howard County

Montgomery County

Prince George's County

### Rural

Allegany County

Calvert County

Caroline County

Carroll County

Cecil County

Charles County

Dorchester County

Frederick County

Garrett County

Harford County

Kent County

Queen Anne's County

Somerset County

St. Mary's County

Talbot County

Washington County

Wicomico County

Worcester County

# Appendix B

## Survey Questions

Below is a summary of the *2008 Hospital Health Information Technology Survey*. Hospitals were asked to provide the number of units for each primary care unit category. Each question with a preceding asterisk was followed up with the question: “*How many primary hospital units use this technology?*” The Planning Questions were included in each section in the event that the hospital selected “no” to any question designated with: “*If no, go to Planning Questions.*”

### Primary Care Units (PCUs)

Critical Care  
Emergency Department  
Labor and Delivery (L&D)  
Medical / Surgical  
Mother / Baby  
Operating Room (OR)  
Outpatient (Ambulatory) Surgery  
Post Anesthesia Care Unit (PACU)  
Short-Stay (23 hour observation)  
Telemetry  
Pediatrics  
Psychiatric

### Order Entry

1. \*Does your hospital have an order entry system that allows providers to electronically enter all patient care orders for laboratory, radiology, pharmacy, nursing, respiratory, ultrasound, PT/OT, etc? *If no, go to Planning Questions.*
2. \*Does your system allow providers to electronically view the status and results of laboratory, radiology, pharmacy, nursing, respiratory, and PT/OT?
3. \*Does your system have an order set feature where a group of orders can be selected based upon problem or diagnosis?
4. What was the total of all inpatient orders (both paper and electronic) for the primary hospital units last month?
  - a. How many were submitted electronically by providers?
5. What were the total inpatient medication orders (both paper and electronic) for the primary hospital units last month?
  - a. How many were submitted electronically by providers?
6. Is decision support software for medication prescribing, such as drug-drug; drug-food; contraindication/dose limit for diagnosis, allergies, age/weight, lab/radiology results; and corollary order prompt, fully implemented and operationalized in your system?
  - a. Does the software offer links to resources for reference?
  - b. Does this software require electronic documentation for overriding an interception?

7. Is decision support software for diagnosis, chronic conditions, and standards of care, such as heart failure, diabetes, or other appropriate treatments – pneumonia vaccination, flu shot, etc., fully operationalized in your system?
  - a. Does the software offer links to resources for reference?
  - b. Does this software require electronic documentation for overriding an interception?
8. Is information from pharmacy, laboratory, and admitting-discharge-transfer integrated into the order entry process?
9. Does the system have an active “read-back order” function for verbal/phone orders?

### **Electronic Health Record (EHR)**

1. Does your hospital have an EHR? *If no, go to Planning Questions*
2. \*Does your system allow review of previous admission data?
3. \*Does your system provide patient assignment lists?

### **Medication Administration**

1. \*Does your hospital have an electronic medication administration record (eMAR)? *If no, answer Planning Questions.*
2. \*Does your hospital have a Barcode Medication Administration (BCMA) system for medication administration? *If no, answer Planning Questions.*
3. Does your hospital have a medication reconciliation system in place for admission, discharge, and changes in level of care?

### **Infection Management**

1. Does your hospital use infection surveillance software to manage your organization’s infectious diseases? *If no, answer Planning Questions.*
2. Is your hospital linked to the national infection surveillance networks: National Healthcare Safety Network? CDC-Alert system?
  - a. Does your reporting to the NHSN exceed minimum reporting requirements?

### **Health Information Exchange**

1. Does your hospital have a system to electronically prescribe discharge medications directly to community pharmacies? *If no, answer Planning Questions.*
2. Does your hospital have a system capable of electronic data exchange for consultation or transfer of care with outpatient providers, such as physicians, long term care, etc.?

### **Planning Questions**

*Planning questions were incorporated in all survey sections as appropriate.*

1. If no, is your hospital:
  - a. Assessing \_\_\_\_\_ system within 12 months?
  - b. Implementing a \_\_\_\_\_ system within 12 months?
  - c. Undecided at this time?

# Appendix C

## Survey Glossary

**Barcode Medication Administration (BCMA):**

Technology that allows for the real-time confirmation of the "five rights" - right patient, right medication, right dose, right route, and right time - for medication administration.

**Computerized Physician Order Entry (CPOE):**

Computer-based application system for ordering providers (MD, DO, NP, PA) to enter patient care orders at the point of care.

**Corollary Order:**

An order that is sequential to another order. (e.g., PTT for Heparin administration)

**Clinical Decision Support:**

Computer application to assist in clinical decisions by providing evidence-based knowledge in the context of patient-specific data.

**Electronic Health Record (EHR):**

A longitudinal collection of electronic health information that serves as a legal medical record, which includes documentation, vital signs, and assessments.

**Electronic Medication Administration Record (eMAR):**

An electronic format of the traditional paper-based medication administration record.

**Electronic Prescribing (e-prescribing):**

Electronic transmission of prescriptions directly to the dispensing pharmacy by the ordering provider.

**Health Information Exchange (HIE):**

Electronic movement of health-related information among organizations.

**Health Information Technology (HIT):**

Technology used to maintain health information into electronic format.

**Infection Surveillance Software (ISS):**

An application that monitors the events of infectious disease.

**Order Set:**

A group of evidenced-based orders for specific diagnosis or problems.

**Primary Care Unit:**

A culmination of hospital units that comprise the major patient care areas and are typical of any hospital, despite the size of the facility.



# Appendix D

<b>2008 Hospital HIT Survey Results</b>											
<b>Key IT Components</b>	<b>Aggregate</b>	<b>Hospital Size</b>				<b>Geographical Location</b>			<b>Hospital Affiliation</b>		
	<b>All Hospitals</b>	<b>Academic</b>	<b>Large</b>	<b>Medium</b>	<b>Small</b>	<b>Urban</b>	<b>Suburban</b>	<b>Rural</b>	<b>In State</b>	<b>Out of State</b>	<b>Standalone</b>
Number of Hospitals	44*	2	16	19	7	11	17	16	23	3	18
Percentage of Hospitals	100	5	36	43	16	25	39	36	52	7	41
<b>Order Entry</b>											
Yes	24	2	9	12	1	7	10	7	11	2	11
<i>Planning Projections</i>											
Assessing	9	-	3	4	2	3	3	3	4	1	4
Implementing	9	-	3	2	4	1	4	4	7	-	2
Undecided	2	-	1	1	-	-	-	2	1	-	1
<b>Clinical Decision Support</b>											
<i>Medications</i>											
Yes	17	2	7	7	1	6	7	4	9	1	7
No	7	-	2	5	-	1	3	3	2	1	4
<i>Diagnosis</i>											
Yes	10	1	6	3	-	5	3	2	4	2	4
No	14	1	3	9	1	2	7	5	7	-	7
<b>Electronic Health Record System (EHR-S)</b>											
Yes	34	2	14	15	5	8	13	15	20	1	15
<i>Planning Projections</i>											
Assessing	4	-	1	2	1	1	2	1	2	1	1
Implementing	1	-	-	1	-	-	1	-	-	-	1
Undecided	5	-	1	1	1	2	1	-	1	1	1
<b>Electronic Medication Administration Record (eMAR)</b>											
Yes	24	2	11	10	1	7	10	7	11	2	11
<i>Planning Projections</i>											
Assessing	5	-	1	2	2	-	3	2	1	-	4
Implementing	13	-	4	6	3	3	3	7	11	-	2
Undecided	2	-	-	1	1	1	1	-	-	1	1
<b>Barcode Medication Administration (BCMA)</b>											
Yes	14	-	6	8	-	2	6	6	4	-	10
<i>Planning Projections</i>											
Assessing	4	1	-	-	3	1	-	3	2	-	2
Implementing	18	-	8	8	2	5	6	7	13	2	3
Undecided	8	1	2	3	2	3	5	-	4	1	3
<b>Infection Surveillance Software</b>											
Yes	19	1	5	10	3	6	6	7	13	-	6
<i>Planning Projections</i>											
Assessing	7	-	2	3	2	1	2	4	3	1	3
Implementing	8	-	5	3	-	2	4	2	3	1	4
Undecided	10	1	4	3	2	2	5	3	4	1	5
<b>Electronic Prescribing (e-prescribing)</b>											
Yes	4	1	1	2	-	2	-	2	1	-	3
<i>Planning Projections</i>											
Assessing	8	-	2	4	2	1	4	3	2	1	5
Implementing	4	-	2	1	1	-	1	3	2	-	2
Undecided	28	1	11	12	4	8	12	8	18	2	8
<b>Electronic Data Exchange with Providers (HIE)</b>											
Yes	17	2	6	7	2	6	3	8	10	-	7
<i>Planning Projections</i>											
Assessing	6	-	2	3	1	1	3	2	2	1	3
Implementing	3	-	2	-	1	-	1	2	1	-	2
Undecided	18	-	6	9	3	4	10	4	10	2	6

\*Maryland has 47 acute care hospitals; three hospitals that are part of a health system combined their responses with the affiliated hospital.

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