



U.S. Department of Health and Human Services
Assistant Secretary for Planning and Evaluation
Office of Disability, Aging and Long-Term Care Policy



LITERATURE REVIEW AND SYNTHESIS:

EXISTING SURVEYS ON HEALTH INFORMATION TECHNOLOGY, INCLUDING SURVEYS ON HEALTH INFORMATION TECHNOLOGY IN NURSING HOMES AND HOME HEALTH

February 2009

Office of the Assistant Secretary for Planning and Evaluation

The Office of the Assistant Secretary for Planning and Evaluation (ASPE) is the principal advisor to the Secretary of the Department of Health and Human Services (HHS) on policy development issues, and is responsible for major activities in the areas of legislative and budget development, strategic planning, policy research and evaluation, and economic analysis.

ASPE develops or reviews issues from the viewpoint of the Secretary, providing a perspective that is broader in scope than the specific focus of the various operating agencies. ASPE also works closely with the HHS operating divisions. It assists these agencies in developing policies, and planning policy research, evaluation and data collection within broad HHS and administration initiatives. ASPE often serves a coordinating role for crosscutting policy and administrative activities.

ASPE plans and conducts evaluations and research--both in-house and through support of projects by external researchers--of current and proposed programs and topics of particular interest to the Secretary, the Administration and the Congress.

Office of Disability, Aging and Long-Term Care Policy

The Office of Disability, Aging and Long-Term Care Policy (DALTCP), within ASPE, is responsible for the development, coordination, analysis, research and evaluation of HHS policies and programs which support the independence, health and long-term care of persons with disabilities--children, working aging adults, and older persons. DALTCP is also responsible for policy coordination and research to promote the economic and social well-being of the elderly.

In particular, DALTCP addresses policies concerning: nursing home and community-based services, informal caregiving, the integration of acute and long-term care, Medicare post-acute services and home care, managed care for people with disabilities, long-term rehabilitation services, children's disability, and linkages between employment and health policies. These activities are carried out through policy planning, policy and program analysis, regulatory reviews, formulation of legislative proposals, policy research, evaluation and data planning.

This report was prepared under contract #HHS-100-03-0028 between HHS's ASPE/DALTCP and the University of Colorado. For additional information about this subject, you can visit the DALTCP home page at http://aspe.hhs.gov/_/office_specific/daltcp.cfm or contact the ASPE Project Officer, Jennie Harvell, at HHS/ASPE/DALTCP, Room 424E, H.H. Humphrey Building, 200 Independence Avenue, S.W., Washington, D.C. 20201. Her e-mail address is: Jennie.Harvell@hhs.gov.

**LITERATURE REVIEW AND SYNTHESIS:
Existing Surveys on Health Information
Technology, Including Surveys on Health
Information Technology in
Nursing Homes and Home Health**

Angela Richard, MS, RN
Meg Kaehny, MSPH
Karis May
Andrew Kramer, MD

University of Colorado, Denver
Division of Health Care Policy and Research

February 2009

Prepared for
Office of Disability, Aging and Long-Term Care Policy
Office of the Assistant Secretary for Planning and Evaluation
U.S. Department of Health and Human Services
Contract #HHS-100-03-0028

The opinions and views expressed in this report are those of the authors. They do not necessarily reflect the views of the Department of Health and Human Services, the contractor or any other funding organization.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	iii
I. INTRODUCTION.....	1
II. SURVEYS ASSESSING HIT USE IN NURSING HOMES AND OTHER LONG-TERM CARE SETTINGS	4
A. Overview	4
B. Summaries of Existing Nursing Home and Long-Term Care Surveys.....	4
C. Comparison of Selected Findings on HIT Use in Nursing Homes/Long- Term Care and Discussion of Measurement Issues.....	17
III. REVIEW OF SELECTED SURVEYS ON HIT ADOPTION IN OTHER SETTINGS	26
A. Overview of Surveys Assessing HIT Use in Home Health and Hospice Agencies	26
B. Summaries of Existing Home Health and Hospice Surveys	26
C. Overview of Surveys Assessing HIT Use in Hospitals and Physician Practices	29
D. Summaries of Existing Hospital and Physician Practices Surveys.....	30
E. Comparison of Survey Findings on HIT Use in Hospitals and Physician Practices	44
IV. REVIEW OF SURVEYS AND INFORMATION ON BARRIERS TO HIT ADOPTION	54
V. RECOMMENDATIONS FOR SURVEY DEVELOPMENT	59
REFERENCES AND RELEVANT LITERATURE	64
ACRONYMS	71
APPENDIX A. HIT ADOPTION QUESTIONS FROM SELECTED OTHER SURVEYS	
2007 National Ambulatory Medical Care Survey	A-1
ONC Physician HIT Survey	A-2
2004 National Nursing Home Survey	A-5
2000 National Home and Hospice Care Survey	A-6
2007 National Home and Hospice Care Survey	A-7
National Survey of Residential Care Facilities.....	A-9
Minnesota Nursing Home Health Information Technology	A-10

LIST OF FIGURES AND TABLES

FIGURE 1: Sample Question on Barriers to Adoption and Use	63
FIGURE 2: Illustration of Core Question on Level of Automation of Medication Administration Record and Associated Drill-Down Questions	63
<hr/>	
TABLE 1: Use of HIT in Nursing Homes/Long-Term Care: Summary of Survey Findings.....	20
TABLE 2: Comparison of Survey Findings for EMR/EHR Use in Nursing Homes/ Long-Term Care Settings	24
TABLE 3: Comparison of Survey Findings for Computerized or Electronic Physician Order Entry Systems in Nursing Homes/Long-Term Care Settings	24
TABLE 4: Comparison of Survey Findings for Electronic Medication Administration Records Systems in Nursing Homes/Long-Term Care Settings	25
TABLE 5: Use of HIT in Home Health and Hospice Agencies: Summary of Survey Findings.....	45
TABLE 6: Use of HIT in Hospitals and Physician Practices: Summary of Survey Findings.....	46
TABLE 7: Comparison of Survey Findings for EMR/EHR Use.....	53
TABLE 8: Survey Findings on Barriers to HIT Adoption	56

EXECUTIVE SUMMARY

In an effort to better understand the current use and adoption rates of electronic health records and other health information technology (HIT) applications within nursing homes, the Division of Health Care Policy and Research at the University of Colorado Denver has been contracted by the Office of the Assistant Secretary for Planning and Evaluation in the U.S. Department of Health and Human Services (HHS) to develop survey instruments for use in long-term care provider settings. Although numerous survey instruments have been fielded to assess HIT use in nursing homes and long-term care settings, the lack of consistent definitions, terminology, item construction, sampling frames, and measurement criteria render it difficult to accurately gauge current HIT adoption. In this report, we review existing surveys for long-term care and other provider settings pertaining to current HIT use and adoption, barriers to adoption, and recommend issues to consider when developing survey questions to ascertain HIT adoption, use, and barriers to adoption and use in nursing homes.

Section I of the deliverable discusses current trends and policy initiatives in HIT for long-term care. Section II summarizes several existing surveys on HIT use and adoption in long-term care settings, compares key findings of the surveys, and discusses measurement issues affecting survey results. Surveys used to assess HIT use and adoption in home health and hospice organizations, ambulatory or physician practices, and hospitals are discussed in Section III to determine if survey items and techniques from other settings could be used in long-term care. The descriptions of survey characteristics and findings were drawn from published papers or web-accessible information. The comparison of survey findings presented in Section II and Section III highlights the assertion that lack of consistency with regard to data items and measurement methods hinders efforts to draw meaningful conclusions from published survey results.

Despite national support for widespread adoption of HIT across health care settings and growing recognition of its value in improving health care safety, quality, and efficiency, HIT adoption continues at a relatively slow pace. Recent efforts have been made to identify barriers contributing to the limited progress in HIT adoption and supply information to help guide the development of policies and incentives to promote more rapid HIT proliferation. In addition to the review of surveys on HIT adoption, we reviewed the literature on barriers to HIT adoption across provider settings. A brief synthesis of existing surveys and literature on barriers is found in Section IV.

Section V provides recommendations for future survey development for long-term care. To reliably ascertain HIT adoption, use, and barriers in nursing homes, two sets of survey questions are recommended: (1) a shorter, core set of questions for possible use in the National Nursing Home Survey sponsored by the National Center for Health Statistics; and (2) an expanded set of questions, which would be made available to industry stakeholder groups for survey administration. The creation of two sets of survey questions will provide both breadth and depth in the collection of information on

the adoption of HIT applications in nursing homes. The core set of questions would provide an overview of HIT adoption that could be generalized to the industry as a whole. The expanded, longer set of questions keyed off of the core set of questions would provide in-depth, detailed data on the extent to which specific workflow and health information exchange processes are being adopted. Both sets of questions will provide valuable information to policy makers to assess movement toward the goal of promoting HIT adoption and make informed decisions about the policy actions that are needed to accelerate adoption. Our recommendations on the content and format for the survey questions will guide the remainder of this project.

I. INTRODUCTION

Health information technology (HIT) in the United States is a broad term encompassing technology used for various administrative, operations management, and direct clinical functions in health care organizations. An electronic health record (EHR) is defined by the Health Information Management Systems Society (HIMSS) as a “longitudinal electronic record of patient health information generated by one or more encounters in any health care setting...including patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data, and radiology reports” (HIMSS, 2007a). The Institute of Medicine (IoM) specifies that an EHR includes: (1) longitudinal collection of electronic health data for and about persons; (2) immediate access to health data pertaining to an individual by authorized users; (3) provision of knowledge and decision-support to enhance quality, safety, and efficiency of patient care; and (4) support of efficient processes for health care delivery. (IoM Committee on Data Standards for Patient Safety, 2003)

EHRs have the potential to improve quality, patient safety (particularly related to medication errors), and patient satisfaction and to decrease costs and inefficiencies by making current patient information and clinical decision making tools available to clinicians in a format which is easily readable (Booz Allen Hamilton, 2006; Shekelle, Morton, & Keeler, 2006; Bates & Gawande, 2003; Kaushal, Shojania, & Bates, 2003; Bates, 2002). By minimizing the number of times that patient care information is re-entered into a health record, potential transcription errors and redundant procedures can be avoided (Coleman et al., 2007). Because of the potential improvements in clinical care and efficiency, the implementation of interoperable HIT became a national priority and President Bush established a goal that most Americans have an EHR by 2014. The Secretary of the Department of Health and Human Services (HHS) has made the promotion of interoperable HIT a priority and envisions Medicare will lead HIT implementation, and that Medicare and Medicaid will be transformed by HIT implementation.

The IoM has recommended that “the U.S. health care system make a commitment to the development of a health information infrastructure by the year 2010” (IoM, 2003). The IoM identified the EHR functions and timeframes over which these functions could be introduced for particular health care settings. One of the settings for which the IoM described the needed EHR-System (EHR-S) functions was nursing homes. In late 2006, the Certification Commission for Healthcare Information Technology (CCHIT) was petitioned by long-term care stakeholder groups to include nursing homes in the development of accreditation criteria for EHR products.

Current work in this area has resulted in a profile of EHR-S functions for long-term care-nursing homes (the LTC-NH EHR-S Functional Profile), developed by a workgroup of long-term care industry stakeholders, including representatives from the American Association of Homes and Services for the Aging (AAHSA), the American Health Care Association (AHCA), and the National Association for the Support of Long Term Care,

along with representatives from organizations involved in standards development for other providers, including the American Health Information Management Association (AHIMA), Health Level 7 (HL7), and the National Council on Prescription Drug Programs. The LTC-NH EHR-S Functional Profile has been submitted to CCHIT and HL7. HL7 will ballot the Profile in December 2008, and it is expected to become the industry standard in January 2009. CCHIT will consider the LTC-NH EHR-S Function Profile in the specification of nursing home EHR certification criteria. It is anticipated that CCHIT will begin certifying LTC-NH EHR products in 2009-2010 (AHIMA, 2007a, 2007b).

The LTC HIT Summit, held first in 2005 and again in 2007, is a collaborative effort by long-term care and aging services stakeholders to assess current progress in the area of HIT adoption by long-term care providers and to identify future priorities. Stakeholders include the groups named above, as well as governmental and consumer representatives, and IT product vendors. The result of the 2005 LTC HIT Summit was a road map for promoting the use of HIT in delivery of services to the elderly. The themes of the roadmap include certification, standards, quality, and areas for research. The 2007-2009 LTC HIT Road Map produced by the 2007 Summit includes recommendations to: (a) strengthen the cross-organizational collaborative of long-term care stakeholders; (b) increase the consumer-focused approach to quality initiatives and HIT applications; (c) advocate for tools to support providers in HIT adoption; (d) prioritize electronic prescribing (e-prescribing) of medications and medication management initiatives to improve patient safety; (e) certify EHR and e-prescribing products; (f) demonstrate interoperability of HIT through emerging standards; and (g) encourage further research investigating relationships between HIT, quality, and outcomes across the full spectrum of aging services and care (AHIMA, 2007a).

Despite the potential of HIT and EHRs to improve quality and efficiency, and current initiatives to improve quality of products through certification and interoperability through standards development, current estimated rates of adoption vary across provider settings and some estimates suggest that adoption rates are relatively low in nursing facilities, particularly in terms of use of non-administrative HIT applications. Slow HIT/EHR adoption rates have been attributed to several factors, including the costs of acquiring, implementing, and maintaining HIT/EHR applications; uncertainty about the benefits that may be realized as a result of EHR implementation and to whom these benefits will accrue; delay in adoption of standards for HIT functionality and interoperability; and a history of instability in the vendor market (Booz Allen Hamilton, 2006; Poon et al., 2006; Middleton, Hammond, Brennan, & Cooper, 2005).

A number of survey instruments have been developed to assess HIT/EHR adoption in various provider settings. In addition, several nursing home-specific surveys have incorporated questions about the adoption of HIT/EHR, including the National Nursing Home Survey (NNHS) sponsored by the National Center for Health Statistics (NCHS). However, to date most surveys have used varying definitions of HIT/EHR, if the terms are defined at all, making national adoption rates difficult to estimate (Robert Wood Johnson Foundation (RWJF), 2006). In addition, some current surveys designed

to assess nursing home HIT/EHR adoption (e.g., a California HealthCare Foundation study on long-term care provider readiness, a Minnesota Department of Health/Stratis Health survey on use and intended use of EHRs for health care providers in Minnesota), are state-specific and may not be generalizable to the national nursing home community. Without reliable and valid data on HIT adoption rates by provider type and the factors that contribute to slow adoption, policy makers will not have an accurate baseline that can be used to assess movement toward the goal of promoting EHR adoption and are less able to make informed decisions about the policy actions that are needed to accelerate adoption.

The Office of the Assistant Secretary for Planning and Evaluation (ASPE) in HHS has funded the University of Colorado Denver to develop a survey instrument that contains a: (i) comprehensive; and (ii) more narrow set of questions that could be used to measure the adoption and use, and barriers to adoption and use of HIT, including EHRs, by nursing home providers. In this report, we review existing surveys for long-term care and other provider settings, and recommend issues to consider and next steps for the development of: (a) a core set of questions that could be included in the NNHS; and (b) an expanded set of questions to ascertain adoption, use, and barriers to adoption and use of HIT/EHR in nursing homes. HIT-related questions from several key federal and other surveys discussed in this report are presented in Appendix A.

II. SURVEYS ASSESSING HIT USE IN NURSING HOMES AND OTHER LONG-TERM CARE SETTINGS

A. Overview

Several surveys assessing HIT use in nursing homes and other long-term care settings have been conducted over the past several years. However, significant variability in breadth and depth of survey content, data item construction, terminology, and definitions (when definitions are provided at all), as well as issues of sample size and representativeness, make it difficult to rely on the accuracy of estimates produced by the surveys. These issues also limit the ability to compare findings on the use of various electronic clinical applications across surveys. Additionally, many of the existing surveys included respondents from a single state (California, New York, Minnesota), limiting the generalizability of findings to the national picture. Not surprisingly, the estimates resulting from the existing surveys vary widely, underscoring the likelihood of reliability and validity issues affecting some findings and making it difficult to discern which estimates are most representative. Findings from seven surveys addressing HIT adoption and use in nursing homes and other long-term care settings are presented in Table 1. Section II.B provides further description of survey content, measurement approach, and related information for each survey included in Table 1 and three additional surveys that have not been fielded extensively to date (and therefore do not have findings to compare).

B. Summaries of Existing Nursing Home and Long-Term Care Surveys

National Nursing Home Survey

The NNHS is a survey of a nationally representative sample of nursing homes in the United States (NCHS, 2004; NCHS, 2007c, <http://www.cdc.gov/nchs/nnhs.htm>). Conducted by NCHS at the Centers for Disease Control and Prevention (CDC), the NNHS was first implemented in 1973 and repeated six times, most recently in 2004. To participate in the NNHS, nursing homes must have at least three beds and be certified by Medicare or Medicaid or have a state license to operate as a nursing home. Responses to the NNHS are obtained through interviews with facility administrators and designated staff, using a computer-assisted personal interviewing system. In 2004, 1,174 nursing homes responded to the NNHS survey, which had been re-designed and expanded to collect many new data items. One of the new items obtains information on use of “Electronic Information Systems” (EIS), as follows:

Does {FACILITY} currently use electronic information systems for any of the tasks on this card? Select all that apply.

Admission, Discharge, Transfer Information
Physician Orders
Medication Orders, Drug Dispensing
Laboratory/Procedures Information
Patient Medical Records
Medication Administration Information
Minimum Data Set (MDS)¹
Dietary
Daily Personal Care by Nursing Assistants
Billing/Finance
Staffing/Scheduling Information
Human Resource/Personnel Information
No Electronic Information System

In a separate Help Screen for this item, "Patient Medical Records" is defined to include nurse's notes, physician notes, and MDS forms. The NNHS survey also collects information on nursing home characteristics including size, location, chain affiliation, ownership, Medicare/Medicaid certification, services provided and specialty programs offered, and charges.

Nursing home respondents participating in the 2004 NNHS reported using EIS as follows:

- 95% use EIS for billing/finance;
- 48% use EIS for physician orders;
- 51% use EIS for medication orders and drug dispensing;
- 38% use EIS for medication administration information; and
- 42% use EIS for patient medical records.

Lack of clarity in the EIS item stem and list of tasks may affect the reliability and validity of survey findings for this item. "EIS" is not defined, resulting in possible variability in interpretation by respondents. In addition, response options (or, the list of tasks) include overlapping concepts; for example, the distinction between "drug dispensing" and "medication administration information" is not clear, although the two applications are included in separately listed tasks. Also, "patient medical records" is defined to include MDS forms yet MDS is a separate task or response option. With regard to facility characteristics, it would be useful to distinguish between regional chain affiliation and national chain affiliation. NCHS staff agree that the EIS question requires clarification, including a focus on adoption and use of clearly defined EHR functions.

¹ The MDS is a federally-mandated process for assessing the functional capabilities of all residents in Medicare and Medicaid certified long-term care facilities. Long-term care facilities are required to complete and electronically transmit MDS data to the designated state agency for all residents as a condition of participation in the Medicare and Medicaid programs.

AHCA/NCAL Study on HIT Use in LTC

A 2006 paper by AHCA and the National Center for Assisted Living (NCAL) entitled, "A Snap-Shot of the Use of Health Information Technology in Long Term Care" reports on findings from a web-based survey developed and fielded in 2006 (AHCA and NCAL, 2006, http://www.ahcancal.org/facility_operations/hit/Documents/HITWhitePaper.pdf). The survey describes six "personas" of HIT usage and asks respondents to identify the persona that best describes their current level of HIT usage and what they think usage might be in three years. The personas are summarized as follows: A - We do most of our work on paper; B - We are starting to do more of our work on a computer; C - We do most of our work on computer; D - We are paperless -- we do all of our work on a computer; E - We are paperless and communicate electronically with some of our health care partners; and F - We are paperless and we communicate electronically with all of our health care partners through a national or regional health information network. Explicit examples for each persona are provided for further clarification, as illustrated by the full descriptions for personas A and D:

Persona A: We do most of our work on paper, meaning...

- We have a few desktop computers that we use for census, billing, and (as appropriate) MDS and/or service plans.
- But we communicate with our physicians, hospitals, pharmacy, lab, and insurance companies via telephone, paper, and fax.

Persona D: We are paperless -- we do all of our work on a computer, meaning...

- We have desktop computers and/or portable computers for traditional activities: census, progress notes, billing, and (as appropriate) MDS and service plans.
- We use our computers at the point of care to document our work with residents, plus we are also electronically charting and recording medication delivery with an electronic medication administration record (e-MAR).
- But we communicate with our physicians, hospitals, pharmacy, lab, and insurance companies via telephone, paper, and fax.

Interestingly, even Persona A, representing the lowest level of HIT use, includes use of computers for census, billing, MDS, and/or service plans.

A total of 1,082 surveys were completed, including 916 nursing facilities and 166 assisted living residences. A single national multi-facility company (Golden Gate National Senior Care) owned and operated 345 responding nursing facilities and 18 responding assisted living residences, representing one-third of all responses. Golden

Gate assigned all of their facilities/residences to Persona C, described as "We do most of our work on computer".

Findings from the 916 nursing facility respondents from 40 states include:

- 4% (34 facilities) reported being paperless, characterizing themselves at the three Personas with the highest level of HIT use (Personas D, E, F), with four of those facilities (less than 1% of the sample) indicating that they communicate electronically with all health care partners through a national or regional information network;
- 50% (including Golden Gate National Senior Care) indicated that they do most of their work using computers (Persona C); and
- 46% indicated that they do most of their work on paper or are just starting to do more work on a computer -- the two Personas (A and B) with the lowest level of HIT use.

Additional study findings include:

- National multi-facility provider organizations (i.e., those with 50 or more facilities in multiple states) are leading in HIT use, will continue to lead the HIT transition and, in three years, are expected to be "highly sophisticated in their use of HIT";
- independent providers (comprised of ten facilities or less) and regional multi-facility companies (with 11-50 individual facilities in one or more states) may be further behind in transitioning to HIT;
- most nursing homes report using information technology for various administrative activities (e.g., census, billing, MDS production), although the vast majority still handle health information exchange (e.g., with physicians, hospitals, etc.) via telephone, paper, and fax;
- the lack of available capital will make it harder for smaller provider organizations to acquire and maintain HIT than large national providers;
- concern exists regarding software integration and finding a single, interoperable package that matches facility needs; and
- most nursing homes reported that their use of computers would increase over the next three years.

Although the use of Personas provides a sense of the comparative degree of HIT usage among responding providers, it is difficult to winnow out precise estimates on the use of particular HIT functionalities and applications using this measurement approach. The explicit descriptions supplied in the Personas are useful, however, in guiding respondents as they characterize their organization's implementation status.

Maestro Strategies: AHCA Multi-Facility Organization Survey

Maestro Strategies' 2007 report entitled, "Information Technology in Long Term Care -- State of the Industry: Multi-Facility Research Report" describes the results from

a web-based survey of 36 AHCA multi-facility members (19% response rate) addressing the current state of information technology use in long-term care, conducted on behalf of AHCA and NCAL. The respondents represented primarily for-profit organizations that owned skilled nursing facilities (SNF), rehabilitation, assisted living, short stay respite care and other program and facility types. Nearly half of the survey respondents were organization Chief Executive Officers (CEOs) (41%), with most other respondents identified as Information Technology Directors, Chief Information Officers (CIOs), and Chief Operating Officers (Maestro Strategies, 2007, http://www.ahcancal.org/facility_operations/hit/Documents/InformationTechnologyinLongTermCare.pdf).

The report provides information on the HIT applications that responding facilities have installed and own, the applications they are planning to buy, and the applications they are not planning to buy. With regard to clinical applications, the authors report that MDS, care and service plans, and assessments are the most frequently implemented applications (about 90%, 75%, and 70%, respectively). EHR/Electronic Medical Record (EMR), e-prescribing, and e-medication/e-therapy e-MAR/electronic treatment administration records (e-TAR) are the top planned purchases. Approximate estimates for selected applications are shown below:

- 18% of respondents had installed an "EHR/EMR";
- 50% had installed automated "Medical Records";
- 50% had automated outcome measurement, quality management, and case management applications;
- 40% had automated physician order entry/order processing; and
- 20% had installed e-MAR/e-TAR systems.

The distinction between "EHR/EMR" and "Medical Records" is unclear (data items are not included in the report), and the survey estimates for current use of these two applications vary considerably.

The report also presents survey findings on the use of electronic applications for financial planning; resident services (e.g., resident billing, care and service plans, resident admissions and census management); and facilities (e.g., preventive maintenance management, construction projects). The survey also addressed currently used software vendors; use of "emerging technologies" (e.g., wireless computing, web-based services and forms, personal digital assistants (PDAs)); perceived EMR readiness; challenges with information technology; percentage of operating budget and percentage of capital budget spent on information technology; and planned changes in information technology spending. Finally, the survey included items on information technology operations and management approaches; the level of integration of financial, clinical, therapy, pharmacy, and supply applications; number of computers or workstations per facility; and extent of connectivity within organizations and with outside facilities.

While the survey assesses many areas of interest, the small sample size limits the generalizability of findings and the lack of clear definitions for certain clinical applications may affect the validity and reliability of estimates.

Kaushal et al.: Expert Panel Estimates

Kaushal et al. relied on expert opinion to generate estimates of current and future HIT adoption rates for several health care provider types, including SNFs (Kaushal et al., 2005a, 2005b; Poon et al., 2006). The expert panel estimated EHR use as part of an effort to develop a model national health information network that could be attained in five years considering current financial, personnel, and technical constraints. Using information from stakeholder interviews conducted with 52 representatives of a variety of health care settings in Denver and Boston -- including five from SNF/rehabilitation hospitals -- and their own estimates, the expert panel estimated that approximately 80% of SNFs now have an electronic billing/claims system and in five years almost 100% will have them. In addition, the panel estimated current use of EHRs in approximately 1% of SNFs and predicted an increase to 14% in five years. For home health agencies (HHAs), 5% were estimated to have EHRs now, with an increase to 21% in five years.

The authors of this study did not define (for purposes of the study) what was meant by the concept of EHRs. In addition, the SNF EHR estimates were constructed based on expert opinion guided by data from a small sample of stakeholder interviews that included only five SNF/rehabilitation hospital representatives, and are considerably lower than findings resulting from data collected in other surveys.

California HealthCare Foundation

As reported in "Health Information Technology: Are Long-Term Care Providers Ready?" the California HealthCare Foundation supported a survey, focus groups, and interviews to examine HIT readiness in California's SNFs, residential care facilities for the elderly (RCFEs), and community-based service providers. The survey was conducted in 2006 in collaboration with the California Association of Health Facilities and Aging Services of California and was distributed electronically to a non-random sample of members who were decision makers for HIT (administrators, clinical leaders, and information technology personnel) from a SNF or assisted living facility with more than 75 beds and considering HIT purchase (Hudak and Sharkey, 2007, <http://www.chcf.org/document/chronicdisease/HITNursingHomeReadiness.pdf>).

The survey yielded responses from 80 SNFs (47% response rate), including 39 that were part of multi-facility organizations, 34 freestanding facilities, and seven hospital-based facilities, with 71% of all respondents characterizing their organizations as for-profit. In addition, 18 assisted living facilities or RCFEs with more than 75 beds responded, all non-profit (24% response rate). Five continuing care retirement communities (CCRCs) also responded.

The authors highlight the following survey findings:

- 97% of nursing homes use business or administrative functions to meet state or federal payment and certification requirements;
- 20% of all respondents reported using clinical HIT applications (e.g., assessments, progress notes, medication and treatment administration, care planning; e-prescribing; and decision-support tools);
- 21% of nursing homes reported using clinical charting applications; and
- 18% of nursing homes reported using medication administration applications.

The report also describes survey findings on “HIT Implementation Progress”, noting that 72% of the seven responding hospital-affiliated SNFs indicated some level of HIT implementation (fully, partially, or in progress) compared to 14% that reported that their HIT system was being developed, 14% indicating they were in the planning stage with a timeline established, and none indicating they had not started. Forty-six percent of the 39 multi-facility SNFs reported some level of implementation, 5% were in the system selection stage, 14% were in the planning stage with a timeline established, 35% were gathering information, and none indicated they had not started. Among the 34 freestanding SNFs, 25% reported some level of implementation, 11% indicated a system was being developed, 7% were in the system selection stage, 7% were in the planning stage with a timeline established, 32% were gathering information, and 18% had not started.

The report authors conclude that: (a) long-term care facilities in California use HIT primarily to meet state or federal requirements; (b) clinical HIT applications are only minimally used; (c) HIT systems are not integrated and often require greater staff time than paper-based processes; and (d) HIT systems are underused, often because they are too complex for staff or cannot easily be customized to meet unique provider needs.

The authors suggest that HIT readiness is relatively low in the long-term care community due to lack of knowledge or background with regard to vendor selection and/or HIT implementation, including fear of the technology; lack of strategic planning and goals; the underestimation of necessary long-term management changes; and the undervaluation of the benefits of HIT in long-term quality improvement.

Generalizability of the survey findings is limited by the non-random selection of survey respondents in a single state who met the requirement of being with a facility considering HIT purchase or gathering information.

Continuing Care Leadership Coalition Study

The Continuing Care Leadership Coalition (CCLC), a coalition of approximately 100 non-profit and public long-term care providers in the metropolitan New York area, conducted a survey in 2006 to gather baseline information regarding their members' adoption of HIT (CCLC, 2006, <http://www.cclcny.org/documents/2006HITsurvey.pdf>).

Thirty-four organizations responded to the survey, for a 55% response rate. Twelve responding organizations were freestanding nursing facilities and 22 were multi-service long-term care organizations. The multi-service organizations (MSOs) included at least two of the following: nursing facilities, certified home health care agencies, long-term home health care programs, licensed home health care programs, medical model adult day health care programs, managed long-term care programs, senior housing, and other community-based services (e.g., diagnostic and treatment centers, hospices, social model adult day health care programs). The 34 survey respondents represented 70 separate entities, specifically 38 nursing facilities and 32 home and community-based service (HCBS) programs. No information was provided regarding the type of staff responding to the survey.

The survey included items on organizational investment in HIT, including the number of staff dedicated to HIT responsibilities, the level of outsourcing of HIT functions, percentage of overall budget allocated to information technology, annual information technology budget for particular categories, and expected capital information technology budget for 2007, as well as a question on whether the organization has developed its own proprietary software to solve problems and in what categories (e.g., comprehensive financial and clinical systems).

The survey also addressed HIT priorities, including the top three information technology priorities for the next two years. Nearly 70% of respondents indicated that implementing an EMR system was their top HIT priority, followed by replacing or upgrading clinical systems (58.8% of respondents), reducing medical errors/promoting patient safety (50%), developing a clinical data exchange with outside entities (47.1%), upgrading network infrastructure (32.4%), establishing wireless capabilities (23.5%), developing security initiatives (20.6%), and creating data repositories (14.7%).

Barriers to HIT adoption and the organization's greatest technical challenges with regard to information technology networks and infrastructure also were assessed. Cost was identified as the top barrier to HIT adoption, with approximately 90% of respondents indicating initial cost of information technology investment as a significant barrier (48.5%) or somewhat of a barrier (42.4%). Additional findings on barriers to adopting HIT are presented in Table 8 in Section IV of this report. Section IV also presents discussion comparing findings on barriers across multiple surveys.

Financial considerations were identified by 62% of respondents as one of the greatest challenges with regard to information technology networks and infrastructure, followed by integration of services, data center redundancy, network security, authentication/single sign-on, and "other."

Survey respondents indicated the operational status for electronic billing and specified clinical information systems, with the following response options: Fully operational, Partially operational, Plan to implement within two years, No plans to implement. Respondents indicated the vendor, specific application, years used, and satisfaction with the system they are using.

The report presented the following findings on billing and clinical information systems, based on responses from 38 nursing facilities (both freestanding and part of MSOs):

- 87% indicated that they had a fully operational electronic billing system;
- 8% had a fully operational CPOE system, 8% had a partially operational CPOE system, 21% indicated plans to implement CPOE within two years, and 26% had no plans to implement;
- 66% cited a fully operational Admission, Discharge, Transfer (ADT) System, none had a partially operational ADT system, 21% planned to implement within two years, and 3% had no plans to implement; and
- 8% reported a fully operational e-prescribing system, with 5% partially operational, 29% planning to implement within two years, and 42% with no plans to implement.

Additional findings on use of electronic systems (without indication of degree of implementation) included e-documentation (24%), care planning (42%), assessments (45%), physician support (11%), workflow (16%), medication administration (21%), and MDS/Outcome and Assessment Information Set (OASIS) (71%).

Of the 32 responding HCBS programs, 75% reported a fully operational billing system. Thirteen percent indicated they had a fully operational CPOE, and 9% were partially operational. Seventy-five percent of HCBS programs reported a fully operational ADT System and 6% reported a partially operational system. Three percent (one program) reported a fully operational e-prescribing system, 3% had a partially operational e-prescribing system, 9% (three programs) planned to implement within two years, and 41% had no plans to implement. (Forty-four percent of HCBS programs did not provide information on CPOE or e-prescribing.)

An item assessing EMR implementation reads: "Please indicate below the status of EMR implementation in your organization. (*For this purpose, the EMR is defined as electronically originated and maintained clinical health information, derived from multiple sources, that replaces the paper record as the primary source of patient information.*)" Response options were: Fully operational, Partially operational, Developing plans to implement, No current plans to implement. The following findings on the status of EMR implementation are reported for the 12 nursing facilities and 22 MSOs, without separating out the nursing facilities and HCBS programs within the MSOs:

- Two (about 6%) of the 34 organizations reported a fully operational EMR system;
- 23.5% reported a partially operational EMR;
- 41.2% were developing plans to implement; and
- approximately 30% indicated they had no current plans to implement an EMR.

MSOs appeared to be somewhat more progressive in implementing EMRs as compared to freestanding nursing facilities, as none of the 12 freestanding nursing facilities indicated they had a fully operational EMR, one indicated a partially operational EMR, four were developing plans to implement, and seven had no current plans to implement.

Fifteen percent of respondents (both nursing facilities and MSOs) indicated involvement in a regional health information organization (RHIO); and almost 40% noted participation in collaborative information technology projects with other health care providers or entities, such as clinical data exchanges with hospitals or physician groups.

The survey also asked how the organization receives hospital discharge data (Fax, Telephone, or Electronically) and how the organization provides clinical information to hospitals or other health care entities (Fax, Send chart with patient, Electronically, or Telephone).

Survey results are limited to New York State, with the survey respondents noted to capture 14% of all nursing home beds in the state, and approximately 30% of all home health care patients.

Stratis Health

Stratis Health conducted a survey of Minnesota nursing homes under contract with the Minnesota Department of Health with the goal of obtaining information to help “understand the use or intended use of EHRs for health care providers in Minnesota”. As reported in “Minnesota Nursing Home Health Information Technology Survey: Survey Results” (Stratis Health, 2008), 297 nursing homes responded to the survey, for a 78.2% response rate.

Participating nursing homes indicated whether they were part of a national or regional chain; freestanding or hospital-based; and for-profit or non-profit. The survey obtained information on the current use of “software/technology” for the following HIT systems and the survey results (if available) are indicated in parentheses.

- Entry and submission of the MDS;
- Census management system (83.2%);
- Resident assessment and care planning (84.5%);
- Documentation of clinical notes (41.4%);
- Receiving external clinical documents (20.9%);
- Decision-support tools (23.2%);
- Completing the medication administration record (MAR) (49.0%); and
- E-prescribing between practitioner and pharmacies (1.7%).

Each application is explicitly defined in the item. For example, the MAR item reads: “Does your facility currently use software/technology to complete the medication administration record (MAR)? (All medications administered to patients are recorded

into the MAR and generated from the medication list. May allow provider to view recent lab results and patient allergies. Interfaces with pharmacy system, computerized order entry system, and patient tracking (admission-discharge-transfer) system." Response options for each item were:

- 1 - We have this technology and are currently using it.
- 2 - We have this technology but are not using it.
- 3 - We plan to obtain this technology in the next 12-24 months.
- 4 - We do not have current plans to obtain this technology, but would like to do so at some point in the future.
- 5 - We have explored this technology and have no desire to obtain it.
- 6 - We have not looked into obtaining this technology.

If 1, To what extent does your facility use the MAR software? (Extensively, Moderately, Rarely).

Is the data collected by the software used to complete the MAR transferred electronically either inside your facility or outside your facility?

The item on documentation of clinical notes also asked respondents to select where documentation of clinical notes occurs: hand-held devices such as PDAs; kiosks located outside patient rooms; laptop; computers located at bedside; voice-activated dictaphones for later transcription; or other. Respondents also were asked when does documentation of clinical notes occur: after each encounter; after multiple encounters, or other?

Survey respondent were also asked to complete the following questions:

- "Does your facility have an EHR or a paperless system? (A longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting?" (Yes, No)
- "How would you describe your facility's EHR implementation status?
 - Fully-implemented -- Facility is fully or partially using;
 - Fully-implemented -- Facility is not using;
 - Partially-implemented, Development stage of EHR-S;
 - Selection stage of EHR-S;
 - Planning stage of EHR-S;
 - Information gathering stage; and
 - Have not started, or no plans for implementation.

Survey findings indicate that almost 32% of responding nursing homes described their EHR implementation status as fully-implemented or partially-implemented.

The survey also included an item identifying barriers "that may have slowed or prevented implementation and/or use of software/technology in your facility," using the scale options of Major barrier, Minor barrier, or Not a barrier. The list of barriers

respondents were asked to consider is presented in Table 8 in Section IV in this report. Lack of capital resources to invest was supported by 72.1% of respondents as a major barrier, as reported in the survey (Stratis Health, 2008).

Survey results are limited to Minnesota. The inclusion of specific description of HIT applications in the data items estimating use (as noted for the MAR above) likely promotes valid and reliable findings for those items.

ASPE Taxonomy of HIT Application Features for Nursing Homes

Work recently completed under another ASPE-funded project entitled "Understanding Costs and Benefits of Health Information Technology in Nursing Homes and Home Health Agencies", conducted by the University of Colorado Denver, produced a Draft Taxonomy of HIT Application Features for Nursing Homes. As part of the developmental process, representatives from nine nursing homes were invited to provide information requested in the taxonomy, and to comment on the taxonomy's accuracy and comprehensiveness in reflecting HIT use in nursing homes. (A similar taxonomy was developed for home health providers, as described later in this document.)

The draft nursing home taxonomy includes five domains: Administration, Operations Management, EHR/EMR; Medications; and Telemedicine/Telehealth. For each domain, respondents are asked to list the product(s) their organization uses for any of the domain functions, including the product name and year implemented. Multiple application features are listed within each of the five domains, with a definition provided for each feature. For example, Census Management, listed under the Administration domain, is defined as follows: "Pre-admission/referrals, admissions, discharges, transfers, leave of absences, bed holds, census verification, current list of residents, available beds, admission/discharge/transfer/leave reporting". For each application feature listed, respondents address the following five areas:

1. Products that support this feature (from the product list provided for the domain as a whole).
2. Does this product interface with other products in or outside of your facility? (Y/N) If Yes, what?
3. Current or Planned Usage -- responses include:
 - 1 - We have this application and are currently using it.
 - 2 - We have this application but are not using it.
 - 3 - We plan to purchase this application in the next 12-24 months.
 - 4 - We do not have current plans to purchase this application, but would like to do so at some point in the future.
 - 5 - We do not have this application and have no desire to obtain it.
4. Types of Employees, Disciplines using this application.

5. Extent of Use -- responses include:
 - 1 - This application is fully-implemented and all appropriate staff are using it.
 - 2 - This application has been partially-implemented and in use by at least 50% of staff for whom the application is targeted.
 - 3 - This application has been partially-implemented but in use by less than 50% of staff for whom the application is targeted.
 - 4 - This application has been purchased and staff training has been (or will be) scheduled.
 - 5 - This application has been purchased but we do not plan to use it at this time.

The taxonomy and findings from the review and submission of information on HIT functions by five responding nursing homes can be found in "Taxonomy of Health Information Technology in Nursing Homes -- Report B: Review by Representatives from Nursing Homes and Vendors" submitted to ASPE in August 2007 (University of Colorado Denver, 2007a), and is available at the following link: <http://aspe.hhs.gov/daltcp/reports/2007/Taxonomy-NH.htm>. The taxonomy was used to identify nursing home providers for a qualitative case study evaluation of costs and benefits of implementing certain HIT functions.

With its comprehensive content, explicitly defined applications for each functionality promoting reliability and validity, and foundation in a rigorous developmental and review process, the Draft Nursing Home Taxonomy, in combination with selected features from other existing survey instruments, can serve as a useful resource when developing effective items for assessing adoption and use of HIT applications in nursing homes.

National Survey of Residential Care Facilities (NSRCF)

The National Survey of Residential Care Facilities (NSRCF) is a new survey developed by the NCHS in collaboration with ASPE (NCHS, 2008c, http://www.cdc.gov/nchs/about/major/nhcs/nhcs_datacollection.htm). NCHS expects to nationally field the NSRCF beginning in February 2009, after pilot and pre-testing has been completed. The NSRCF Facility Questionnaire contains three items addressing EIS, as listed below.

Other than for accounting purposes, does this facility have a computerized system for resident service records? For example, an Electronic Medical Records System. (Yes/No)

Respondents who answer yes to the above question also complete the following questions:

In that computerized system, which of the following components are included?
You may select all that apply.

Resident demographics;
Functional assessments;
Individual service plans;
Clinical notes, such as daily progress notes;
Medication administration (for example, for maintaining lists of resident's medications);
Discharge and transfer summaries; and
Electronic Point of Care Documentation (for example, hand-held devices for charting or for other clinical notations).

Does this system support electronic health information exchange with any of the following entities? For example, sending electronic records from this facility to a hospital. You may select all that apply.

Physicians;
Nursing homes;
Hospitals;
Pharmacies;
Other health or long-term care providers;
Resident's personal health record;
Corporate office; and
Electronic information is NOT exchanged.

University of Pittsburgh Study on Availability and Use of HIT in Nursing Homes

A study currently underway at the University of Pittsburgh (Degenholtz, 2007) is examining the availability and use of HIT in nursing homes, with a focus on identifying clinical care processes that benefit particularly from HIT, reviewing currently available HIT software designed for nursing home use, and conducting a survey of multiple nursing home representatives (including administrators, directors of nursing, physicians, consultant pharmacists, and advance practice nurses) to estimate the actual use of HIT functions that have been implemented in nursing homes. A key objective of the study is to examine the differences between the routine work of nursing home staff and clinical providers and the features offered in HIT applications marketed to nursing homes.

C. Comparison of Selected Findings on HIT Use in Nursing Homes/Long-Term Care and Discussion of Measurement Issues

Despite the number of estimates related to HIT use in long-term care that have been produced, the noted lack of consistency in types of applications covered in the surveys, terminology, definitions, and measurement approaches limits the capacity to make direct comparisons to only a small subset of estimates for particular applications. Table 2, Table 3 and Table 4 present the estimates for use of EMRs/EHRs, CPOE, and medication administration systems from surveys where terminology was similar enough to reasonably compare. (The information in the tables is drawn from Table 1 above, but focuses on the single application estimates.)

As highlighted in the tables, the estimates are generally inconsistent. Much of this inconsistency likely derives from survey respondents' varying interpretations of whether the applications in use at their facilities meet the definitions of those being measured by the survey. Some respondents may tend to be more expansive in their interpretation, while some may have a very constricted view of the criteria that must be met to label an application as an EMR, EHR, CPOE, or automated MAR system. This range of interpretation clearly is even wider for surveys that do not provide definitions or explicit descriptions to guide respondents.

Table 2 shows that estimates for EMR/EHR use ranged from 18% to 47% (setting aside the Maestro Strategies estimate of 50% use of automated medical records as a separate category from EHR/EMR), with limited consistency across the five surveys. The use of EMR/EHR systems is higher in the NNHS findings at 47% compared to about 29% for the CCLC survey, and approximately 17% and 18% in the Stratis Health and Maestro Strategies surveys, respectively, with the Kaushal et al. estimate at a notably lower 1%. The variability in estimates is at least partly attributable to the lack of consistent, clear description of what the surveys are measuring. The lack of universal agreement on the definition of EHR in general (Jha et al., 2006) compounds the complexity of measuring use. Respondents may not share the same view of what constitutes an EMR or EHR and whether their facility's system does or does not meet the definition they have in mind. Estimates resulting from surveys that simply use the terms EMR or EHR without providing further explanation suffer from personal biases, lack of agreement, and unclear and inconsistent understanding among respondents. The surveys that do provide definitions, explanations, or examples improve the likelihood of producing accurate results within the survey, although cross-survey consistency in definitions and measurement approaches remains limited. Among the reviewed set of surveys, the 47% estimate from the NNHS referred to use of EIS for Patient Medical Records, with a Help Screen that notes the records to include nurse's notes, physician notes, and MDS forms, a rather broad definition that does not use the term EMR or EHR. Stratis Health's survey, which found a 32% estimate of Minnesota nursing homes with fully or partially implement EHR systems, refers to a "paperless" EHR-S without defining the components of the EHR. The 29% estimate produced by the CCLC survey may be closer to an accurate representation for their respondent population due to their more explicit definition (although the phrase "clinical health information" still may leave for variable respondent interpretation).

As displayed in Table 3, the NNHS estimate for computerized or electronic physician order entry systems (48%) is similar to the Maestro Strategies finding (40%), with the CCLC survey yielding a substantially lower 16% estimate. While CPOE may be among the more commonly recognized electronic applications, the operationalization of such a system may differ from organization to organization, with many gradations of use still appropriately described as CPOE (termed variably as computerized physician order entry or computerized provider order entry). For example, a nursing home may routinely and reliably use a CPOE system under which physicians call or fax orders to a nurse or other staff member at the facility, who then enters the order into the computerized system. At other facilities, it may be that the physician always enters

orders directly into the computer, perhaps guided by an automated dropdown list. Other facilities may operate with a combination of these activities. All of these approaches involve use of a CPOE system. If a survey does not explicitly indicate the gradations of a system, survey respondents rely on their own interpretation. As such, some respondents may believe that, in order to label a system as CPOE, it must be entirely paperless and involve entry only by the ordering physician/provider. Under this understanding, the facilities at which a nurse or other staff member enters a physician's fax or telephone order into a CPOE system would not be counted as CPOE users. Other respondents, even within the same organization, may count this same approach as meeting the criteria of a CPOE system, and respond accordingly to the survey. It is impossible to know precisely what is represented, therefore, in results from a survey that measures simply the use of "CPOE", without explanation or definition.

Finally, as shown in Table 4, Stratis Health reports the highest use of e-MARs at 49% compared to 38% in the NNHS survey and only 18% identified in the California HealthCare Foundation survey. The inconsistent findings likely are again associated with variable terminology and definitions across surveys and, for the two surveys that did not provide a definition, subjective judgment among individual respondents regarding whether their organization's system meets their own concept of e-MAR. Interestingly, the highest use estimate came from the Stratis Health survey, which explicitly describes an e-MAR system for purposes of the survey.

As highlighted in Tables 2-4, many current surveys assessing HIT use are limited by a lack of clarity in describing the applications being measured and the extent to which an application is automated, beyond characterization as "fully operational" or "partially operational". This lack of clarity leads to differing interpretation among respondents, and ultimately, wide variability in use estimates for the same applications. In this context, it is difficult to discern which surveys have produced the most accurate findings or to attribute particular findings to a survey's setting or sample. For example, absent clear and consistent definitions of survey questions and response options, it is difficult, if not impossible, to make comparisons and draw conclusions about the rates of implementation of certain HIT functions across states or nationally.

The review of existing surveys of HIT use in long-term care underscores the need to develop (or refine) surveys that use clear and precise descriptions of the applications being measured and the way or extent to which the applications are being used. Specifically, data items should be designed to clearly describe an application and to provide precise and easily understandable response options that allow for gradations of use, as further discussed in Section V. This approach will allow respondents to more easily characterize their facilities' systems, promoting accurate estimates and ensuring that survey findings can be consistently and appropriately interpreted and therefore relied upon to more accurately gauge national HIT use, state or region-specific trends, or use within organizations or facilities.

TABLE 1: Use of HIT in Nursing Homes/Long-Term Care: Summary of Survey Findings

Survey ^{a,b}	Respondents	Items	HIT Use (approx. %s)	Definitions
National Nursing Home Survey (NNHS), 2004	<p>1,174 nursing home respondents, nationally representative sample.</p> <p>Interviews with facility administrators, designated staff.</p>	<p>Does {FACILITY} currently use EIS for any of the tasks on this card? Select all that apply.</p> <p>ADT Information Physician Orders Medication Orders Drug Dispensing Laboratory/Procedures Information Patient Medical Records Medication Administration Information MDS Dietary Daily Personal Care By Nursing Assistants Billing/Finance Staffing/Scheduling Information Human Resource/ Personnel Information No EIS</p>	<p>Administrative EIS:</p> <ul style="list-style-type: none"> • 95% use for billing/finance • 96% for MDS <p>Resident Care EIS:</p> <ul style="list-style-type: none"> • 47% use for patient medical records • 48% use for physician orders • 51% use for medication orders & drug dispensing • 38% use for MARs <p>EIS for patient medical records by facility characteristics:</p> <ul style="list-style-type: none"> • 61% of hospital-based agencies • 41% of voluntary non-profit & other • 40% of facilities w/100 or more beds • 45% with chain affiliation • 40% not with a chain 	<p>In a separate Help Screen for this item, "Patient Medical Records" is defined to include nurse's notes, physician notes, & MDS forms.</p>
American Health Care Association (AHCA)/National Center for Assisted Living (NCAL), 2006	<p>916 nursing facilities & 166 assisted living residences in 40 states.</p> <p>Golden Gate National Senior Care represented approximately 1/3 of the sample.</p>	<p>Described six "Personas" of HIT usage and asked respondents to identify the persona that best described their current level of HIT usage & predicted usage in three years. Personas:</p> <p>A - We do most of our work on paper B - We are starting to do more of our work on a computer C - We do most of our work on computer D - We are paperless -- we do all of our work on a computer E - We are paperless & communicate electronically with some of our health care partners F - We are paperless & we communicate electronically with all of our health care partners through a national or regional health information network.</p>	<p>Nursing Facilities:</p> <ul style="list-style-type: none"> • 4% (34 facilities) are paperless, w/4 (less than 1%) communicating electronically w/all health care partners through a national or regional information network • 50% (includes 345 nursing facilities & 18 assisted living residences w/Golden Gate National Senior Care) do most of their work using computers • 46% do most of their work on paper or are just starting to do more work on a computer <p>Assisted Living Residences:</p> <ul style="list-style-type: none"> • Less than 2% are paperless & beginning to or fully communicate electronically w/health care partners through a national or regional HIT network • 33% do most of their work on computers • 64% do most of their work on paper or are just starting to do more work on computers 	<p>Each Persona included explicit examples to help respondents select the Persona that best describes their HIT usage.</p>

TABLE 1 (continued)

Survey ^{a,b}	Respondents	Items	HIT Use (approx. %s)	Definitions
Maestro Strategies, 2007	36 multi-facility long-term care organization AHCA members, most for-profit. 41% of respondents were CEOs.	Data items not reported. The survey obtained information on electronic clinical (and other) applications facilities have installed & own, the applications they are planning to buy, & the applications they are not planning to buy.	Electronic clinical applications (selected findings): <ul style="list-style-type: none"> • 18% had installed EHR/EMR (4% owned but not installed) • 50% had installed automated “medical records” • 50% had installed outcome measurement, quality management, & case management applications • 40% had installed automated physician order entry/order processing • 20% had installed eMAR/eTAR systems 	Unclear whether definitions were provided in survey administration materials. Distinction between “Medical Records” & EHR/EMR listed in the figure displaying clinical application use is unclear, although the survey findings on % use are substantially different.
Kaushal et al., 2005a, 2005b	Expert panel estimates	Expert panel asked to estimate HIT use based on experience & findings from stakeholder interviews with 52 provider organizations in Boston & Denver, including 5 nursing homes & rehab hospitals.	<ul style="list-style-type: none"> • 80% of SNFs currently have an electronic billing/claims system • Almost 100% of SNFs will have an electronic billing/claims system in 5 years • 1% of SNFs currently have an EHR • 14% of SNFs will have an EHR in 5 years 	Unclear how EHR is defined.
California HealthCare Foundation (Hudak & Sharkey, 2007)	103 SNFs & assisted living facilities w/>75 beds in California. Non-random sample. HIT decision makers: administrators, clinical leaders, information technology personnel.	Data items not reported. However, response options regarding HIT implementation appear to include: Fully-implemented Partially-implemented Implementation in progress System being developed System selection stage Planning stage (timeline established) Gathering information (no timeline established) Have not started	Authors reported the following findings: <ul style="list-style-type: none"> • 97% of nursing homes use business or administrative functions to meet state or federal payment & certification requirements • 20% of all respondents (SNF & assisted living) use clinical HIT applications • 21% of SNF & 17% assisted living respondents use clinical charting applications • 18% SNF & 22% assisted living respondents use medication administration applications Survey findings on “HIT Implementation Progress”: Hospital-affiliated SNFs (n=7) <ul style="list-style-type: none"> • 72% indicated some level of HIT implementation (fully, partially, or in progress) • 14% reported HIT system was being developed • 14% in the planning stage with a timeline established • None indicated they had not started 	Clinical HIT applications include assessments & progress note documentation; medication & treatment administration; care planning; e-prescribing; & decision-support tools.

TABLE 1 (continued)

Survey ^{a,b}	Respondents	Items	HIT Use (approx. %s)	Definitions
California HealthCare Foundation (continued)			Multi-facility SNFs (n=39): <ul style="list-style-type: none"> • 46% reported some level of implementation • 5% in the system selection stage • 14% in the planning stage with a timeline established • 35% gathering information • None indicated they had not started Freestanding SNFs (n=34): <ul style="list-style-type: none"> • 25% reported some level of implementation • 11% indicated a system was being developed • 7% in the system selection stage • 7% in the planning stage with a timeline established • 32% gathering information • 18% had not started 	
Continuing Care Leadership Coalition (CCLC), 2006	34 long-term care organizations (12 freestanding nursing facilities, 22 MSOs) in New York State.	Please indicate below the status of EMR implementation in your organization. <i>(For this purpose, the EMR is defined as electronically originated & maintained clinical health information, derived from multiple sources, that replaces the paper record as the primary source of patient information.)</i> Response options appear to include: Fully operational Partially operational Developing plans to implement No current plans to implement Full data items regarding clinical information status not reported. Response options for these items appear to include: Fully operational Partially operational Plan to implement within 2 years No plans to implement	EMR Implementation Status for all responding facilities -- 12 nursing facilities, 22 MSOs: <ul style="list-style-type: none"> • 6% fully operational EMR system • 24% partially operational EMR • 41% developing plans to implement EMR • 30% have no current plans to implement an EMR • MSOs somewhat more progressive than freestanding nursing facilities in implementing EMRs Nursing Facilities (n=38, freestanding and within a MSO): <ul style="list-style-type: none"> • 50% fully operational clinical data system • 18% partially operational clinical data system • 8% fully operational CPOE system • 8% partially operational CPOE system • 66% fully operational ADT system • 8% fully operational e-prescribing system • 5% partially operational e-prescribing system 	EMR defined as "electronically originated & maintained clinical health information, derived from multiple sources, that replaces the paper record as the primary source of patient information". Clinical data system includes: <ul style="list-style-type: none"> • E-documentation • Care planning • Assessments • Physician support • Workflow • Medication administration • MDS/OASIS • CPOE • ADT System • E-prescribing

TABLE 1 (continued)

Survey ^{a,b}	Respondents	Items	HIT Use (approx. %s)	Definitions
CCLC (continued)			Home & Community-Based Services (HCBS) programs within a MSO (n=32) <ul style="list-style-type: none"> • 31% fully operational clinical data system • 9% partially operational clinical data system • 13% fully operational CPOE • 9% partially operational • 75% fully operational ADT System • 6% partially operational ADT system • 3% fully operational e-prescribing system • 3% partially operational e-prescribing system 	
Stratis Health, 2008	297 Minnesota nursing homes. Survey completed by administrator or delegate.	Does your facility have an EHR or a paperless system? (A longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting?" (Yes, No) "How would you describe your facility's EHR implementation status? <ul style="list-style-type: none"> • Fully-implemented -- facility is fully or partially using • Fully-implemented -- facility is not using • Partially-implemented, development start of EHR-S • Selection stage of EHR-S • Planning stage of EHR-S • Information gathering stage • Have not started, or no plans for implementation 	<ul style="list-style-type: none"> • 32% of responding nursing homes described their EHR implementation status as fully-implemented or partially-implemented. • Survey findings identified the following functions as most commonly used: <ul style="list-style-type: none"> – 84.5% -- resident assessment & care planning – 83.2% -- census management – 49% -- MAR – 41.4% -- documentation of clinical notes – 23.2% -- decision-support tools – 20.9% -- receiving external clinical documents – 1.7% -- e-prescribing 	EHR is defined as a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting?" Explicit descriptions are included in each data item assessing "use of software/technology support" for various applications.
a. Citation information for each survey is included in the References and Relevant Literature section provided at the end of this report. b. Findings from the ASPE Nursing Home Taxonomy (University of Colorado, 2007a), the NSRCF (NCHS), 2007), and University of Pittsburgh study, described in Section II.B, are not included in this table, as findings are available for completion of the taxonomy by only five nursing home representatives as part of the developmental process, and the NSRCF and University of Pittsburgh survey have not yet been fielded.				

TABLE 2: Comparison of Survey Findings for EMR/EHR Use in Nursing Homes/ Long-Term Care Settings			
Survey	Respondents	EMR/EHR^a	Item Wording/Definition
NNHS	1,174 nursing homes -- nationally representative	47%	Does {FACILITY} currently use EIS for any of the tasks on this card? Select all that apply. Patient medical records. In a separate Help Screen for this item, "Patient Medical Records" is defined to include nurse's notes, physician notes, & MDS forms.
Maestro Strategies	36 multi-facility long-term care organizations -- AHCA members	18% 50%	EHR/EMR. Medical records. Unclear whether or how these terms were defined in the survey. Report presents findings regarding whether an organization had installed or owned various electronic clinical applications.
Kaushal et al.	Expert panel -- national estimate for nursing homes	1%	EHR. Not defined.
CCLC	34 long-term care organizations: 12 freestanding nursing facilities, 22 MSOs -- New York	29%	Estimate is for fully or partially operational EMR system (23.5% partially operational; 5.9% fully operational). Please indicate below the status of EMR implementation in your organization. <i>(For this purpose, the EMR is defined as electronically originated and maintained clinical health information, derived from multiple sources, that replaces the paper record as the primary source of patient information.)</i> Response options appear to include: Fully operational Partially operational Developing plans to implement No current plans to implement
Stratis Health	297 nursing homes -- Minnesota	32%	Do you have an EHR or a paperless system? Estimate is for a fully or partially-implemented EHR-S. EHR is not defined other than as stated in the item stem.
a. Approximate percentages are presented in this table.			

TABLE 3: Comparison of Survey Findings for Computerized or Electronic Physician Order Entry Systems in Nursing Homes/Long-Term Care Settings			
Survey	Respondents	Physician Order^a	Item Wording/Definition
NNHS	1,174 nursing homes -- nationally representative	48%	Does {FACILITY} currently use EIS for any of the tasks on this card? Select all that apply. Physician orders.
Maestro Strategies	36 multi-facility long-term care organizations -- AHCA members	40%	Data items not reported. However, data presented in report on whether organizations had installed an automated system for: Physician order entry/order processing.
CCLC	34 long-term care organizations: 12 freestanding nursing facilities, 22 MSOs -- New York ^b	16%	Fully or partially operational CPOE system.
a. Approximate percentages are presented in this table.			
b. CPOE results are reported for 38 nursing facilities and 38 HCBS programs, by breaking out units within the MSOs.			

TABLE 4: Comparison of Survey Findings for Electronic Medication Administration Records Systems in Nursing Homes/Long-Term Care Settings			
Survey	Respondents	MAR^a	Item Wording/Definition
NNHS	1,174 nursing homes -- nationally representative	38%	Does {FACILITY} currently use EIS for any of the tasks on this card? Select all that apply. MARs.
California HealthCare Foundation	103 SNFs & assisted living facilities w/more than 75 beds -- California -- non-random sample	18%	Medication administration applications. Unclear whether definition or description was provided in the survey materials. It also is unclear what level of implementation is reflected in this estimate; i.e., respondents identified level of HIT implementation (fully, partially, or in progress) & whether their HIT system was being developed, in the system selection stage, in the planning stage with a timeline established, gathering information, or had not started.
Stratis Health	297 nursing homes -- Minnesota	49%	Do you currently use software/technology support for completing the MAR? All medications administered to patients are recorded into the MAR (by a kiosk, laptop, PDA, or bar code reader). Generated from the medication list. May also allow provider to view recent lab results & patient allergies. Interfaces with pharmacy system, computerized order entry system, & patient tracking (admissions-discharge-transfer) system. Estimate reflects the % who answered "We have this application and are currently using it".
a. Approximate percentages are presented in this table.			

III. REVIEW OF SELECTED SURVEYS ON HIT ADOPTION IN OTHER SETTINGS

A. Overview of Surveys Assessing HIT Use in Home Health and Hospice Agencies

Very few surveys examining HIT use in home health and hospice agencies specifically have been conducted, although HHAs have been included in some surveys assessing HIT use in long-term care, as described in Section II (e.g., the Kaushal et al. expert panel estimate; CCLC's 2006 survey that include MSOs in New York). Findings from the two national home health care surveys summarized in Table 5 present a 32% use of "computerized" medical records in the 2000 National Home and Hospice Care Survey (NHHCS) compared to 58.5% use of EMR systems in the 2007 Philips National Study conducted by Fazzi Associates. Both surveys indicate that larger agencies (although measured as Medicare revenue in one survey and number of patients in the other) are more likely to have an EMR or computerized medical record (CMR). The NHHCS found no other agency characteristics to have a significant relationship with CMR use, whereas the Philips/Fazzi Associates survey found non-profit agencies and hospital-based agencies more likely to use an EMR system. Comparison of findings is limited by variability and lack of clarity in terminology and definitions within and across surveys, resulting in validity and reliability issues.

B. Summaries of Existing Home Health and Hospice Surveys

National Home and Hospice Care Survey

NCHS at the CDC conducts the NHHCS, which includes a nationally representative survey of licensed or certified HHAs and hospices (NCHS, 2008a, <http://www.cdc.gov/nchs/nhhcs.htm>). The NHHCS was fielded in 1992, 1993, 1994, 1996, 1998, and 2000. After a significant re-design to enhance and expand content and move from paper-and-pencil to computer-assisted personal interviewing administration, the NHHCS was fielded again in 2007. Survey data primarily are collected through personal interviews with administrators and staff. A Staffing Questionnaire also is mailed to administrators for completion by the administrator or a designee prior to the on-site personal interviews. Interviewers review the Staffing Questionnaires for completeness during the personal interviews. The NHHCS items related to HIT are included as part of the Staffing Questionnaire, in a section on Agency Information Technology Capabilities. This set of questions is significantly expanded compared to the 2000 NHHCS, and provides far greater precision in terminology, definitions, and enumeration of specific functions. Findings from the 2007 NHHCS are not yet available.

The first item in the Agency Information Technology Capabilities section in the 2007 NHHCS Staffing Questionnaire asks whether the responding agency currently has

an EMRs system, defined as a "computerized version of the patient's medical information used in the management of the patient's health care", indicating that the respondent should exclude electronic records used only for billing and required documentation such as OASIS² files. A follow-up item lists eight EMR functions and asks whether each component is used, available but not used, or not available. The EMR functions enumerated are:

- CPOE -- prescriptions, labs, tests, etc.;
- Test results (chest x-rays, labs, etc.);
- Patient demographics;
- Electronic reminders for tests (labs, imaging, etc.);
- Clinical Decision-Support System (CDSS) contraindications, allergies, guidelines, etc.;
- Clinical notes;
- Public health reporting (notifiable diseases); and
- Sharing medical records electronically with other agencies.

An item addressing the agency's use of electronic management systems includes the following responses: (a) Billing system; (b) Inventory control (i.e., bar coding); (c) Human resources management (personnel records); (d) Staff management (e.g., staffing scheduling); and (e) Accounting. Responses to an item on use of electronic education systems are: (a) Satellite Broadcast capability (in service, training); (b) Staff Internet access; and (c) Patient Internet access (website with patient educational materials). Three items address telemedicine, defining telemedicine as "the use of electronic communication and information technologies to provide or support clinical care at a distance" and asking about use of specific telemedicine functions (e.g., video consults with health care professionals) and the approximate percentage of patients with whom telemedicine is used. Finally, five items ask about staff use of Electronic Point of Care Documentation systems or devices, including how many direct care, administrative, or other staff use the systems or devices, and whether devices are used for any of the following: (a) CPOE (prescriptions/pharmacy, labs, tests); (b) Test results; (c) Electronic reminders for tests; (d) CDSS guidelines or reference systems; (e) E-mail communication with agency staff/other staff; (f) Scheduling appointments/visits; (g) OASIS; or (h) Other.

The 2000 version of the NHHCS included an item asking whether the agency's medical records are computerized and if not, whether the agency plans to computerize its medical records within the next year. Of the 1,425 responding agencies (a 96% response rate), approximately 32% indicated use of a CMR; specifically, 32.1% of responding HHAs, 18.6% of responding hospice agencies, and 40.3% of mixed-type agencies (offering both services). Among agencies with 100 or more patients, 44.8% reported use of a CMR, while only 23% of agencies with 50 or fewer patients reported

² The OASIS is a federally-mandated set of core assessment items from which quality-based outcome measurements can be derived. HHAs are required to complete and electronically transmit OASIS data to the designated state agency for all patients as a condition of participation in the Medicare and Medicaid programs.

CMR use. No other agency characteristics were found to have a significant relationship with CMR use, although data were collected on ownership (proprietary, non-profit, state or local government, Federal Government), affiliation (hospital or nursing home), chain membership, and health maintenance organization (HMO) status.

It may be useful to consider elements of the more precise, expanded set of questions on agency IT capabilities in the 2007 NHHCS when developing the core and expanded set of questions for assessing HIT use in nursing homes.

Philips National Study on the Future of Technology and Telehealth in Home Care

The National Study on the Future of Technology and Telehealth in Home Care was sponsored by Philips Consumer Healthcare Solutions and co-sponsored by the National Association for Home Care and Hospice and Fazzi Associates. The study was designed to determine the level of technology and telehealth adoption in the home care industry in general and by agency characteristics such as size, affiliation/type, and location and to identify decisions and strategies regarding telehealth and technology plans for the next 1-3 years, providing agency leaders with information to help guide strategic decisions related to technology and telehealth (Fazzi Associates, 2007; Fazzi, Ashe, & Doak, 2007, <http://www3.medical.philips.com/resources/hsg/docs/en-us/custom/HomeCareStudy.asp>).

Fazzi Associates developed the survey based on online input regarding issues of interest from over 1,000 agency staff throughout the country. A National Steering Committee composed of agency leaders from across the country reviewed the online input and developed a draft survey, which was pilot tested and refined prior to full implementation. The survey, which was administered by phone, focused on four main types of technology, described as: (1) backroom fiscal, billing, payroll, HR IS services; (2) point of care; (3) EMRs; and (4) telehealth.

Agencies were selected using random sampling within target groups representing characteristics such as geographic area, rural vs. urban location, for-profit vs. non-profit or public health departments, ownership (hospital-based, hospital-affiliated, freestanding), agency size based on annual revenues, and use of telehealth. In addition, agencies had to have complete Home Health Compare scores for June 2007 and cost reports for 2005 or 2006.

Preliminary survey findings reported in an Executive Level Briefing published in 2007 and confirmed in an April 2008 release (Fazzi, Ashe & Doak, 2007; Fazzi Associates, 2008) indicate that 58.5% of the 976 responding agencies presently have EMR, 77.2% have purchased a fiscal, billing, and backroom system, and 61% use some form of electronic POS system, most frequently laptops. Interestingly, a question asking how many weeks it takes for new point of service (POS) users to return to original productivity levels yielded significant variability across respondents, with 31.6% indicating "More than 12 weeks" and 12%-18% indicating four other categories (0-2 weeks, 2-4 weeks, 4-8 weeks, 8-12 weeks) and 6.4% indicating users never reached

original productivity. The survey indicated that 17.1% of respondents use telehealth systems, with larger agencies more likely to use them.

Terms (e.g., EMR, telehealth) were not clearly defined in survey administration materials. A Fazzi Associates slide presentation notes that respondents may have been confused over the definition of EMR: "Does EMR mean "digital medical records" or integration with all segments of the health field?" With sponsorship by telehealth product and service vendor Philips Consumer Healthcare Solutions, the study provided an in-depth examination of telehealth use and plans.

ASPE Draft Taxonomy of HIT Application Features for Home Health Agencies

As described in Section II.B above, a Taxonomy of Health Information Technology Functions has been developed under another ASPE-funded project entitled, "Understanding the Costs and Benefits of Health Information Technology in Nursing Homes and Home Health Agencies". While substantial overlap in HIT applications exists across home health and nursing home settings, setting-specific versions were developed to allow respondents to focus on those applications of most relevance to their own work. The Draft Taxonomy of HIT Application Features for Home Health includes the same five domains as the Draft Nursing Home Taxonomy: Administration; Operations Management; EHR/ EMR; Medications; and Telemedicine/Telehealth. Each domain includes multiple application features (e.g., Census Management under the Administration domain). For each application feature, a definition specific to the home health care setting is provided. For example, Census Management, listed under the Administration domain, is defined as follows: "Admissions, discharges, transfers, current list of patients, ability to generate lists of unduplicated admissions". The response scale for each application feature is the same as that used in the Nursing Home Taxonomy. The taxonomy was used to identify and select home health providers for a qualitative case study evaluation of the costs and benefits of implementing certain HIT functions.

The taxonomy and findings from the review and submission of information on HIT functions by five responding HHAs can be found in "Taxonomy of Health Information Technology in Home Health Agencies -- Report C: Review by Representatives from Home Health Agencies and Vendors" submitted to ASPE in August 2007 (University of Colorado Denver, 2007b; <http://aspe.hhs.gov/daltcp/reports/2007/Taxonomy-HHA.htm>).

C. Overview of Surveys Assessing HIT Use in Hospitals and Physician Practices

A number of surveys assessing HIT use in hospitals and physician practices (ambulatory care) have been conducted over the past several years. These surveys are included in this review, as they may help inform the design and scope of survey questions to assess HIT use in nursing home settings. As is the case with long-term care and home health surveys, considerable variability exists in item construction, terminology, definitions, sample size, and measurement criteria. Findings from ten

surveys addressing HIT adoption and use in hospitals and physician practices are summarized in Table 6. A more detailed review of each survey can be found following the table.

D. Summaries of Existing Hospital and Physician Practices Surveys

Health Information Technology in the United States: The Information Base for Progress

The Health Information Technology in the United States: The Information Base for Progress, is a joint project of RWJF and the Federal Government's Office of the National Coordinator (ONC) for Health Information Technology. The research team also includes Massachusetts General Hospital (MGH) and George Washington University (GWU). A key project purpose was to identify surveys and studies that had attempted to measure the adoption of EHRs by US hospitals and physician practices, then use that information as a base to expand on adoption trends, adoption gaps, and policy information (RWJF, 2006, 2008, <http://www.rwjf.org/files/publications/other/EHRReport0609.pdf>, <http://www.rwjf.org/files/research/062508.hit.exsummary.pdf>).

Following a systematic review process that examined relevant methodologies, survey instruments, and results, the researchers identified 36 surveys conducted between 1995 and 2005 and were able to obtain both the survey instrument and complete results for 22. The surveys were assessed and rated according to both content and methodology of EHR use measurement.

Physician practice and hospital EHR findings from the surveys studied in the ONC project are inconclusive. Physician adoption rates ranging from 9% to 57% are reported, depending on the definition of EHR, functionalities, number of functionalities used, amount of time functionalities are used, and other variables. Hospital use is equally inconclusive with reported adoption rates ranging from 5% to 59%, dependent again on functionalities, integration, definitions, etc.

The researchers concluded that while there have been several surveys designed to assess EHR adoption, these studies have failed to produce "valid, and reliable estimates of rates and patterns of EHR adoption at any point in time or longitudinally" and as such, do not identify where and why adoption is lagging. These researchers note that, "[a]lthough numerous surveys have attempted to measure HIT adoption and use, our current understanding is limited by inconsistencies in sampling techniques, data collection instruments and terminology, as well as varying response rates" and "the quality of available surveys is variable and generally inadequate to form the basis for national policy development" (RWJF, 2006).

National Survey of Electronic Health Record Adoption in the United States

Building upon the lack of consistent data that could be obtained from the surveys in the aforementioned study, the ONC has contracted with GWU, MGH, and Research Triangle Institute (RTI) International to lead a national survey of physicians and physician practice managers to ascertain the level of EHR adoption. In the short term, this survey will provide timely, additional data necessary for policy development; in the long-term, the survey will provide background information that in the future could be incorporated into the annual National Ambulatory Medical Care Survey (NAMCS) (RTI International, 2006).

The 2007 survey includes a broader range of EHR domains and functionalities, including acquisition, implementation, use, barriers, incentives and practice characteristics. The survey will be mailed to and completed by both the physician and “the most knowledgeable” person of information technology use in the physician office.

In an attempt to better define EHR, two options are given -- minimally functional EHR and Functional EHR. “Minimally functional” includes six key functionalities (clinical notes, computerized orders for prescription, computerized orders for labs, computerized order for radiology, viewing lab results, and viewing imaging results). A “functional” EHR includes the above six functionalities plus patient demographic information, patient problem lists, patient medication lists, medical history and follow-up notes, orders sent electronically for prescriptions, orders sent electronically for labs, orders sent electronically for radiology, electronic images are returned, warnings of drug interactions or contraindications, out-of-range lab levels are highlighted, and reminders for guideline-based interventions and screenings (Modern Healthcare, 2008).

Only general preliminary results have been released from the 2007 survey at this time. Using the above criteria to determine EHR use, preliminary results suggest that 4% of respondents indicate they have a functional EHR, and 14% report a minimally functional EHR.

The 2007 survey also addresses the issues of incentives and barriers to EHR implementation. Preliminary results indicate that 80% of physicians thought monetary incentives would have an impact on adoption. Lack of capital was identified as a major barrier by 66% of physicians without an EHR and 36% of those with a functioning EHR (Modern Healthcare, 2008). Additional findings on barriers are presented in Table 8 in Section IV of this report.

National Ambulatory Medical Care Survey (NAMCS)

NCHS at the CDC, and the U.S. Bureau of Census conduct the field data collection effort for the NAMCS. This survey was conducted annually from 1973 to 1981, in 1985, and annually since 1989, with electronic health information or EHR questions being introduced in 2001. The 2005 survey expanded the EHR module to include EHR functionality, use, and non-use. The proposed 2008 survey will include an EMR

Supplement (NCHS, 2007b, 2008b, <http://www.cdc.gov/nchs/about/major/ahcd/surinst.htm#Survey%20Instrument%20NAMCS>).

The physician sample is attained through the master files of both the American Medical Association and the American Osteopathic Association. The sample design includes geographic units, which are then stratified by specialty. The results for the 2006 survey include data from 1,281 office-based, non-federal physicians providing direct patient care. The survey requests physicians to provide information on a random sample of patient visits during a one-week period. A face-to-face induction interview is also included as part of the NAMCS. The physician office data are provided to the U.S. Bureau of Census representatives by the physician or his/her staff.

EMR questions on the 2008 NAMCS survey include the following:

“Does your practice use electronic medical records (not including billing records)?” Answer options are “yes, all electronic,” “yes, part paper and part electronic,” “no,” or “don’t know.” If yes, the survey continues with “Does your practice have a computerized system for” the following eight function capabilities, all with answer options of Yes, No, Unknown, or Turned off options.

- Patient demographic information? If yes, does this include problem lists?
- Orders for prescriptions? If yes,
- Are there warnings of drug interactions or contraindications provided?
- Are prescriptions sent electronically to the pharmacy?
- Orders for tests? If yes, are orders sent electronically?
- Viewing lab results? If yes, are out-of-range levels highlighted?
- Viewing imaging results? If yes, are electronic images returned?
- Clinical notes? If yes, do they include medical history and follow-up notes?
- Reminders for guideline-based interventions and/or screening tests?
- Public health reporting? If yes, are notifiable diseases sent electronically?”

Two questions that follow ask: “Are there any of the above features of your system that you do not use or have turned off?” and “Are there plans for installing a new EMR system or replacing the current system within the next three years?”

The 2008 HIT survey questions were changed slightly from the 2006 version, which is the latest for which results are listed in this review. Some questions were distinctly reworded -- for example, in 2006, physicians were asked about their practice’s “electronic medical record,” while the 2008 version asks if they have a “computerized system for...” One other change between the two versions was that reminders for guidelines-based interventions, part of the clinical notes question in 2006, was separated into its own question in 2008.

Estimates of EMR use resulting from the 2006 survey were calculated in two ways: physicians were considered to use EMRs if they reported “yes” to the general question on EMR use, and physicians were considered to use comprehensive EMR systems if

they gave a “yes” response to all four features deemed minimally necessary for a comprehensive EMR system. The four features required of an EMR system are computerized orders for prescriptions, computerized orders for tests, test results, and clinical notes. Results indicate 12.4% had an EMR system with the minimal four features of a comprehensive system, unchanged since 2005. Approximately 29.2% of physicians reported using full (14.5%) or partial (14.7%) EMR systems. This represents a 22% increase since 2005. Between 2005 and 2006, the percentage of office-based medical practices using any form of EMR increased by 42%.

Among physicians with fully electronic systems, 63.7% reported using reminders for guideline-based interventions or screening tests, 52.9% used computerized prescription order entry, and 46.5% used computerized test order entry features.

In 2006, approximately one in four physicians without an EMR-S planned to install a new EMR-S within the next three years, while 31% of physicians with partially-electronic systems planned to replace their current systems within the next three years.

The survey does not include questions regarding EHR acquisition and/or installation, barriers, or incentives. However, the NAMCS provides both physician-level and practice-level data on EHR adoption on an annual basis.

American Hospital Association

In October and November 2006, the American Hospital Association (AHA) conducted a survey to determine the degree of implementation and use of HIT in hospitals across the United States. The results and methodology of this survey were released in 2007 in the report entitled *Continued Progress: Hospital Use of Information Technology* (AHA, 2007, <http://www.aha.org/aha/content/2007/pdf/070227-continuedprogress.pdf>).

Surveys were e-mailed and faxed to hospital CEOs in all United States community hospitals (both members and non-members of the AHA). Surveys could be returned either online or by fax. Surveys were returned by 1,543 community hospitals for a response rate of 31%. AHA indicates the respondent pool is a fairly representative sample (by size, location, region, ownership, and teaching status) of all United States community hospitals.

CEO respondents were asked about the use of specific HIT applications including: (1) EHRs, which were defined as systems that integrate electronically originated and maintained patient-level clinical health information, derived from multiple sources, into one point of access (an EHR replaces the paper medical record as the primary source of patient information); (2) CPOE, defined as physician ordering of medications, laboratory and other tests, alerts to adverse drug events; (3) other functionalities not normally considered part of an EHR including bar coding, telemedicine, and administrative functions; (4) financing of HIT systems; (5) barriers to use and/or implementation; and (6) involvement in clinical health information exchange efforts.

Hospital HIT adoption was measured based on implementation of select clinical information technology functions (e.g., access to current medical records, laboratory and radiology order entry and results, pharmacy order entry), then placed on a spectrum or “level of use” ranking: Getting Started - 0-3 functions; Low - 4-7 functions; Moderate - 8-11 functions; High - 12-15 functions.

While results varied based upon hospital size, location, and teaching hospital affiliation, the following were reported:

- 11% of hospitals had fully-implemented EHRs, with 68% reporting either fully or partially-implemented EHRs;
- 46% reported high or moderate use of HIT;
- 10% of hospitals reported CPOE use at least half of the time, 16% reported CPOE for ordering laboratory tests at least half of the time;
- 51% reported the use of real-time drug interaction alerts; and
- Percent of hospitals reporting full implementation for other functions:
 - 60% -- Lab order entry,
 - 66% -- Lab results,
 - 59% -- Radiology order entry,
 - 59% -- Radiology imaging results,
 - 46% -- Pharmacy order entry.

The survey also reported on the greatest barriers to HIT adoption. Initial costs were selected as either a somewhat or significant barrier by 94% of respondents. Additional findings on barriers are presented in Section IV of this report.

Results from the 2006 survey also were compared to the AHA 2005 survey, as shown below. While the percentages between 2005 and 2006 showed a drop for some of the fully-implemented functions (pharmacy order entry, electronic orders for laboratory and radiology tests), hospitals reporting partial implementation rose slightly for all functions.

	Fully-Implemented		Partially-Implemented		Fully & Partially-Implemented	
	2006	2005	2006	2005	2006	2005
Electronic pharmacy order entry	46%	48%	15%	14%	61%	62%
Electronic order for laboratory tests	60%	62%	12%	11%	72%	73%
Electronic results for laboratory tests	66%	64%	12%	11%	78%	75%
Electronic order for radiology tests	59%	62%	11%	9%	70%	71%
Electronic results for radiology tests	65%	60%	12%	12%	77%	72%

Using the AHA spectrum of HIT use noted above, which creates levels of HIT use based on the number of clinical information technology functions reported to be fully-implemented, AHA reported that in 2006, 46% of hospitals reported moderate (8-11 functions) to high (12-15 functions) HIT use, compared to 2005 when 37% reported

moderate to high HIT use. However, for both 2005 and 2006, the percentages for “Getting Started” and “Low” HIT use levels combined remained very high, accounting for 63% in 2005 and 54% in 2006.

Healthcare Financial Management Association, Overcoming Barriers to Electronic Health Record Adoption: Results of Survey and Roundtable Discussions

The Healthcare Financial Management Association (HFMA), in association with the Office of the National Health Information Technology Coordinator, held a series of discussions and conferences to address challenges associated with EHR adoption. Following these conferences, a survey to identify implementation and barriers to EHR adoption along with recommendations to encourage adoption was conducted in 2006 with 176 senior health care finance executives at hospitals and health systems of various sizes and regions in the United States responding.

For this HFMA survey, an EHR was defined as a digital collection of a patient’s medical history and could include items like diagnosed medical conditions, prescribed medications, vital signs, immunizations, lab results, and personnel characteristics (e.g., age, weight) (HFMA, 2006, <http://www.hfma.org/NR/rdonlyres/480C921F-8D33-48E8-A33F-1512A40F2CC8/0/ehr.pdf>).

Survey findings on hospitals making “significant progress” in acquiring specific functionalities follow (n=176 responses):

- 38% -- Order entry/order management. Clinical test, consults, and medication order entry are managed electronically.
- 27% -- Results management. Physicians are able to access all information on patient care delivered at the hospital or health system.
- 23% -- Electronic health information/data capture. All patient health records are contained in a computerized repository.
- 23% -- Administrative processes. Scheduling, resource management, billing, and other administrative systems are interoperable.
- 13% -- Clinical decision-support. Enhanced clinical performance is achieved through computerized tools (e.g., computer-assisted diagnosis and disease management).
- 13% -- Health outcomes reporting. The system can automatically extract information for quality indicator reporting.
- 2% -- Patient access. Patients have remote access to their individual records.

The survey also addressed barriers to EHR adoption, with the lack of national information standards and code sets reported as the most significant barrier (supported by 62% of respondents). Findings for other listed barriers to EHR adoption are shown in Section IV. The authors note that the reported importance of any barrier can vary depending on the current level of implementation, organization size, organization type, and organization location.

A survey question regarding electronic connectivity and electronic exchange of clinical data was also included in this survey; however, no results were reported for this item.

Leapfrog Hospital Quality and Safety Survey

The Leapfrog Group (Leapfrog), a consortium of large private and public health care purchasers, launched a national effort in November 2000 to measure and publicly disseminate progress in hospitals for advances in patient safety and quality. Their annual survey assesses self-reported hospital performance based on quality and safety practices (the survey can be found at the following link:

http://www.leapfroggroup.org/for_hospitals/leapfrog_hospital_survey_copy). For the 2007 survey, they assessed use of CPOE, defined as the ability to “enter hospital medication orders via a computer system that includes decision-support software to reduce prescribing errors; that their inpatient CPOE system can alert physicians to at least 50% of common serious prescribing errors, and requires that prescribers electronically document a reason for overriding an interception prior to doing so.” No other HIT functionality was addressed. Specific CPOE questions included in the 2007 survey were (numbering added for clarity):

1. Does your hospital have a functioning CPOE system in at least one unit of the hospital? Yes/No
2. If Yes, what percent of your hospital’s total inpatient medication orders (including orders made in units which do NOT have a functioning CPOE) do prescribers enter via a CPOE system that:
 - includes decision-support software to reduce prescribing errors;
 - is linked to pharmacy, laboratory, and ADT information in your hospital; and,
 - requires that they document electronically a reason for overriding an interception prior to doing so?
3. What percent of inpatients have the majority of their medication orders entered by a prescriber via a CPOE system?

4. If hospitals do not have a CPOE system installed, they are then asked the current stage of CPOE planning and implementation.
 - currently selecting CPOE system,
 - currently implementing a CPOE system,
 - none of the above.

5. Has your hospital implemented in the last 12 months either:
 - a hospital-wide EMR system (defined as a comprehensive documentation of all care given to a specific patient within the entire hospital), or
 - a hospital-wide results reporting system that handles 90% of all laboratory and radiology results electronically?

Only summary statistics are available for the 2007 survey on the Leapfrog website. For CPOE, of 1,330 hospitals responding, 10.6% met the CPOE “leap”, which requires hospitals to meet the following assessment criteria: (1) prescribers must enter hospital medication orders via a computer system; (2) CPOE system can alert physicians to at least 50% of common serious prescribing errors; and (3) prescribers must be able to electronically document a reason for overriding any prescribed orders. From this same survey, 6.8% indicated they will implement CPOE criteria by 2008.

For 2008, the Leapfrog Group has reportedly re-designed the survey to minimize reporting burden for hospitals and incorporate the latest research on measures that have the greatest impact on saving costs and improving quality, including CPOE (Leapfrog Group, 2007a, 2007b).

Mathematica Policy Research Survey

A Mathematica Policy Research survey was conducted for Centers for Medicare and Medicaid Services (CMS) in the summer of 2005. The stated purpose of the survey was to assess how public reporting of quality information has influenced quality improvement efforts within hospitals; if the use of information technology has helped improve the quality of care; and the most important quality improvement benefits associated with HIT use (Felt-Lisk, 2006, <http://www.mathematica-mpr.com/publications/pdfs/newhospinfo.pdf>).

Targeted respondents for this survey were short-term acute care general and critical-access hospitals that had submitted hospital quality data for the Hospital Compare quality initiative in 2005. The nationally representative sample was 375 large Joint Commission on Accreditation of Healthcare Organizations (JCAHO)-accredited hospitals; 133 small, non-JCAHO-accredited hospitals; and 129 other hospitals. Respondents to this 30-40 minute telephone interview (administered using computer-assisted telephone interviewing [CATI] or hardcopy when requested) included 650 senior quality improvement hospital executives.

HIT was defined as the ability to collect, store, retrieve, and transfer clinical information electronically. A leading question to ascertain the various types of

information technology in the hospital was asked, “Do clinicians at your hospital use any of the following EHR capabilities?” and then listed the six types of information technology (e-prescribing, electronic clinical notes systems, electronic lab orders for lab tests, electronic lab results, electronic images [CT, MRI, PET scans]), and electronic reminders. If executives indicated they were using one or more of the above HIT functions, they were then asked whether any had been an important factor in improving quality to date. If the answer was yes, they were then asked the open-ended question: “What is the single most important way that any of these EHR capabilities has affected quality in the hospital?”

Results indicate the percentage reported using a specific HIT capability:

- 21% -- E-prescribing ;
- 59% -- Electronic clinical notes systems;
- 49% -- Electronic lab orders for lab tests;
- 88% -- Electronic lab results;
- 50% -- Electronic images (CT, MRI, PET scans); and
- 24% -- Electronic reminders.

Reported results indicated that 80% of hospital executives thought that information technology use had been an important factor in quality improvement; however, the noted quality improvement benefits were dependent on the types of information technology capabilities implemented in each hospital.

18th Annual HIMSS Leadership Study: Healthcare CIO Results

The HIMSS Leadership Survey is conducted annually and in this review, the results from the 2007 web-based CIO survey are reported (HIMSS, 2007b, 2007c). The survey can be found at http://www.himss.org/2007Survey/healthcareCIO_questionnaire.asp. Three hundred sixty completed surveys were received from hospitals or ambulatory care facilities (87%), physician offices/clinics (5%), long-term care facilities (1.3%), HHAs (1.9%), and other health care organizations. The survey includes questions on a Participant Profile, Information Technology Priorities, Vendor Satisfaction, Information Technology Applications, RHIOs, Information Technology Security, Information Technology Governance, Information Technology Staffing, and Information Technology Budget. Selected results from the Information Technology Priorities and Information Technology Applications section are noted below.

Survey respondents identified the five health care applications (from a list of 25) that they considered most important over the next two years, as noted below:

- 46.9% -- CPOE;
- 46.9% -- EMR;
- 45.8% -- Clinical Information Systems;

- 42.9% -- Bar Coded Medication Management;
- 37.3% -- Clinical Data Repository (CDR); and
- 35.0% -- Enterprise-wide Clinical Information Sharing.

Respondents also were asked to identify/select five technologies that their organization planned to use in the next two years. The five responses with the highest percentages are listed below:

- 73.7% -- Bar coding;
- 63.7% -- High-speed networks;
- 62.8% -- Intranet ;
- 61.5% -- Tablet computers ; and
- 60.1% -- Document imaging.

Respondents were asked to describe the status of the organization’s current use of an EMR system, defined by HIMSS as an “electronically originated and maintained clinical health information, derived from multiple sources, about an individual’s lifetime health status and health care. An EMR is supported by clinical decision systems and replaces the paper medical record as the primary source of patient information.” Selected results for this question are noted below:

- 31.9% -- Have fully operational EMR system in place;
- 36.7% -- Have begun to install EMR hardware and software;
- 16.0% -- Have developed a plan to implement an EMR system; and
- 8.4% -- Have not yet begun to plan for the use of an EMR system.

CIOs also were asked to identify the most significant barrier to information technology implementation in their organization. Nearly 20% selected “Lack of adequate financial support for IT”. Complete results on barriers are presented in Section IV of this report.

HIMSS Analytics

In a HIMSS Analytics White Paper, entitled “Electronic Medical Records vs. Electronic Health Records: Yes, there is a Difference,” the authors (Garets & Davis, 2006, http://www.himssanalytics.org/docs/WP_EMR_EHR.pdf) not only have attempted to clarify and better define the difference between an EMR and an EHR, but also have created an EMR Adoption Model, which can be used to identify levels of capabilities and stages of adoption.

The HIMSS Analytics EMR Adoption Model identifies the levels of EMR capabilities ranging from the initial CDR environment through a paperless EMR environment. From a HIMSS database of approximately 4,000 hospitals, HIMSS Analytics was able to score the included hospitals as to their place in the adoption model. The stages of the model and percentage of hospitals that fall within this scale are presented below.

Level	Criteria	% of US hospitals
Stage 7	The hospital has a paperless EMR environment. Clinical information can be readily shared via electronic transactions or exchange of electronic records with all entities within a regional health network (i.e., other hospitals, ambulatory clinics, subacute environments, employers, payers and patients).	0.0
Stage 6	Full physician documentation/charting is implemented for at least one patient care service area. Clinical decision-support provides guidance for all clinician activities related to protocols and outcomes in the form of variance and compliance alerts. A full complement of radiology picture archiving and communication systems provides medical images to physicians via an intranet and displaces all film-based images.	0.1
Stage 5	The <i>closed loop medication administration environment</i> is fully-implemented in at least one patient care service area. The eMAR and bar coding or other auto identification technology, such as radio frequency identification (RFID), are implemented and integrated with CPOE and pharmacy to maximize point of care patient safety processes for medication administration.	0.5
Stage 4	CPOE for use by any clinician is added to the nursing and CDR environment along with the second level of clinical decision-support capabilities related to evidence based medicine protocols. If one patient service area has implemented CPOE and completed the previous stages, then this stage has been achieved.	1.9
Stage 3	Clinical documentation required, nursing notes, care plan charting, and/or the e-MAR system are implemented and integrated with the CDR for at least one service in the hospital. The first level of clinical decision-support is implemented to conduct error checking with order entry (i.e., drug/drug, drug/food, drug/lab conflict checking normally found in the pharmacy). Some level of medical image access is available for access by physicians via the organization's Intranet or other secure networks outside of the radiology department confines.	8.1
Stage 2	CDR provides physician access for retrieving and reviewing results, clinical decision-support, may have Document Imaging	49.7
Stage 1	Laboratory, pharmacy, and radiology are implemented	20.5
Stage 0	Some clinical automation present, but laboratory, pharmacy, and radiology are not implemented	19.3

Medical Records Institute 8th Annual Survey of Electronic Health Record Trends and Usage for 2006

The Medical Records Institute (MRI) carried out the 8th Annual Survey of Electronic Health Record Trends and Usage for 2006. This is an annual survey of information technology usage among various sizes and types of health care providers (hospitals, physician practices, integrated health delivery service organizations). The survey was conducted among e-mail prescribers to MRI or Towards the Electronic Paper Record (TEPR), and attendees at a TEPR conference in 2006. Excluding vendors and consultants, there were 729 responses, with the largest group of respondents being physicians (22.6%), then medical information system professionals (10.2%) (MRI, 2006, http://www.medrecinst.com/PDFs/EHRSurvey_2006.pdf).

MRI takes note that the results from their surveys are not accurate measures of EHR implementation in the industry, rather the results can be seen as an indicator of “relative” implementation levels and future plans. Also, as this is an annual survey, MRI is able to compare results from previous years.

For the 2006 survey, MRI requested facility and respondent demographics, then raised questions regarding priority for strategic information technology decisions, what factors are “driving” the need for EHR systems in both hospitals and medical practices, methods for data capture, methods for clinical information entry to the EHR, applications and functions in use and/or planned for implementation (administrative, EHR data capture and review, remote access, hospital order entry applications and functions, e-prescribing, use of continuity of care record, access to reference information, e-mail applications, clinical data repositories), and major barriers to implementation of an EHR. Other questions with regard to RFID, wireless connectivity technology, and safety improvements were included in the survey but are not highlighted in this review.

Selected results from the 2006 annual survey are noted below, however, results are not broken out for different provider types or facility types.

EHR Data Capture, Review, and Update Capabilities -- In use:

- 60.2% -- Demographics;
- 46.9% -- Laboratory results;
- 44.2% -- Medications taken; and
- 42.7% -- Radiology results.

Hospital physician order entry WITH clinical decision-support -- In use:

- 14.8% -- Pharmacy;
- 11.1% -- Laboratory; and
- 10.6% -- Radiology.

E-prescribing to commercial/retail pharmacies -- In use:

- 23.9% -- New prescriptions; and
- 23.5% -- Prescription renewal.

Lack of adequate funding or resources was identified as a major barrier to EHR implementation by 55.5% of respondents. Additional findings on barriers are presented in Section IV of this document.

The term “EHR” does not appear to be defined in this survey. However, MRI indicates that their respondents are “knowledgeable” regarding health care information technology.

Commonwealth Fund International Health Policy Survey of Primary Care Physicians

Researchers at the Commonwealth Fund and Harris Interactive designed and conducted this international survey of primary care physicians in Australia, Canada, Germany, New Zealand, Netherlands, the United Kingdom, and the United States. The purpose of the 2006 survey was to obtain cross-national physician practice information, with an information technology and clinical record systems focus.

Physicians for the international survey were randomly selected from lists available from private or government sources. The four-page questionnaire/survey was conducted in each country's native language, either by mail (Canada, Netherlands, United States -- 43-51% response rate) or phone (Germany and the United Kingdom-- phone only; New Zealand and Australia--phone recruitment, mail and fax -- 18-32% response rate). There were 1,004 respondents from the United States and for this summary, United States results will be featured.

Questions for HIT use were as follows with United States results noted (Schoen et al., 2007, http://www.commonwealthfund.org/usr_doc/topline_results_2006_IHPsurvey2.pdf?section=4056).

- Do you currently use electronic patient medical records in your practice? (Yes, No-plan to implement within the year, No-no plans to implement, Don't know/Declined)
 - 28% -- Yes;
 - 31% -- Plan to implement within the year; and
 - 39% -- No plans to implement.

- Does your EMR system allow you to: (Yes, No, Don't know/Declined)
 - 12% -- Yes, share patient's medical records electronically outside your practice;
 - 22% -- Yes, access patient's medical records when you are outside the office; and
 - 10% -- Yes, provide patients with easy access to their medical records.

- Do you currently use any of the following technologies in your practice? (Yes, routinely; Yes, occasionally; No; Don't know/Declined)
 - 22% routinely -- electronic ordering of tests;
 - 20% routinely -- e-prescribing of medications;
 - 48% routinely -- electronic access to patient's test results; and
 - 40% routinely -- electronic access to patient hospital records (discharge summary, etc.).

Using a combination of the above functions, 13% indicated they routinely used the first three electronic functions, while 10% reported they routinely used the entire list.

- With the patient medical records system you currently have, how easy would it be for you/your staff to generate the following information: diagnosis, due for tests, list of medications (Easy, Somewhat difficult; Very difficult; Cannot generate; Don't know/Declined) (No results reported)

Also included were questions regarding the use of a computerized or manual system to routinely send reminder notices (computerized -- 18%; manual -- 32%), send alerts to doctor as to a potential problem with drug dose or drug interaction (computerized -- 23%; manual -- 28%), and reminders/alerts to provide patients with test results (computerized -- 15%, manual -- 40%) (Schoen et al., 2007; Schoen et al., 2006).

National Study of Physician Organizations (NSPO) and the Management of Chronic Illness (Medical Groups)

This survey was conducted by the University of California, Berkeley, and RWJF in September 2000-September 2001. The purpose of the survey was to implement and create a national database on physician organizations. Survey data were collected on practice demographics, size, ownership, type, and volume of patients seen; management and governance of the organization; compensation models; relationships with health plans; and implementation of care management practices and quality improvement approaches. From five large databases, 1,587 medical groups and independent practice associations with 20 or more physicians were identified and contacted for the survey, 1,040 physician offices responded. Sixty-minute CATI surveys were conducted with each organization's president, CEO, or medical director. Physician groups that completed the survey were given a stipend of \$150. Field visits and follow-up phone interviews were conducted in 24 practices to validate the self-report data.

Survey questions pertaining to information technology use were as listed below. Results provided in the reviewed report are noted in boldfaced parentheses (Casalino et al., 2003; Simon, Rundall, & Shortell, 2005, <http://nspo.berkeley.edu/index.htm>).

- Does your group use an electronic database containing: (Yes/No)
 - a. An enrollment record for each patient.
 - b. Encounter data for each patient.
 - c. Claims data for each patient.
 - d. A medical record for each patient **(28%)**.
- Do individual physicians have access to the computerized database? Y/N
- Which of the following pieces of information are linked together for an individual patient in your practice's electronic data systems?

- a. A standardized problem list **(17.7%)**.
 - b. Ambulatory visit data (encounters).
 - c. Emergency room use.
 - d. Inpatient stays.
 - e. Laboratory findings **(40.4%)**.
 - f. Medications prescribed **(23.9%)**.
 - g. Radiology findings **(30.1%)**.
 - h. Clinical guidelines/protocols.
 - i. Medication ordering reminders and/or drug interaction information **(14.5%)**.
- Are the **majority** of patient progress notes for physicians who are members of your group: (Yes/No)
 - a. Handwritten.
 - b. Dictated and transcribed.
 - c. Entered into an EMR directly by the physician or after being dictated and transcribed.

E. Comparison of Survey Findings on HIT Use in Hospitals and Physician Practices

The reviewed surveys are varied with respect to targeted respondents, sample size, methodology, data item construction, definitions, and other variables. While some surveys asked about actual use (Commonwealth, MRI, NSPO, NAMCS), other surveys addressed the levels of implementation, using varying methods of measurement; (e.g., fully operational [HIMSS], significant progress [HFMA], or fully or partially-implemented [NAMCS, AHA]). One survey (Leapfrog) addressed only the implementation of CPOE, while other surveys attempted to measure EHR use, separately assessed use of the multiple clinical functions within an EHR, or measured use and adoption of EMRs or HIT. Given this variability, it is possible only to make a few generalized comparisons of the estimates resulting from the surveys. Table 7 presents findings from the surveys that used similar terminology in assessing EHR/EMR implementation in hospitals and/or physician practices, showing a range of estimates from 4% to about 32% with regard to EMR or EHR use.

As was the case in examining surveys of HIT use in nursing homes (and other long-term care settings), comparisons of survey findings of hospital and physician HIT adoption is limited by variability and lack of clarity in terminology and definitions within and across surveys, resulting in validity and reliability issues. This variability and lack of clarity makes it difficult to discern which surveys have produced the most accurate findings or to attribute particular findings to a survey's setting or sample.

TABLE 5: Use of HIT in Home Health and Hospice Agencies: Summary of Survey Findings

Survey ^{a,b}	Respondents	Items	HIT Use (approx. %s)	Definitions
National Home & Hospice Care Survey (NHHCS), 2000	1,425 home care, hospice, mixed agencies (96% response rate) Nationally representative	Are the medical records of this agency computerized? (Yes/No) Does this agency plan to computerize its medical records within the next year? (Yes/No)	<p>CMR use (all respondents):</p> <ul style="list-style-type: none"> • 32% use a CMR <p>CMR use by agency type:</p> <ul style="list-style-type: none"> • 32.1% of HHAs • 18.6% of hospice agencies • 40.3% of mixed-type agencies (offering both services) <p>CMR use by agency size:</p> <ul style="list-style-type: none"> • 44.8% of agencies w/100 or more patients • 23% of agencies w/50 or fewer patients <p>No other agency characteristics were found to have a significant relationship w/CMR use. Data collected on size (# patients), ownership (proprietary, non-profit, state/local government, Federal Government), affiliation w/hospital or nursing home, chain membership, HMO status.</p>	No definition of CMR provided.
Philips National Study/Fazzi Associates, 2007	976 home care agencies National sample	<p>Do you presently have some type of EMR system to input, store & retrieve patient data in the field or your office? (Yes/No)</p> <p>Do you presently use a Point of Care system to collect data in your patients' homes? (Yes/No)</p> <p>What type of hardware do your clinicians use? Laptop Hand-held Tablets or Notebook Other</p> <p>Do you presently have some type of Telehealth or Remote Patient Monitoring system? (Yes/No)</p> <p>Additional items address details related to use of these technologies.</p>	<p>EMR use (all respondents):</p> <ul style="list-style-type: none"> • 58.5% have EMRs <p>EMR use by agency characteristics:</p> <ul style="list-style-type: none"> • 61.3% of hospital-based agencies • 69.3% of non-profit agencies • 66.5% of agencies w/\$3-\$6 million in Medicare revenue <p>Other HIT Use</p> <ul style="list-style-type: none"> • 77.2% have purchased a fiscal, billing, & backroom system • 61% use some form of electronic POS system, most frequently laptops <p>17.1% use telehealth systems, with larger agencies more likely to use them</p>	<p>Definitions were not provided in survey administration materials.</p> <p>Fazzi Associates presentation handout notes possible confusion over definition: "Does EMR mean 'digital medical records' or integration with all segments of the health field?"</p>

a. Information for each survey can be found in the References and Relevant Literature section at the end of this report.
 b. The ASPE Draft Home Health Taxonomy is not included in this table, as findings are available for completion of the taxonomy by only five HHAs as part of the developmental process.

TABLE 6: Use of HIT in Hospitals and Physician Practices: Summary of Survey Findings

Survey	Respondents	Items	HIT Use (approx. %s)	Definitions
<p>National Survey of Electronic Health Record Adoption in the United States: Preliminary Findings, 2008</p> <p>Collaboration among RTI International, Massachusetts General, the Harvard School of Public Health, & George Washington University (on behalf of ONC)</p>	<p>Random sample of 5,000 currently practicing physicians received two questionnaires: one for physician response & one for response by "the person most knowledgeable about the practice characteristics and HIT use"</p> <p>Preliminary findings presented 1/2008 based on over 1500 responses received -- data collection still in progress.</p>	Unknown	<p>Only preliminary general results have been released from this 2007 survey at this time:</p> <ul style="list-style-type: none"> • 4% -- Functional EHR • 14% -- Minimally functional EHR 	<p>In an attempt to better define EHR, two options for definition are given -- Minimally functional EHR & Functional EHR. "Minimally functional" includes six key functionalities (clinical notes, computerized orders for prescription, computerized orders for labs, computerized order for radiology, viewing lab results, and viewing imaging results). A "functional" EHR includes the above six functionalities plus patient demographic information, patient problem lists, patient medication lists, medical history & follow-up notes, orders sent electronically for prescriptions, labs, radiology, electronic images are returned, warnings of drug interactions or contraindications, out-of-range lab levels are highlighted, & reminders for guideline-based interventions and screenings.</p>
<p>National Ambulatory Medical Care Survey (NAMCS)</p> <p>CDC, National Center for Health Statistics (NCHS)</p> <p>2006</p>	<p>3,000 physicians are randomly selected to provide data on approximately 30 patient visits over a 1-week period.</p> <p>1936 eligible</p> <p>Responses obtained from 1,311</p>	<p><u>2008 version</u></p> <p>"Does your practice use EMR (not including billing records)?" Answer options -- "yes, all electronic," "yes, part paper and part electronic," "no," or "don't know."</p> <p>"Does your practice have a computerized system for" eight function capabilities, answer options of Yes, No, Unknown, or Turned off.</p> <ul style="list-style-type: none"> • Patient demographic information? If yes, does this include problem lists? • Orders for prescriptions? If yes, <ul style="list-style-type: none"> (a) Are there warnings of drug interactions or contraindications provided? (b) Are prescriptions sent electronically to the pharmacy? 	<p>For 2006, estimates of EMR use were calculated in two ways: physicians were considered to use EMRs if they reported "yes" to the general question on EMR use, & physicians were considered to use comprehensive EMR systems if they gave a "yes" response to all four features deemed minimally necessary for a comprehensive EMR system. The four features required of an EMR system are computerized orders for prescriptions, computerized orders for tests, test results, & clinical notes.</p> <p>Findings from 2006:</p> <ul style="list-style-type: none"> • 12% -- had an EMR system with the minimal four features of a comprehensive system (unchanged since 2005) 	EHR not defined.

TABLE 6 (continued)

Survey	Respondents	Items	HIT Use (approx. %s)	Definitions
NAMCS (<i>continued</i>)		<ul style="list-style-type: none"> • Orders for tests? If yes, are orders sent electronically? • Viewing lab results? If yes, are out-of-range levels highlighted? • Viewing imaging results? If yes, are electronic images returned? • Clinical notes? If yes, do they include medical history and follow-up notes? • Reminders for guideline-based interventions and/or screening tests? • Public health reporting? If yes, are notifiable diseases sent electronically?" <p>Two questions that follow ask: "Are there any of the above features of your system that you do not use or have turned off?" & "Are there plans for installing a new EMR system or replacing the current system within the next three years?"</p>	<ul style="list-style-type: none"> • 29% -- reported using full (14.5%) or partial (14.7%) EMR systems (This represents a 22% increase since 2005) <p>Between 2005 & 2006, the percentage of office-based medical practices using any form of EMR increased by 42%.</p> <p>Among physicians with fully electronic systems:</p> <ul style="list-style-type: none"> • 64% -- reported using reminders for guideline-based interventions or screening tests • 53% -- used computerized prescription order entry • 47% -- used computerized test order entry features 	
American Hospital Association (AHA) 2006	CEOs from all US community hospitals, AHA members & non-members, 1,543 responded to the survey (31%)	<p>The survey requested information about these specific functions & applications:</p> <ul style="list-style-type: none"> • EHRs • CPOE • e-prescribing • lab results • lab orders • radiology orders • radiology results • access to current medical record, history • telemedicine • spending • sharing with other entities <p>The survey also asked about financing for information technology, barriers to use, & efforts to exchange clinical information.</p>	<ul style="list-style-type: none"> • 11% of hospitals had fully-implemented EHRs • 68% of hospitals had either fully or partially-implemented EHRs • 10% of hospitals routinely ordered medications electronically at least half of the time. • 16% of physicians routinely placed orders electronically at least half of the time. • 49% of hospitals shared electronic patient data with others (physicians, laboratories, payers, other hospitals) <p>Fully-implemented:</p> <ul style="list-style-type: none"> • 60% -- Lab order entry • 66% -- Lab results • 59% -- Radiology order entry • 47% -- Radiology results • 46% -- Pharmacy order entry 	<p>EHRs were defined as systems that integrate electronically originated and maintained patient-level clinical health information, derived from multiple sources, into one point of access. (An EHR replaces the paper medical record as the primary source of patient information.)</p> <p>Hospital information technology adoption was measured based on implementation of select clinical information technology functions (e.g., access to current medical records, laboratory & radiology order entry & results, pharmacy order entry), then placed on a spectrum or "level of use" ranking: Getting Started - 0-3 functions; Low - 4-7 functions; Moderate - 8-11 functions; High - 12-15 functions.</p>

TABLE 6 (continued)

Survey	Respondents	Items	HIT Use (approx. %s)	Definitions
<p>Mathematica Policy Research</p> <p>2005</p> <p>Centers for Medicare & Medicaid Services</p>	<p>650 completed surveys from a combination of short-term acute care general & critical-access hospitals in 50 states & DC that had submitted data for Hospital Compare, participated in CMS Premier Hospital Quality Incentive Demo, & accredited by JCAHO. Respondents were senior quality improvement hospital executives.</p>	<p>“Do clinicians at your hospital use any of the following EHR capabilities?”</p> <ul style="list-style-type: none"> • prescribing • Electronic clinical notes systems • Electronic lab orders • Electronic lab results • Electronic images available throughout a hospital • Electronic reminders for guideline-based interventions <p>If one or more types of information technology in place, whether any of the initiatives had been an important factor in improving quality to date. If “yes,” What is the single most important way that any of these EHR capabilities has affected quality in the hospital?”</p>	<ul style="list-style-type: none"> • 21% -- E-prescribing • 59% -- Electronic clinical notes systems • 49% -- Electronic lab orders for lab tests • 88% -- Electronic lab results • 50% -- Electronic images (CT, MRI, PET scans) • 24% -- Electronic reminders <p>Quality improvement benefits associated with HIT use were reported:</p> <ul style="list-style-type: none"> • Timeliness of clinical information, diagnosis, & treatment, • Reduced medication errors & improved patient safety, & • Improved communication among care team. 	<p>HIT was defined as the ability to collect, store, retrieve, & transfer clinical information electronically.</p>
<p>Leapfrog Group Hospital Quality & Safety Survey, 2007</p>	<p>Self-reporting -- hospitals involved in Leapfrog's “Roll out” regions receive invitation & security code to complete the survey. Other hospitals can voluntarily complete the survey.</p>	<p>Does your hospital have a functioning CPOE system in at least one unit of the hospital? Y/N</p> <p>What percent of your hospital's total inpatient medication orders (including orders made in units which do NOT have a functioning CPOE) do prescribers enter via a CPOE system that:</p> <ul style="list-style-type: none"> • includes decision-support software to reduce prescribing errors; • is linked to pharmacy, laboratory, & ADT information in your hospital; & • requires that they document electronically a reason for overriding an interception prior to doing so? <p>What percent of inpatients have the majority of their medication orders entered by a prescriber via a CPOE system</p> <p>Questions also include use, implementation, future plans.</p>	<p>For CPOE, of 1,330 hospitals responding, 10.6% met the CPOE assessment criterion with 6.8% indicating they will commit by 2008</p>	<p>Electronic Medical Record System EMR is a comprehensive record that includes all documentation of care given to a specific patient. “Hospital-wide” means that the EMR is used for all hospital inpatients</p> <p>CPOE Linked to Pharmacy, Laboratory, ADT Information The ability of a CPOE system to catch the majority of common, serious prescribing errors depends on proper identification of patients (ADT information), current & recent pharmacy orders & drug dispensing history, & access & integration of key laboratory results for the patient.</p>

TABLE 6 (continued)

Survey	Respondents	Items	HIT Use (approx. %s)	Definitions
<p>Healthcare Financial Management Association (HFMA)</p> <p>2006</p>	<p>Senior health care finance executives at hospitals & health systems of various sizes & regions -- 176 survey responses.</p> <p>Roundtable discussions included HFMA, in collaboration with the National Health Information Technology Coordinator, met with 15 health care finance executives to identify methods & associated challenges involved with a universal EHR.</p>	<p>Level of EHR adoption by function:</p> <ul style="list-style-type: none"> • Order entry/order management • Results management • Electronic health information/data capture • Administrative processes • Electronic connectivity • Clinical decision-support • Health outcomes reporting • Patient access 	<p>Functions in which the greatest number of hospitals reported significant progress:</p> <ul style="list-style-type: none"> • 38% -- Order entry/order management • 27% -- Results management • 23% -- Electronic health information/data capture • 23% -- Administrative processes • 13% -- Clinical decision-support • 13% -- Health outcomes reporting • 2% -- Patient access <p>The most significant barriers:</p> <ul style="list-style-type: none"> • 62% -- Lack of national information standards & code sets • 59% -- Lack of available funding • 50% -- Lack of interoperability 	<p>An EHR is a digital collection of a patient's medical history & could include items like diagnosed medical conditions, prescribed medications, vital signs, immunizations, lab results, & personnel characteristics like age and weight.</p>
<p>18th Annual HIMSS Leadership Survey: Healthcare CIO</p> <p>2007</p>	<p>Hospitals, physician offices/clinics, long-term care facilities, HHAs, & other health care organizations -- for this review, 360 CIO respondents</p>	<p>Respondents were asked to identify/select the five health care applications (from a list of 25) that they considered most important over the next two years.</p> <p>Respondents were asked to identify/select five technologies that their organization planned to use in the next two years.</p> <p>Respondents were asked to describe the status of the organization's current use of an EMR system.</p> <p>Respondents were asked to identify the most significant barrier to information technology implementation.</p>	<p>Five health care applications considered most important over the next two years:</p> <ul style="list-style-type: none"> • 47% -- CPOE • 47% -- EMR • 46% -- Clinical Information Systems • 43% -- Bar Coded Medication Management • 37% -- CDR • 35% -- Enterprise-wide Clinical Information Sharing • 32% -- fully operational EMR system in place • 37% -- have begun to install EMR hardware & software • 16% -- developed a plan to implement an EMR system • 8% -- have not yet begun to plan for the use of an EMR system 	<p>EMR system, as defined by HIMSS: "electronically originated & maintained clinical health information, derived from multiple sources, about an individual's lifetime health status & health care; An EMR is supported by clinical decision systems and replaces the paper medical record as the primary source of patient information."</p>

TABLE 6 (continued)

Survey	Respondents	Items	HIT Use (approx. %s)	Definitions
<p>Medical Records Institute (MRI)</p> <p>8th Annual Survey of Electronic Health Record Trends and Usage for 2006</p>	<p>Health care providers who are e-mail subscribers to MRI or TEPR, or visitors at TEPR conference, 2006</p> <p>Excluding vendors & consultants, there were 729 responses.</p> <p>22.6% respondents were physicians; 10.2% were medical information systems professionals</p>	<p>EHR Data Capture, Review, & Update Capabilities -- In Use Today & Planned (selected from list of 18 options):</p> <p>Demographics, Laboratory Results, Medications being taken, radiology results, progress notes, discharge summary, etc.</p> <p>Order Entry Applications & Functions in use today & planned including laboratory, radiology, pharmacy by nurses, physicians with & without clinical decision-support</p> <p>E-prescribing to pharmacy -- in use today & planned</p>	<p>Selected EHR Data Capture, Review, & Update Capabilities -- In use:</p> <ul style="list-style-type: none"> • 60% -- Demographics • 47% -- Laboratory results • 44% -- Medications taken • 43% -- Radiology results <p>Physician order entry WITH clinical decision-support -- In use:</p> <ul style="list-style-type: none"> • 15% -- Pharmacy • 11% -- Laboratory • 11% -- Radiology <p>E-prescribing -- In use:</p> <ul style="list-style-type: none"> • 24% -- New prescriptions • 24% -- Prescription renewal <p>Barriers:</p> <ul style="list-style-type: none"> • 56% -- Lack of adequate funding or resources • 37% -- Lack of support by medical staff • 29% -- Inability to find an EHR solution at an affordable cost • 24% -- Difficulty in evaluating EHR solutions/components • 24% -- Unable to find an EHR solution that meets our application, technical requirements • 23% -- Difficulty in finding an EHR solution not fragmented among vendors or information technology platforms • 23% -- Difficulty in creating a plan from paper to EHRs • 21% -- Difficulty in building a strong business case (ROI) 	<p>EHR is not defined.</p>

TABLE 6 (continued)

Survey	Respondents	Items	HIT Use (approx. %s)	Definitions
<p>Commonwealth Fund International Health Policy Survey of Primary Care Physicians</p> <p>2006</p>	<p>Primary care physicians, including internists & pediatricians. Randomly selected from lists available from private or government sources. 1,000 respondents from the US.</p>	<p>Do you currently use electronic patient medical records in your practice? (Yes, No-plan to implement, No-no plans to implement, Don't know/Declined)</p> <p>Does your EMR system allow you to:</p> <ul style="list-style-type: none"> • Share patient's medical records electronically outside your practice? • Access your patient's medical records when you are outside the office • Provide patients with easy access to their medical records <p>Do you currently use any of the following technologies in your practice?</p> <ul style="list-style-type: none"> • Electronic ordering of tests • E-prescribing of meds • Electronic access to patient's test results • Electronic access to patient hospital records (discharge summary, etc.) <p>With the patient medical records system you currently have, how easy would it be for you/your staff to generate the following info: diagnosis, due for tests, list of meds</p> <p>Also included are questions re: ability to routinely send reminder notices, alerts, test results.</p>	<p>US results:</p> <ul style="list-style-type: none"> • 28% -- Use EMRs • 12% -- Share records • 22% -- Access records outside office • 22% -- Electronic test orders • 20% -- E-prescribing • 48% -- Electronic results to test results • 40% -- Electronic access to patient's hospital records 	<p>EMR is not defined.</p>

TABLE 6 (continued)

Survey	Respondents	Items	HIT Use (approx. %s)	Definitions
<p>National Study of Physician Organizations (NSPO) & the Management of Chronic Illness (Medical Groups)</p> <p>September 2000 to September 2001</p> <p>University of CA, Berkeley, Robert Wood Johnson Foundation (RWJF)</p>	<p>1,587 US medical groups & independent practice associations with 20 or more physicians were identified using 5 large databases, 1,040 physician offices responded.</p>	<p>Does your group use an electronic data system containing:</p> <ol style="list-style-type: none"> An enrollment record for each patient Encounter data for each patient Claims data for each patient A medical record for each patient <p>Do individual physicians have access to the computerized database? Y/N</p> <p>Which of the following pieces of information are linked together for an individual patient in your practice's electronic data systems?</p> <ol style="list-style-type: none"> A standardized problem list Ambulatory visit data (encounters) Emergency room use Inpatient stays Laboratory findings Medications prescribed Radiology findings Clinical guidelines/protocols Medication ordering reminders &/or drug interaction information <p>Are the majority of patient progress notes for physicians who are members of your group:</p> <ol style="list-style-type: none"> Handwritten Dictated & transcribed Entered into an EMR directly by the physician or after being dictated & transcribed. 	<ul style="list-style-type: none"> 28% -- Use an electronic database containing a medical record for each patient <p>Which of the following pieces of information are linked together for an individual patient in your practice's electronic data systems?</p> <ul style="list-style-type: none"> 17.7% -- A standardized problem list 40.4% -- Laboratory findings 23.9% -- Medications prescribed 30.1% -- Radiology findings 14.% -- Medication ordering reminders &/or drug interaction information 	<p>Questions refer to "electronic data systems" for particular functions (e.g., enrollment record, encounter data, claims data, medical record for each patient).</p>
<p>NOTE: RWJF, GWU, and MGH environmental scan (Health Information Technology in the United States: The Information Base for Progress) is not included in this table as summary findings only were included.</p>				

TABLE 7: Comparison of Survey Findings for EMR/EHR Use (Approximate %s)			
Survey	Respondents	EMR/EHR	Item Wording/Definition
AHA (2006)	1,543 CEOs from US community hospitals	11%	Fully-implemented EHR
HIMSS (2007)	360 CIOs from hospitals, physician offices, long-term care, home health & other health care organizations	31.9%	Fully operational EMR
NAMCS (2006)	1,311 ambulatory care physicians	14.5%	Full EMR system
GWU/MGH/RTI (2008)	Physicians & physician practice managers	4%	Functional EHR
NSPO (2001)	1,040 physician practices	28%	Have electronic database containing a medical record for each patient
Commonwealth (2006)	1,000 primary care physicians from the US	28%	Use EMRs

IV. REVIEW OF SURVEYS AND INFORMATION ON BARRIERS TO HIT ADOPTION

Despite national support for widespread adoption of HIT across health care settings and growing recognition of its value in improving health care safety, quality, and efficiency, HIT adoption continues at a relatively slow pace. Recent efforts have been made to identify barriers contributing to the limited progress in HIT adoption beyond commonly used administrative functions, and supply information to help guide the development of policies and incentives to promote more rapid HIT proliferation.

Table 8 summarizes the findings from ten recent surveys that addressed barriers to HIT adoption in a variety of health care settings. Four surveys targeted administrators and other HIT "decision makers" in nursing homes and other long-term care organizations. Three of these surveys were state-specific (California, Minnesota, and New York), while one (Maestro Strategies) included 36 multi-facility long-term care organizations from across the country. In addition, six surveys obtained feedback on barriers from physicians, CEOs, health care finance executives, information technology managers, and other respondents primarily from hospitals and physician practices.

The ten surveys summarized in the table use a variety of measurement approaches to capture feedback on HIT adoption barriers. Response options vary considerably; for example, respondents are asked to rate listed barriers as "a significant barrier", "somewhat of a barrier", or "not a barrier"; select the one most important barrier; select all that apply as significant barriers; or rate barriers on a scale of 1 (not a problem) to 5 (makes implementation extremely difficult). The lists of barriers presented for respondent feedback are not consistent across surveys, although they contain substantial conceptual overlap. Terminology/phrasing of barriers also is inconsistent across surveys. Even minor variation in wording can influence respondent interpretation and affect his or her perception of the degree to which a particular factor is a barrier to HIT adoption.

Despite the variability in measurement approaches and phrasing related to cost issues (e.g., lack of capital resources, lack of financial support, initial costs, lack of adequate funding or resources), cost -- particularly for initial investment in HIT software -- remains an easily identifiable top barrier for most health care facilities and organizations across settings. Only two of the ten surveys reviewed did not identify cost issues as the greatest barrier or challenge. Specifically, respondents to a Maestro Strategies survey of 36 long-term care multi-facility AHCA members identified obsolescence/limited functionality of legacy systems, end user support, and software incompatibilities as their greatest challenges with HIT, while a HFMA survey of 176 senior health care finance executives at hospitals and health systems identified lack of national standards and code sets as the top barrier (cost remained a primary issue, however, as lack of available funding was a close second).

Interestingly, results from the California Healthcare Foundation survey of long-term care organizations show variability among nursing homes that were hospital-based, part of multi-facility organizations, and freestanding with regard to the importance of cost as a barrier. Lack of capital resources was supported by 80% of hospital-based nursing facilities as a significant barrier and 78% of freestanding nursing homes, but only 44% of multi-facility organizations. The lesser degree of support of cost as a critical barrier by multi-facility organizations is corroborated by the findings of the Maestro Strategies survey of multi-facility organizations across the nation where "expense of transitioning from paper to electronic records" was fifth in the selection of greatest challenges with information technology. For the five hospital-based and 27 freestanding nursing homes in the California survey, lack of capital resources was the top barrier, while this was third for the 32 multi-facility organizations, after lack of integration with other systems (56%) and lack of computer skills among staff (53%). For the hospital-based nursing homes in the California survey, lack of professional information technology staff was the second most supported barrier, while lack of reimbursement for using information technology was second among the freestanding nursing homes.

Outside of initial and ongoing/maintenance costs, the reviewed surveys yielded considerable variability with regard to the top barriers to HIT implementation. Other noted barriers (again, described using variable terminology), perceived as fairly significant in some surveys and less significant in other surveys, include concern about integration of HIT systems with other software; physician resistance; lack of standards/code sets; obsolescence of legacy systems; lack of technical/information technology staff; staff lacking computer skills; inability of technology to meet needs; return on investment; transitioning historic data into new system; concern about loss of productivity during transition to new system; lack of time to select, contract, install, and implement software/technology; vendor issues; and security/privacy concerns. Although resistance by users of HIT systems (particularly physicians) was a frequently supported barrier among the hospital/physician practice surveys, "end user support" was reported as one of the top barriers by only one of the four long-term care surveys.

Many of the existing survey items addressing barriers to HIT adoption and use can provide a useful foundation for developing survey items targeting nursing homes in particular, to add to the limited current findings in this area.

TABLE 8: Survey Findings on Barriers to HIT Adoption

Survey	Respondent(s)	Findings
Nursing Homes/Long-Term Care		
Maestro Strategies, 2007	36 multi-facility long-term care organization AHCA members -- most for-profit. 41% of respondents were CEOs.	Organization's greatest challenges with information technology (those selected by 10 or more of the 36 survey respondents are shown here): <ul style="list-style-type: none"> • Obsolescence/limited functionality of legacy systems (16 respondents) • End user support (16) • Software incompatibilities (13) • Difficulty of quantifying value of information technology investments (12) • Expense of transitioning from paper to electronic records (11)
California HealthCare Foundation (Hudak & Sharkey, 2007)	103 SNFs & RCFEs w/ >75 beds in California. Non-random sample. Decision makers for HIT, including administrators, clinical leaders, & information technology personnel at the facilities.	Percent responding "significant barrier" to information technology adoption: SNFs: Hospital-based (n=5); In multi-facility orgs. (n=32); Freestanding (n=27) -- % presented by facility type: <ul style="list-style-type: none"> • Lack of capital resources (80%, 44%, 78%) • Lack of professional information technology staff (60%, 31%, 44%) • Information technology product not integrated with other systems (40%, 56%, 44%) • Staff lack computer skills (40%, 53%, 48%) • Lack of reimbursement for using information technology (20%, 17%, 60%) RCFEs (n=13) <ul style="list-style-type: none"> • Lack of capital resources (54%) • Lack of professional information technology staff (62%) • Information technology product not integrated with other systems (85%) • Staff lack computer skills (85%) • Lack of reimbursement for using information technology (29%) Focus groups: <ul style="list-style-type: none"> • Lack of capital resources • Difficulty in finding HIT products that meet their need (a simple, user-friendly, comprehensive clinical system that interfaces with existing systems) • Lack of proven benefit/lack of evidence that HIT will have a positive impact on quality of care and operational efficiencies • Risk of new state or federal requirements -- systems purchased now might not integrate with government mandated products or requirements later • Lack of hardware & technical support staff/inadequate infrastructure
Continuing Care Leadership Coalition, 2006	34 long-term care organizations (including freestanding nursing facilities & MSOs in New York State.	Barriers to HIT adoption -- percent of respondents indicating "Significant Barrier," "Somewhat of a Barrier," or "Not a Barrier": <ul style="list-style-type: none"> • Initial cost of information technology investment (48.5%, 42.4%, 9.1%) • Ability to support ongoing costs of hardware & software (23.5%, 52.9%, 23.5%) • Inability of technology to meet needs (24.2%, 48.5%, 27.3%) • Interoperability of hardware & software with current systems (24.2%, 42.4%, 33.3%) • Availability of well-trained information technology staff (18.8%, 34.4%, 46.9%)

TABLE 8 (continued)

Survey	Respondent(s)	Findings
Stratis Health, 2008	297 Minnesota nursing homes. Completed by administrator or delegate.	<p>All options presented as possible barriers in the survey question are listed below. The percent of respondents indicating "Major Barrier" is presented for the top four barriers (results for other barriers were not presented in the report on findings).</p> <ul style="list-style-type: none"> • Lack of capital resources to invest (72.1%) • Insufficient time to select, contract, install, & implement a software/technology (26.5%) • Inability to easily input historic medical record data into the software/technology system (25.4%) • Lack of technical infrastructure (e.g., networking, servers, other hardware) (24.0%) • Insufficient return on investment • Lack of proven benefit • Lack of staff support • Staff does not have skills/training to use software/technology • Unable to find software/technology solution that meets our needs • Lack of technical support • Inability to evaluate, compare, & select the appropriate software/technology system • Concern about the loss of productivity during transition to software/technology system • Risk of changing state or federal requirements • Security and privacy concerns
Hospitals/Physician Practices		
<p>National Survey of Electronic Health Record Adoption in the United States: Preliminary Findings (2008).</p> <p>Collaboration among RTI International, MGH, the Harvard School of Public Health, & GWU (on behalf of ONC)</p>	<p>Random sample of 5,000 currently practicing physicians received two questionnaires: one for physician response & one for response by "the person most knowledgeable about the practice characteristics & HIT use."</p> <p>Preliminary findings presented in January 2008 based on over 1,500 responses received -- data collection started in July 2007 & is still in progress.</p>	<p>Percent of physicians reporting a "major barrier" -- presented for physicians with a functional EHR & without a functional EHR</p> <ul style="list-style-type: none"> • Lack of capital (36% w/EHR, 66% w/o EHR) • Finding system to meet needs (22% w/EHR, 55% w/o EHR) • Uncertainty of ROI (16% w/EHR, 51% w/o EHR) • System becoming obsolete (18% w/EHR, 43% w/o EHR) • Loss of productivity (27% w/EHR, 41% w/o EHR) • Capacity to implement (15% w/EHR, 40% w/o EHR) • Physician resistance (30% w/EHR, 30% w/o EHR) <p>Percent of physicians reporting incentive would have an impact:</p> <ul style="list-style-type: none"> • Monetary incentives for purchase (80%) • Additional payment (82%) • Legal physician protection (78%) • Published certification standards (72%) • Legal liability if NOT using technology (55%)
Medical Record Institute's 8th Annual Survey of Electronic Health Record Trends & Usage for 2006	<p>568 respondents to the question on barriers, from respondent group of 729 providers from ambulatory settings (nearly 50%), hospitals, integrated health systems, & other settings.</p> <p>About 35% of respondents were information technology managers or professionals, 28% were physicians or nurses, 18% were non-information technology management staff, & 18% other.</p>	<p>What are the major barriers to your plans for implementing an EHR-S? (Select all that apply.)</p> <ul style="list-style-type: none"> • Lack of adequate funding or resources (55.5%) • Lack of support by medical staff (31.7%) • Inability to find an EHR solution or components at an affordable cost (29.4%) • Difficulty in evaluating EHR solutions or components (23.6%) • Unable to find an EHR solution that meets our application or technical requirements (23.6%) • Difficulty in finding an EHR solution that is not fragmented among vendors or information technology platforms (23.2%) • Difficulty in creating a migration plan from paper to EHRs (22.9%) • Difficulty in building a strong business case (ROI) (21.0%) • Other (17.1%)

TABLE 8 (continued)

Survey	Respondent(s)	Findings
HIMSS Foundation, 2004	307 senior information technology executives at US health care facilities -- over 700 hospitals (86% of respondents). Other respondents: physician offices, mental/behavioral health facilities, long-term care facilities, HHAs.	Most significant barrier to IT implementation: <ul style="list-style-type: none"> • Lack of financial support (23%) -- 4th consecutive year as top barrier • Vendors' inability to satisfactorily deliver products & services (14%) • Difficulty in proving quantifiable results or ROI (13%)
Healthcare Financial Management Association (HFMA), 2006: Overcoming Barriers to Electronic Health Record Adoption	176 senior health care finance executives at hospitals & health systems across the country.	Top barriers to EHR adoption <ul style="list-style-type: none"> • Lack of consistent national information standards & code sets (62%) • Lack of available funding (59%) • Concern about physician usage (51%) • Lack of interoperability with other systems (50%) • Lack of available staff resources (43%) • Lack of existing regional information network (37%) • Concern about payer adoption (32%) • Insufficient financial return (28%) • Privacy concerns (16%) Comparisons <ul style="list-style-type: none"> • Mid-sized hospital leaders were more concerned about funding than large or small hospital leaders. • Rural hospitals more concerned about funding than non-rural hospitals. • Hospitals with low level of adoption were more concerned about funding than those further along. Financial return also was a greater concern for hospitals with low adoption level.
AHA: Continued Progress: Hospital Use of Information Technology, 2007	1,543 respondents. Survey instruments sent to hospital CEOs by e-mail & fax, reply by either online web portal or fax	Percent of hospitals indicating barrier is a "significant barrier" or "somewhat of a barrier": <ul style="list-style-type: none"> • Initial costs (54% significant, 40% somewhat) • Ongoing costs (32% significant, 55% somewhat) • Interoperability with current systems (27% significant, 52% somewhat) • Acceptance by clinical staff (23% significant, 59% somewhat) • Availability of well-trained information technology staff (16% significant, 51% somewhat) • Inability of technology to meet needs (11% significant, 51% somewhat)
California HealthCare Foundation, 2008: The State of Health Information Technology in California	Findings on barriers are from Health Information Technology Survey conducted by the California Medical Association in December 2005 -- January 2006. 359 physicians or physician staff responded to the web-based survey.	Barriers to EHR use among physicians: <ul style="list-style-type: none"> • Expense to purchase (59%) • Difficulty/expense of implementation (42%) • Unsure how to make selection (31%) • Resistance to change in practice style (30%) • Retraining of staff (28%) • Lack of internal technical expertise to lead/organize project (25%) • No return on investment (22%) • Attractive product not found (18%) • Inadequate vendor support (15%)

V. RECOMMENDATIONS FOR SURVEY DEVELOPMENT

Purpose of Survey Instruments to Assess HIT/EHR Adoption in Nursing Homes

The purpose of both the core survey and drill-down questions to be specified in this project is to further our understanding of the adoption and use of HIT applications related to clinical care, including those applications used for health information exchange with other providers. The core set of questions could be fielded as part of the NNHS that is administered periodically by NCHS or as a stand-alone survey. Both the core set of questions and the drill-down questions will be available to nursing home/long-term care industry stakeholder groups (e.g., AHCA, AAHSA), which could administer the questions to members to derive detailed information on the adoption of HIT in general, as well as implementation of specific HIT applications, including the use of products designed to incorporate national standards (e.g., HL7 messaging standards, LOINC semantic standards).

Core Set of HIT/EHR Survey Questions

This parsimonious set of questions (e.g., 8-15 items) could enhance the HIT/EHR-related data item currently collected by the NNHS (or others) by gathering more specific information on the adoption of specified HIT applications. For example, data items could target a list of HIT functionalities, and define different levels of HIT adoption for each application as part of the question responses. The questions developed for potential use with the NNHS would be designed so the results could be compared with NCHS surveys fielded in other provider settings (e.g., the National Home Health and Hospice Survey, the NAMCS) to promote the ability to assess HIT adoption across provider types. In addition, the questions would be designed so that the data gathered could be considered along with other survey data to address other questions important for national health policy (e.g., is there a difference in rates of rehospitalization in nursing homes adopting EHRs vs. those not adopting EHRs). An advantage of fielding questions with the NNHS is that the survey would be administered to a large, representative group of nursing homes, allowing the findings to be generalized to the nursing home industry. In addition, because the NNHS is fielded with nursing homes on a regular basis, it would be possible to track HIT/EHR adoption rates over time. The primary disadvantage to incorporating these questions into the NNHS is that data collection efforts beyond the data normally collected for the NNHS must be financially sponsored by an interested agency. In addition, the number of questions/data items must be limited to minimize overall survey burden. Therefore, careful consideration is needed to limit the focus and number of questions related to nursing home EHR/HIT adoption, use, and barriers that could be included in the NNHS.

Domains of Interest

The ASPE Nursing Home HIT taxonomy includes categories for administrative functions, operations management functions, EHR functions, functions related to medication ordering and management, and telehealth functions. Based on information derived from experts in long-term care (nursing homes) and vendors of HIT products for nursing homes as well as findings from existing nursing home/long-term care surveys, we believe that most facilities currently use various administrative information technology functions. CMS has announced that it will be requiring nursing home providers to complete and electronically transmit, beginning in October 2009, a new version of the nursing home MDS assessment, the MDSv3. ASPE is sponsoring work linking accepted HIT standards to the MDSv3 in an effort to promote the use of interoperable software by nursing home providers. The MDSv3 linked with accepted HIT standards will be made available to CMS and nursing home providers and vendors so that either CMS could use these standards in its MDSv3 data specifications, and/or providers could ask vendors for software that supports the use of these applied standards. Thus, consideration will be given as to the inclusion of survey questions concerning the use of HIT standards for various applications, including in the completion and transmission of assessments.

Of particular interest for nursing home facilities and policy makers are the use of HIT applications that support improvements in patient safety and communication/coordination among care providers, and increases in efficiency in clinical work processes. Therefore, we recommend that the focus of both sets of survey questions address applications that support these objectives.

The use of HIT applications for the following functions will be considered for the core set of survey questions:

- Resident Demographic Data;
- Problem and Allergy Lists;
- Advance Directives;
- Assessment/Care Planning (including MDS);
- Clinical Notes;
- CNA Charting and Workflow (e.g., electronic task lists by resident);
- MAR;
- TAR;
- Provider Orders -- Medications and Non-Medications;
- Results Viewing (Lab, Imaging, Consults);
- Automated Clinical Decision-Support Tools;
- Summary Reports and Quality Management Reports; and
- Telehealth and Telemonitoring.

Questions likely will be included to assess degree or level of automation (paper only, combination paper/electronic, or fully electronic) for key functions; use of clinical decision-support tools for a subset of relevant functions; and health information

exchange capabilities (within and outside of a facility or health system). In addition, information on barriers to adoption and benefits of HIT will be included. Figure 1 provides an example of a possible question concerning barriers to adoption and use of HIT. The illustrative question was built on a question on barriers included in the national physician survey developed under an ONC contract (RTI International, 2006).

Drill-Down Questions on HIT/EHR Use in Nursing Homes

A set of drill-down questions that key off of responses to the core set of questions is proposed to provide a better understanding of actual implementation of HIT by nursing homes that are actively using it to support clinical work functions. We anticipate that the drill-down questions could be administered by industry stakeholder groups (e.g., AHCA, AAHSA) and recommend that the questions be administered using a web-based format. Using a web application rather than paper-and-pencil administration allows respondents to view only those questions relevant to them based on their responses to the core questions, thus substantially reducing the average number of questions to be answered by each respondent and, correspondingly, the amount of time needed to complete the survey.

Figure 2 provides an example of how the drill-down methodology could work for a possible core survey question on the level of automation used for a facility's MAR.

Depending on the response to a core survey question, drill-down questions will allow for assessment of details related to the target function. Using the example in Figure 2, if the respondent selects response option a (i.e., Paper Only) to the core question regarding level of automation for a facility's MAR, then no drill-down questions are asked. If a respondent selects response option b or c to the core question, then a series of follow-up questions on the MAR are asked (e.g., regarding the authoritative record, data capture, etc.). Survey questions will be logically sequenced so that the appropriate follow-up questions will be programmed to automatically appear on the user's computer screen.

The advantage of the drill-down questions is the potential to collect data that would allow the industry to track not only adoption rates, but provide detailed information on the level of automation, use of clinical decision-support tools, and health information exchange capabilities. The disadvantage is that surveys administered by provider groups tend to have lower response rates than those fielded by NCHS and are subject to respondent bias (i.e., nursing homes who are members of the provider group may adopt HIT/EHR at higher rates than the industry as a whole). In addition, it is important to consider the length of the survey and associated response burden. Careful consideration will be required regarding the number and focus of drill-down questions to ensure that only those questions that will provide meaningful data about HIT implementation in nursing homes are included. As mentioned, response burden will be reduced by use of a web-based survey process that incorporates automated skip patterns. Combining the core and the drill-down questions is expected to provide

comprehensive information about the breadth and depth of HIT adoption in nursing homes.

Types of Facilities and Survey Respondents

Both sets of survey questions should be geared toward various facility auspices and ownership, including facilities that are proprietary and non-profit; stand-alone, corporate chain, hospital-based, CCRC, etc. One of the first questions in the more comprehensive survey instrument should gather data on facility characteristics. Facility characteristics information already gathered as part of the NNHS would be included and could perhaps be expanded (e.g., to specify regional or national chain affiliation). The more comprehensive survey instrument would gather information about each facility's location, size, ownership status, and certification status.

Survey respondents for the NNHS are typically administrators or designated staff with the information necessary to complete the survey questions. For the drill-down questions on nursing home HIT functions, it is likely that the respondent will be a CIO (or equivalent) who are responsible for the purchase and maintenance of software applications for the facility, and clinicians with a responsibility for the implementation of software applications for the facility.

Technical Expert Panel Review and Final Report

Following development of the draft survey questions, a technical expert panel (TEP) will be convened. The TEP will consist of stakeholders from the ONC, ASPE, and NCHS, along with experts in HIT for long-term care, nursing home administration, and survey development. The TEP will review the draft questions and offer feedback on content, wording, and format. The TEP will be asked to judge the feasibility of implementing the two surveys in terms of potential respondent burden and cost, and to provide suggestions on survey implementation. After TEP feedback is compiled, both sets of survey questions will be refined and submitted to ASPE as part of a final project report.

FIGURE 1: Sample Question on Barriers to Adoption and Use

Barriers to HIT Adoption and Use: Indicate whether each factor listed below is or was perceived as a major barrier, minor barrier, or not a barrier to purchasing and using automated system(s) for clinical work functions at your facility.

BARRIER	MAJOR BARRIER	MINOR BARRIER	NOT A BARRIER
a. Financial Barriers (e.g., needed capital, uncertain return on investment)			
b. Organizational Barriers (e.g., staff resistance, lack of IT personnel, concern about loss of productivity during transition, transitioning historic information, capacity to train staff)			
c. Legal or Regulatory Barriers (e.g., concern about confidentiality breaches, state regulations regarding electronic signatures)			
d. State of Technology (e.g., finding a system that meets facility needs, concerns that system will become obsolete, software or hardware incompatibilities with established systems, difficulty with wireless access)			

Comments: If you believe one or more specific functions (e.g., e-prescribing, MAR) are particularly affected by specific barriers, please comment on this:

FIGURE 2: Illustration of Core Question on Level of Automation of Medication Administration Record and Associated Drill-Down Questions

Illustrative Core Question:

Mark a, b, or c to indicate the level of automation currently in use at your facility (not just installed or available, but actually used), even if not facility-wide.

Medical Administration Record (MAR)

Illustrative Core Question Response Options:	a. Paper Only	b. Combination Paper/Electronic	c. Fully Electronic, with Point of Service
Example of Drill-Down Questions Triggered by Responses to Core Survey Question	No further questions.	<ol style="list-style-type: none"> 1. Do you have wireless capability? 2. Is the authoritative record paper or electronic? 3. Although the authoritative record is electronic, does the facility still maintain a hard copy? 4. Why is a hard copy record maintained? 5. Is the electronic system housed at the facility or hosted by a third party? 6. How does electronic documentation/data capture occur? 7. If you are not using point of service data capture, why not? 	<ol style="list-style-type: none"> 1. Do you have wireless capability? 2. Is the authoritative record paper or electronic? 3. Although the authoritative record is electronic, does the facility still maintain a hard copy? 4. Why is a hard copy record maintained? 5. Is the electronic system housed at the facility or hosted by a third party? 6. How does electronic documentation/data capture occur?

REFERENCES AND RELEVANT LITERATURE

- American Health Care Association (AHCA) and the National Center for Assisted Living (NCAL). (2006). *A Snap-Shot of the Use of Health Information Technology in Long Term Care*.
http://www.amda.com/news/othernews/2007/ahca_hit_longtermcarewhitepage1206.pdf [Online].
- American Health Information Management Association (AHIMA). (2007a). *2007 Long Term Care (LTC) Health Information Technology (HIT) Summit Working Document*. (Unpublished Document)
- AHIMA. (2007b). *HL7 LTC-Nursing Home EHR-S Functional Profile and Letter of Invitation*. (Unpublished Document)
- American Hospital Association (AHA). (2007). *Continued Progress: Hospital Use of Information Technology*. <http://www.aha.org/aha/content/2007/pdf/070227-continuedprogress.pdf> [Online]. Available:
http://www.aha.org/aha_app/index.jsp?SSO_COOKIE_ID=0a2f011430d82c3a21bfd0fd4f08bbdab815c8e16b61.
- Ash, J.S., Gorman, P.N., Seshadri, V., & Hersh, W.R. (2004). Computerized physician order entry in U.S. hospitals: Results of a 2002 survey. *Journal of the American Medical Informatics Association*, 11(2):95-9.
- Ash, J.S., & Bates, D.W. (2005). Factors and forces affecting EHR system adoption: Report of a 2004 ACMI discussion. *Journal of the American Medical Informatics Association*, 12:8-12.
- Ash, J.S., Sittig, D.F., Dykstra, R., Campbell, E., & Guappone, K. (2007). Exploring the unintended consequences of computerized physician order entry. *Medinfo*, 12(Pt 1):198-202.
- Bates, D.W. (2002). The quality case for information technology in healthcare. *BMC Medical Informatics & Decision Making*, 2:7.
- Bates, D.W., & Gawande, A. A. (2003). Improving safety with information technology. *New England Journal of Medicine*.348(25):2526-34.
- Blumenthal, D. (2008). A National Survey of the Electronic Health Record Adoption in the United States. <http://www.hhs.gov/healthit/documents/m20080115/04-blumenthal.html> [Online].

- Booz Allen Hamilton. (2006). *Evaluation Design of the Business Case of Health Information Technology in Long-Term Care: Final Report*. Washington, DC: Office of Disability, Aging and Long-Term Care Policy, ASPE, HHS. Available: <http://aspe.hhs.gov/daltcp/reports/2006/BCfinal.htm>.
- Burt, C., Hing, E., & Woodwell, D. (2007). *Electronic Medical Record Use by Office-Based Physicians: United States, 2005*. Bethesda, MD: National Center for Health Statistics, Center for Disease Control. <http://www.cdc.gov/nchs/products/pubs/pubd/hestats/electronic/electronic.htm> [Online].
- California Healthcare Foundation. (2008). Snapshot: The State of Health Information Technology in California. <http://www.chcf.org/documents/chronicdisease/HITSnapshot08.pdf> [Online]. Available: <http://www.chcf.org/topics/view.cfm?itemid=133552>.
- Casalino, L., Gillies, R.R., Shortell, S.M., Schmittiel, J.A., Bodenheimer, T., Robinson, J.C. et al. (2003). External incentives, information technology, and organized processes to improve health care quality for patients with chronic diseases. *JAMA*, 289:434-441.
- Centers for Disease Control and Prevention (CDC). (2008). *National Health Care Surveys, New Data Collection Efforts. Residential Care Facilities*. Available: http://www.cdc.gov/nchs/about/major/nhcs/nhcs_datacollection.htm.
- Coleman, E.A., May, K., Bennett, R.E., Dorr, D., & Harvell, J. (2007). Report on Health Information Exchange in Post-Acute and Long-Term Care. <http://aspe.hhs.gov/daltcp/reports/2007/HIErpt.htm> [Online].
- Continuing Care Leadership Coalition (CCLC). (2006). Health Information Technology in Long Term Care Survey Findings. <http://www.cclcnyc.org/documents/2006HITsurvey.pdf> [Online].
- Degenholtz, H.B. (2007). *Availability and Use of Health Information Technology in Nursing Homes*. University of Pittsburgh, Department of Health Policy and Management. (Unpublished document.)
- Fazzi Associates. (2007). *Phillips National Study on the Future of Technology and Telehealth in Home Care -- Presentation at National Association for Home Care and Hospice: October 2007*. Northampton, MA.
- Fazzi, R., Ashe, T., & Doak, L. (2007). *Philips National Study on the Future of Technology and Telehealth in Home Care: An Executive Level Briefing*. http://www.medical.philips.com/main/products/telemonitoring/assets/docs/Philips_National_Study_%20Dr.%20Fazzi_Oct_25_07.pdf [Online].

- Felt-Lisk, S. (2006). *New Hospital Information Technology: Is It Helping to Improve Quality?* <http://www.mathematica-mpr.com/publications/pdfs/newhospinfo.pdf> [Online]. Available: <http://mathematica-mpr.com/>.
- Garets, D., & Davis, M. (2006). *Electronic Medical Records vs. Electronic Health Records: Yes, There is a Difference.* http://www.himssanalytics.org/docs/WP_EMR_EHR.pdf [Online].
- Health Information Technology Adoption Initiative. (2006). *Electronic Health Records S Not Routine Part of Medical Practice, Says New Study.* Robert Wood Johnson Foundation, the George Washington University Medical Center [Online]. Available: <http://hitadoption.org/index.php?module=News&id=cntnt01&cntnt01action=detail&cntnt01articleid=3&cntnt01returnid=51>.
- Healthcare Financial Management Association (HFMA). (2006). *Overcoming Barriers to Electronic Health Record Adoption.* <http://www.hfma.org/NR/rdonlyres/480C921F-8D33-48E8-A33F-1512A40F2CC8/0/ehr.pdf> [Online].
- Hersh, W. (2004). *Health care information technology: Progress and barriers.* *JAMA*, 292:2273-2274.
- Health Information Management Systems Society (HIMSS). (2004). *Healthcare CIO results: Final report, 15th Annual HIMSS Leadership Survey sponsored by Superior Consultant Company.* http://www.himss.org/2004survey/docs/Healthcare_CIO_final_report.pdf [Online].
- HIMSS. (2004). *Healthcare CIO results, Questionnaire Index, 15th Annual HIMSS Leadership Survey sponsored by Superior Consultant Company.* http://www.himss.org/2004survey/docs/Healthcare_CIO_questionnaire_index.pdf [Online].
- HIMSS. (2006). *EMR sophistication correlates to hospital quality data.* HIMSS Analytics [Online]. Available: <http://www.himssanalytics.org/docs/UHC25.pdf>.
- HIMSS. (2007a). *HIMSS electronic health record.* http://www.himss.org/ASP/topics_ehr.asp [Online].
- HIMSS. (2007b). *18th Annual HIMSS Leadership Study: CIO results, final report.* http://www.himss.org/2007survey/DOCS/2007Healthcare_CIO_questionnaire_index.pdf [Online].
- HIMSS. (2007c). *18th Annual HIMSS Leadership Study: CIO results, Questionnaire Index.* <http://www.himss.org/2007survey/DOCS/18thAnnualLeadershipSurvey.pdf> [Online].

- Hing, E., Burt, C., & Woodwell, D. (2007). *Electronic medical record use by office-based physicians and their practices: United States, 2006*. Advance Data from Vital and Health Statistics, No.393 [Online]. Available: <http://www.cdc.gov/nchs/data/ad/ad393.pdf>.
- Hudak, S., & Sharkey, S. (2007). *Health Information Technology: Are Long Term Care Providers Ready?* Oakland, CA: California Healthcare Foundation. Available: <http://www.chcf.org/documents/chronicdisease/HITNursingHomeReadiness.pdf>.
- Institute of Medicine (IoM) Committee on Data Standards for Patient Safety. (2003). *Key Capabilities of an Electronic Health Record System: Letter Report*. Washington, DC: National Academies Press.
- Jha, A.K., Ferris, T.G., Donelan, K., DesRoches, C., Shields, A., Rosenbaum, S. et al. (2006). How common are electronic health records in the United States? A summary of the evidence. *Health Affairs*, 25:w496-w507.
- Kaushal, R., Shojania, K.G., & Bates, D.W. (2003). Effects of computerized physician order entry and clinical decision support systems on medication safety: A systematic review. *Archives of Internal Medicine*, 163(12):1409-16.
- Kaushal, R., Blumenthal, D., Poon, E.G., Jha, A.K., Franz, C., Middleton, B. et al. (2005a). The costs of a national health information network. *Annals of Internal Medicine*, 143:165-173.
- Kaushal, R., Bates, D.W., Poon, E.G., Jha, A.K., Blumenthal, D., & the Harvard Interfaculty Program for Health Systems Improvement NHIN Working Group. (2005b). Functional gaps in attaining a national health information network. *Health Affairs*, 24:1281-1289.
- Kaushal, R., Jha, A.K., Franz, C., Glaser, J., Shetty, K.D., Jaggi, T. et al. (2006). Return on investment for a computerized physician order entry system. *Journal of the American Medical Informatics Association*, 13:261-266.
- Laschober, M., Maxfield, M., Felt-Lisk, S., & Miranda, D.J. (2007). Hospital response to public reporting of quality indicators. *Health Care Financing Review*, 28(3):61-76.
- Leapfrog Group. (2007a). *The Leapfrog Group Hospital Quality and Safety Survey, Version 4.0*. <https://leapfrog.medstat.com/pdf/final.pdf> [Online]. Available: [https://leapfrog.medstat.com/\(1bsnph30qe2x5x5522ltgrud\)/index.aspx](https://leapfrog.medstat.com/(1bsnph30qe2x5x5522ltgrud)/index.aspx).
- Leapfrog Group. (2007b). *The Leapfrog Group Hospital Quality and Safety Survey*. <https://leapfrog.medstat.com/pdf/final.pdf> [Online]. Available: [https://leapfrog.medstat.com/\(e511qd55i5boaknhrxn41bvf\)/index.aspx](https://leapfrog.medstat.com/(e511qd55i5boaknhrxn41bvf)/index.aspx).

- Maestro Strategies. (2007). *Information Technology in Long Term Care -- State of the Industry: Multi-Facility Research Report*. American Health Care Association and National Center for Assisted Living [Online]. Available: http://www.ahcancal.org/facility_operations/hit/Documents/InformationTechnologyinLongTermCare.pdf.
- Medical Records Institute (MRI). (2005). *Seventh Annual Survey of Electronic Health Record Trends and Usage for 2005*. Boston, MA: Medical Records Institute.
- MRI. (2006). *Eighth Annual Survey of Electronic Health Record Trends and Usage for 2006*. http://www.medrecinst.com/PDFs/EHRSurvey_2006.pdf [Online].
- Middleton, B., Hammond, W.E., Brennan, P.F., & Cooper, G.F. (2005). Accelerating U.S. EHR adoption: How to get there from here. Recommendations based on the 2004 ACMI retreat. *Journal of the American Medical Informatics Association*, 12(1):13-9.
- Miller, E., & Mor, V. (2006). *Out of the Shadows: Envisioning a Brighter Future for Long-Term Care in America*. Providence, RI: Brown University Center for Gerontology and Health Care Research.
- Miller, R.H. & Sim, I. (2004). Physicians' use of electronic medical records: Barriers and solutions. *Health Affairs*, 23(2):116-26.
- Modern Healthcare. (2008). *Little Change in Overall EHR Adoption*. <http://modernhealthcare.com/apps/pbcs.dll/article?Date=20080213&Category=REG&ArtNo=439728250&SectionCat=&Template=printpicart> [Online]. Available: <http://modernhealthcare.com/apps/pbcs.dll/article?AID=/20080213/REG/439728250>.
- NCHS (National Center for Health Statistics). (2000). *2000 National Home and Hospice Care Survey Agency Questionnaire*. http://www.cdc.gov/nchs/data/nhhcs/hhcs_ag00.pdf [Online].
- NCHS. (2004). *2004 National Nursing Home Survey Facility Questionnaire*. http://www.cdc.gov/nchs/data/nnhsd/2004NNHS_Facility_Questionnaire_072506tags.pdf [Online].
- NCHS. (2007a). *2007 National Home and Hospice Care Survey -- Staffing Questionnaire*. Rockville MD: Westat. (Unpublished Document)
- NCHS. (2007b). *National Ambulatory Medical Care Survey 2008 Panel -- Form NAMCS-1*. http://www.cdc.gov/nchs/data/ahcd/NAMCS_1_2008.pdf [Online].
- NCHS. (2007c). *2004 National Nursing Home Survey Description*. <http://www.cdc.gov/nchs/about/major/nnhsd/nnhsdesc.htm> [Online].

- NCHS. (2008a). *Home Health Care Patients: Data from the 2000 National Home and Hospice Care Survey*. <http://www.cdc.gov/nchs/pressroom/04facts/patients.htm> [Online].
- NCHS. (2008b). *National Ambulatory Medical Care Survey (NAMCS): Electronic Medical Records Supplement*. <http://www.cdc.gov/nchs/data/ahcd/EMR-NAMCS-011608webversion.pdf> [Online].
- NCHS. (2008c). *National Survey of Residential Care Facilities (NSRCF)*. http://www.cdc.gov/nchs/about/major/nhcs/nhcs_datacollection.htm [Online].
- Pearson, W., & Bercovitz, A. (2006). *Use of Computerized Medical Records in Home Health and Hospice Agencies: 2000*. National Center for Health Statistics, Vital Health Statistics, 13(161) [Online]. Available: http://www.cdc.gov/nchs/data/series/sr_13/sr13_161.pdf.
- Poon, E., Jha, A., Christino, M., Honour, M., Fernandopulle, R., Middleton, B. et al. (2006). Assessing the level of healthcare information technology adoption in the United States: A snapshot. *BMC Medical Informatics and Decision Making*, 6:1.
- Robert Wood Johnson Foundation (RWJF). (2006). *Health Information Technology in the United States: The Information Base for Progress*. With the George Washington University School of Public Health and Health Services, and the Institute for Health Policy at Massachusetts General Hospital [Online]. Available: <http://www.rwjf.org/files/publications/other/EHRReport0609.pdf>.
- RWJF. (2008). *Health Information Technology in the United States: Where We Stand, 2008*. With the George Washington University Medical Center, and the Institute for Health Policy at Massachusetts General Hospital [Online]. Available: <http://www.rwjf.org/files/research/062508.hit.exsummary.pdf>.
- RTI International. (2006). *Supporting Statement Prepared for the Office of Management and Budget*. With George Washington University and Massachusetts General Hospital, on behalf of National Coordinator for Health Information Technology. (Unpublished).
- Schoen, C., Osborn, R., Huynh, P.T., Doty, M., Peugh, J., & Zapert, K. (2006). On the front lines of care: Primary care doctors' office systems, experiences, and views in seven countries. *Health Affairs*, 25(6):w555-71.
- Schoen, C., Davis, K., How, S.K., & Schoenbaum, S.C. (2006). U.S. health system performance: A national scorecard. *Health Affairs*, 25(6):w457-75.
- Schoen, C., Osborn, R., Doty, M.M., Bishop, M., Peugh, J., & Murukutla, N. (2007). Toward higher-performance health systems: adults' health care experiences in seven countries, 2007. *Health Affairs*, 26(6):2717-34.

- Shekelle, P., Morton, S., & Keeler, E. (2006). *Costs and Benefits of Health Information Technology*. Rockville, MD: Agency for Healthcare Research and Quality. Evidence Report/Technology Assessment No. 132, AHRQ Publication 06-E006.
- Sidorov, J. (2006). It ain't necessarily so: The electronic health record and the unlikely prospect of reducing health care costs. *Health Affairs*, 25:1079-1981.
- Simon, J.S., Rundall, T.G., & Shortell, S.M. (2005). Drivers of electronic medical record adoption among medical groups. *Joint Commission Journal on Quality & Patient Safety*, 31(11):631-9.
- Stratis Health. (2008). *Minnesota Nursing Home Health Information Technology Survey: Survey Results*. Submitted to the Minnesota Department of Health, Minnesota e-Health Initiative. Minnesota: Stratis Health.
- University of California Berkeley. (2000). *National Survey of Physician Organizations and the Management of Chronic Illness: Medical Groups*. <http://nspo.berkeley.edu/MedGrps.pdf> [Online].
- University of Colorado, Division of Health Care Policy and Research. (2007a). *Taxonomy of Health Information Technology in Nursing Homes -- Report B: Review by Representatives from Nursing Homes and Vendors*. Aurora, CO: University of Colorado Denver. Available: <http://aspe.hhs.gov/daltcp/reports/2007/Taxonomy-NH.htm>.
- University of Colorado, Division of Health Care Policy and Research. (2007b). *Taxonomy of Health Information Technology in Home Health Agencies -- Report C: Review by Representatives from Home Health Agencies and Vendors*. Aurora, CO: University of Colorado Denver. Available: <http://aspe.hhs.gov/daltcp/reports/2007/Taxonomy-HHA.htm>.

ACRONYMS

AAHSA	American Association of Homes and Services for the Aging
ADT	admission, discharge, transfer
AHA	American Hospital Association
AHCA	American Health Care Association
AHIMA	American Health Information Management Association
ASPE	HHS Office of the Assistant Secretary for Planning and Evaluation
CATI	computer-assisted telephone interview
CCHIT	Certification Commission for Healthcare Information Technology
CCLC	Continuing Care Leadership Coalition
CCRC	continuing care retirement community
CDC	HHS Centers for Disease Control and Prevention
CDR	clinical data repository
CDSS	Clinical Decision-Support System
CEO	Chief Executive Officer
CIO	Chief Information Officer
CMR	computerized medical record
CMS	HHS Centers for Medicare and Medicaid Services
CPOE	computerized provider (or physician) order entry
e-MAR	electronic medication administration record
e-TAR	electronic treatment administration record
EHR	electronic health record
EHR-S	EHR-System
EIS	electronic information system
EMR	electronic medical record
GWU	George Washington University
HCBS	home and community-based services
HFMA	Healthcare Financial Management Association
HHA	home health agency
HHS	U.S. Department of Health and Human Services
HIMSS	Health Information Management Systems Society
HIT	health information technology
HL7	Health Level 7
HMO	health maintenance organization
IoM	Institute of Medicine
JCAHO	Joint Commission on Accreditation of Healthcare Organizations

MAR	medication administration record
MDS	minimum data set
MGH	Massachusetts General Hospital
MRI	Medical Records Institute
MSO	multi-service organization
NAMCS	National Ambulatory Medical Care Survey
NCAL	National Center for Assisted Living
NCHS	CDC National Center for Health Statistics
NHHCS	National Home and Hospice Care Survey
NNHS	National Nursing Home Survey
NSPO	National Study of Physician Organizations
NSRCF	National Survey of Residential Care Facilities
PDA	personal digital assistant
POS	point of service
OASIS	Outcome and Assessment Information Set
ONC	Office of the National Coordinator
RCFE	residential care facility for the elderly
RFID	radio frequency identification
RHIO	regional health information organization
RTI	Research Triangle Institute
RWJF	Robert Wood Johnson Foundation
SNF	skilled nursing facility
TAR	treatment administration record
TEP	Technical Expert Panel
TEPR	Towards the Electronic Paper Record

APPENDIX A. HIT ADOPTION QUESTIONS FROM SELECTED OTHER SURVEYS

2007 NATIONAL AMBULATORY MEDICAL CARE SURVEY (NAMCS)

21a. Does your practice use electronic MEDICAL RECORDS (not including billing records)?

- Yes, all electronic
- No
- Don't know

21b. Does your practice have a computerized system for --

	Yes	No	Unknown	Turned off
(1) Patient demographic information? If yes, does this include patient problem use?				
(2) Orders for prescriptions? <i>If Yes, ask --</i> (a) Are there warnings of drug interactions or contraindications provided? (b) Are prescriptions set electronically to the pharmacy?				
(3) Orders for tests? <i>If Yes, ask --</i> (a) Are orders sent electronically?				
(4) Viewing Lab results? <i>If Yes, ask --</i> (a) Are out of range levels highlighted?				
(5) Viewing Imaging results? <i>If Yes, ask --</i> (a) Are electronic images returned?				
(6) Clinical notes? <i>If Yes, ask --</i> (a) Do they include medical history and follow up notes?				
(7) Reminders for guideline-based interventions and/or screening tests?				
(8) Public health reporting? <i>If Yes, ask --</i> (a) Are notifiable diseases sent electronically?				

22. Are there any of the above features of your system that you do NOT use or have turned off

If Yes -- *Please specify* _____

23. Are there plans for installing a new EMR system or replacing the current system within the next 3 years?

ONC PHYSICIAN HIT SURVEY

(National Survey of Health Record Keeping among Physicians & Group Practices in the United States -- RTI International, George Washington University, Massachusetts General Hospital on behalf of the Office of the National Coordinator for Health Information Technology). Please note: only questions directly related to HIT adoption are included below; therefore, question numbering may not be sequential.

100. Use of computers in your main practice site

101. Does your main practice site have a computerized system for any of the following? For those features, please indicate the extent to which they are available to you and the extent to which you use them. If a feature is unavailable, check "no" to availability and skip the related "use" question.

	Availability			Use			
	Yes	No	Don't know	I do not use	I use some of the time	I use most or all of the time	Not applicable to my practice or specialty
a) Patient demographics							
b) Patient problem lists							
c) Orders for prescriptions?							
d) If yes -- are there warnings of drug interactions or contraindications provided?							
e) If yes -- are prescriptions sent electronically to the pharmacy?							
f) Orders for laboratory tests?							
g) If yes -- are orders sent electronically?							
h) Orders for radiology tests?							
i) If yes -- are orders sent electronically?							
j) Viewing Lab results?							
k) If yes -- are out-of-range levels highlighted?							
l) Viewing Imaging results?							
m) If yes -- are electronic images returned?							
n) Clinical notes?							
o) If yes -- do they include medical history and follow up notes?							
p) Electronic lists of what medications each patient takes?							
q) Reminders for guideline-based interventions and/or screening tests?							
r) Public health reporting?							
s) If yes -- are notifiable diseases sent electronically?							

200. Acquisition and Implementation of an EHR system

201. Does your *main* practice use an electronic health record (not including billing records)?
- 1 - Yes, all electronic
 - 2 - Yes, part paper, part electronic
 - 3 - No
 - 4 - Don't know
202. As of today, what is your degree of electronic health record acquisition or implementation at your main practice site [Choose one]
- 1 - We have acquired an EHR system, but have not implemented it (go to Question 203).
 - 2 - Our EHR implementation is in process (go to Question 203)
 - 3 - We have fully implemented our EHR system (go to Section 300)
 - 4 - We plan to acquire an EHR system in the next 12 months (go to Section 400)
 - 5 - We plan to acquire an EHR system in the next 13 – 24 months (go to Section 400)
 - 6 - We have no plans to acquire an EHR system (go to Section 400).
203. If you have purchased and are in the process of implementing an EHR system, when do you expect to have completed implementation?
- 1 - in the next 12 months.
 - 2 - in the next 13 to 24 months.

IF YOUR SITE USES ELECTRONIC HEALTH RECORDS OR IS IN TRANSITION TO AN EHR SYSTEM PLEASE COMPLETE THE FOLLOWING SECTION.

300. Experience with Electronic Health Records

301. How many years have you been using an EHR in your main practice site?
_____ years.
302. To what extent has the EHR system affected the following areas at your main practice site?

	Major positive impact	Positive impact	No impact	Negative impact	Major negative impact	Not applicable
a) The quality of clinical decisions						
b) Communication with other providers						
c) Communication with your patients						
d) Prescription refills						
e) Timely access to medical records						
f) Avoiding medication errors						
g) Delivery of preventive care that meets guidelines						
h) Delivery of chronic illness care that needs guidelines						

305. How satisfied are you with each of the following aspects of your EHR system?

	Very satisfied	Somewhat satisfied	Somewhat dissatisfied	Very dissatisfied
a) Ease of use when providing direct care to a patient				
b) Reliability of the system (i.e. frequency of system failures, system speed)				
c) Sharing of medical information with hospitals and other health-care providers				

308. If you use an electronic health record, does it meet certification standards?

- 1 - Yes
- 2 - No
- 3 - Don't know

2004 NATIONAL NURSING HOME SURVEY (NNHS)

(Facility Characteristics Questionnaire)

FC26. Does {FACILITY} currently use electronic information systems for any of the tasks on this card?

ADMISSION, DISCHARGE, TRANSFER INFORMATION
PHYSICIAN ORDERS
MEDICATION ORDERS, DRUG DISPENSING
LABORATORY/PROCEDURES INFORMATION
PATIENT MEDICAL RECORDS
MEDICATION ADMINISTRATION INFORMATION
MINIMUM DATA SET (MDS)
DIETARY
DAILY PERSONAL CARE BY NURSING ASSISTANTS
BILLING/FINANCE
STAFFING/SCHEDULING INFORMATION
HUMAN RESOURCE/PERSONNEL INFORMATION
NO ELECTRONIC INFORMATION SYSTEMS

2000 NATIONAL HOME AND HOSPICE CARE SURVEY (NHHCS)

- 5a. Are the medical records of this agency computerized? (yes/no)
- 5b. Does this agency plan to computerize its medical records within the next year? (yes/no)

2007 NATIONAL HOME AND HOSPICE CARE SURVEY (NHHCS)

(Note: Only questions relating to specific aspects of health information technology are listed below; therefore, question numbers are not always consecutive.)

78. Does this agency currently have an Electronic Medical Records system? This is a computerized version of the patient's medical information used in the management of the patient's health care. (Exclude electronic records used only for billing purposes and required documentation, such as OASIS files. No/Yes
79. Does this agency have plans to obtain an Electronic Medical Records System within the next year? No/Yes
80. With this agency's current Electronic Medical Records system, please indicate for each component listed below, whether it is used, available but not used, or not available.

	used	available but not used	not available
Computerized Physician Order Entry (CPOE) -- prescriptions, labs, tests, etc.			
Test results (chest x-rays, labs, etc.)			
Patient demographics			
Electronic reminders for tests (labs, imaging, etc.)			
Clinical Decision Support System (CDSS) contraindications, allergies, guidelines, etc.			
Clinical notes			
Public health reporting (notifiable diseases)			
Sharing medical records electronically with other agencies			

81. For each item below, please indicate whether or not this agency uses any of the following Management systems electronically? Mark one box (No/Yes) in each row.
- Billing system
 - Inventory control (i.e., bar coding)
 - Human Resources management (personnel records)
 - Staff management (e.g., staffing scheduling)
 - Accounting
86. Does this agency's staff use any system for Electronic Point of Care Documentation? (Includes PDAs (Personal Digital Assistants) Notebook PCs, or other portable handheld devices.) No/Yes
1. Are these devices used for any of the following? No/Yes
 - Computerized Physician Order Entry (prescriptions/pharmacy, labs, tests)
 - Test results
 - Electronic reminders for tests
 - Clinical Decision Support System guidelines or reference systems

- E-mail communication with agency staff/other staff
- Scheduling appointments/visits
- OASIS
- Other (please specify)

**NATIONAL SURVEY OF RESIDENTIAL CARE FACILITIES (NSRCF) --
Draft 8-14-08**

F_A49 Other than for accounting purposes, does this facility have a computerized system for resident service records? For example, an Electronic Medical Records System.

- 1 - Yes
- 2 - No

If no, skip the following questions

F_A50 In that computerized system, which components are included?

- 1. RESIDENT DEMOGRAPHICS
- 2. FUNCTIONAL ASSESSMENTS
- 3. INDIVIDUAL SERVICE PLANS
- 4. CLINICAL NOTES, SUCH AS DAILY PROGRESS NOTES
- 5. MEDICATION ADMINISTRATION, FOR EXAMPLE, FOR MAINTAINING LISTS OF RESIDENT'S MEDICATIONS
- 6. DISCHARGE AND TRANSFER SUMMARIES
- 7. ELECTRONIC POINT OF CARE DOCUMENTATION, FOR EXAMPLE, HANDHELD DEVICES FOR CHARTING OR FOR OTHER CLINICAL NOTATIONS
- 8. OTHER
- 9. NONE

If respondent answers "Other": What other components are included in the computerized system?

F_A51 Does this computerized system support electronic health information exchange with any of the following entities? For example, sending electronic records from this facility to a hospital.

- 1. Physicians
- 2. Nursing homes
- 3. Hospitals
- 4. Pharmacies
- 5. Other health or long-term care providers
- 6. Resident's personal health record
- 7. Corporate office
- 8. Other
- 9. Electronic information is not exchanged

If respondent answers "Other": What other entity?

MINNESOTA NURSING HOME HEALTH INFORMATION TECHNOLOGY STRATIS HEALTH (2007)

Section Two: Current level of information technology use

4. Does your facility use software/technology to support entry and submission of the MDS data? Yes/No
5. Does your facility currently use software/technology for your Census management system? (Census management is defined as patient demographics. It can be a stand-alone software that provides real-time information on resident transfers, discharges, admissions, pre-admissions, payor changes and staff scheduling.) *(Required)* **Response Options for the following major item questions are the same as below and are not repeated following each question. Also, respondents are asked for the name of their software and these questions are not included; therefore numbering may not seem consecutive.)**
 - We have this technology and are currently using it
 - We have this technology but are not using it
 - We plan to obtain this technology in the next 24 months
 - We do not have current plans to obtain this technology, but would like to do so at some point in the future
 - We have explored this technology and have no desire to obtain it
 - We have not looked into obtaining this technology
- 5a. To what extent does your facility use the Census management software?
 - Extensively
 - Moderately
 - Rarely
- 5c. Is the data collected by the Census management software transferred electronically either inside your facility or outside your facility? *(Required)*
 - Yes, all of the data
 - Yes, some of the data
 - No
6. Does your facility currently use software/technology for Resident Assessment and Care Planning? (Electronic data collection and availability of data for creation of the plan of care and goal setting. May be limited to an overall Plan of Care, or may allow for discipline-specific plans of care e.g., therapy plans of care and nursing plans of care). *(Required)*

- 6a. To what extent does your facility use the Resident Assessment and Care Planning software?
- Extensively
 - Moderately
 - Rarely
- 6c. Is the data collected by the Resident Assessment and Care Planning software transferred electronically either inside your facility or outside your facility? *(Required)*
- Yes, all of the data
 - Yes, some of the data
 - No
7. Does your facility currently use software/technology for documentation of clinical notes? (Create, addend, correct, authenticate, and close clinical visit data (including assessments/clinical measurements, interventions, communications, etc.) *(Required)*
- 7a. To what extent does your facility use the software for documentation of clinical notes?
- Extensively
 - Moderately
 - Rarely
- 7c. Is the data collected by the software used to document clinical notes transferred electronically either inside your facility or outside your facility? *(Required)*
- Yes, all of the data
 - Yes, some of the data
 - No
- 7d. Where does documentation of clinical notes occur? (Choose all that apply) *(Required)*
- Hand-held devices such as PDAs
 - Kiosks located outside patient rooms
 - Laptop
 - Computers located at bedside
 - Voice-activated dictaphones for later transcription
 - Other (please specify)
- 7e. When does documentation of clinical notes occur? *(Required)*
- After each encounter
 - After multiple encounters
 - Other (please specify)

8. Does your facility currently use software/technology to receive external clinical documents? (Electronic receipt from external facilities/agencies, provider notes, laboratory data, radiology data, medical devices, patient history, patient consults, pharmacy/consultant pharmacist reports, etc. May capture import of paper documents by scanning to include with other electronic health record data. May also include the ability to view existing documents that were captured by other systems.) *(Required)*
- 8a. To what extent does your facility use the software for receiving external clinical documents?
- Extensively
 - Moderately
 - Rarely
9. Does your facility currently use software/technology for decision support tools? (Clinical support tools provide best practice suggestions for care plans and interventions based on clinical problems/diagnoses. May include alerts or reminders for specific interventions (disease management programs), automated prompts for preventive practices (e.g., immunizations), or decision support for e-prescribing.) *(Required)*
- 9a. To what extent does your facility use the software for decision support tools?
- Extensively
 - Moderately
 - Rarely
- 9c. Is the data collected by the software used for decision support tools transferred electronically either inside your facility or outside your facility? *(Required)*
- Yes, all of the data
 - Yes, some of the data
 - No
10. Does your facility currently use software/technology to complete the medication administration record (MAR)? (All medications administered to patients are recorded in the MAR and generated from the medication list. May allow provider to view recent lab results and patient allergies. Interfaces with pharmacy system, computerized order entry system, and patient tracking (admission-discharge-transfer) system.) *(Required)*
- 10a. To what extent does your facility use the MAR software?
- Extensively
 - Moderately
 - Rarely

- 10c. Is the data collected by the software used to complete the MAR transferred electronically either inside your facility or outside your facility? *(Required)*
- Yes, all of the data
 - Yes, some of the data
 - No
11. Does your facility currently use electronic prescribing between practitioner and pharmacies? (Electronic transmission of prescription information between health care providers and pharmacies.)
- 11a. To what extent does your facility use the software for electronic prescribing between practitioner and pharmacies?
- Extensively
 - Moderately
 - Rarely
12. Does your facility have an Electronic Health Record (EHR) or a paperless system? (a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting) [HiMSS, 2006] *(Required)*
- Yes
 - No
13. How would you describe your facility's EHR implementation status? *(Required)*
- Fully implemented -- Facility is fully or partially using
 - Fully implemented -- Facility is not using
 - Partially implemented
 - Development stage of EHR system (have signed a vendor contract and are creating a change management plan)
 - Selection stage of EHR system (RFPs and demos)
 - Planning stage of EHR system (timeline established)
 - Information gathering stage (no timeline established)
 - Have not started, or no plans for implementation
14. Does your facility have a strategic plan that aligns plans for technologies, technology enhancements, and operational support with the organization's mission and goals across a timeline that reflects interdependencies? *(Required)*
- Yes
 - No
 - Not Sure

To obtain a printed copy of this report, send the full report title and your mailing information to:

U.S. Department of Health and Human Services
Office of Disability, Aging and Long-Term Care Policy
Room 424E, H.H. Humphrey Building
200 Independence Avenue, S.W.
Washington, D.C. 20201
FAX: 202-401-7733
Email: webmaster.DALTCP@hhs.gov

RETURN TO:

Office of Disability, Aging and Long-Term Care Policy (DALTCP) Home
[\[http://aspe.hhs.gov/office_specific/daltcp.cfm\]](http://aspe.hhs.gov/office_specific/daltcp.cfm)

Assistant Secretary for Planning and Evaluation (ASPE) Home
[\[http://aspe.hhs.gov\]](http://aspe.hhs.gov)

U.S. Department of Health and Human Services Home
[\[http://www.hhs.gov\]](http://www.hhs.gov)