ASPE
ASSISTANT SECRETARY FOR PLANNING AND EVALUATION

OFFICE OF BEHAVIORAL HEALTH, DISABILITY, AND AGING POLICY

# Health Information Technology Adoption and Utilization in Long-Term and Post-Acute Care Settings

Prepared for
**the Office of the Assistant Secretary for Planning and Evaluation (ASPE)**
**at the U.S. Department of Health & Human Services**

by
**RTI International**

**December 2023**

## Office of the Assistant Secretary for Planning and Evaluation

The Assistant Secretary for Planning and Evaluation (ASPE) advises the Secretary of the U.S. Department of Health and Human Services (HHS) on policy development in health, disability, human services, data, and science; and provides advice and analysis on economic policy. ASPE leads special initiatives; coordinates the Department's evaluation, research, and demonstration activities; and manages cross-Department planning activities such as strategic planning, legislative planning, and review of regulations. Integral to this role, ASPE conducts research and evaluation studies; develops policy analyses; and estimates the cost and benefits of policy alternatives under consideration by the Department or Congress.

## Office of Behavioral Health, Disability, and Aging Policy

The Office of Behavioral Health, Disability, and Aging Policy (BHDAP) focuses on policies and programs that support the independence, productivity, health and well-being, and long-term care needs of people with disabilities, older adults, and people with mental and substance use disorders. Visit BHDAP at https://aspe.hhs.gov/about/offices/bhdap for all their research activity.

***NOTE***: *BHDAP was previously known as the Office of Disability, Aging, and Long-Term Care Policy (DALTCP). Only our office name has changed, not our mission, portfolio, or policy focus.*

*This research was funded by the U.S. Department of Health and Human Services Office of the Assistant Secretary for Planning and Evaluation under Contract Number #HHSP233201600021I and carried out by Research Triangle Institute. Please visit https://aspe.hhs.gov/topics/long-term-services-supports-long-term-care for more information about ASPE research on long-term services and supports (LTSS).*

# HEALTH INFORMATION TECHNOLOGY ADOPTION AND UTILIZATION IN LONG-TERM AND POST-ACUTE CARE SETTINGS


Authors

**Michelle Dougherty, MA**
**Rebecca McGavin, MSSP**
**Joshua E. Richardson, PhD, MS, MLIS**
**Roberta C. Wines, MPH**
**Marc Horvath, BA**
RTI International


December 5, 2023


Prepared for

Office of Behavioral Health, Disability, and Aging Policy
Office of the Assistant Secretary for Planning and Evaluation
U.S. Department of Health and Human Services
Contract #HHSP233201500039I



The opinions and views expressed in this report are those of the authors. They do not reflect the views of the Department of Health and Human Services, the contractor or any other funding organization. This report was completed and submitted on September 22, 2020.

# Contents

**ACRONYMS** ..... iv

**EXECUTIVE SUMMARY** ..... 1

**SECTION 1. Introduction** ..... 3

**SECTION 2. Current State of Health Information Technology Adoption in Long-Term and Post-Acute Care** ..... 6

**SECTION 3. Evolving Current State: Long-Term and Post-Acute Care Innovators and Champions** ..... 9

**SECTION 4. Barriers and Facilitators to Health Information Technology Adoption** ..... 10
- 4.1. Barriers to Health Information Technology Interoperability and Adoption for Data Exchange ..... 10
- 4.2. Facilitators and Strategies that Increase Adoption and Interoperability ..... 11
- 4.3. New and Developing Barriers and Facilitators ..... 12

**SECTION 5. Current and Emerging Uses for Technology in Care Coordination and Reporting** ..... 14
- 5.1. Uses for Technology in Care Coordination ..... 15
- 5.2. Uses for Technology in Reporting ..... 16

**SECTION 6. Policy Considerations and Research** ..... 18
- 6.1. Understand and Address the Policy Barriers that Limit Long-Term and Post-Acute Care Inclusion in Health Information Technology and Interoperability Advances ..... 18
- 6.2. Spur Adoption of Interoperable Health Information Technology in Long-Term and Post-Acute Care Settings ..... 19
- 6.3. Coordinate on Interoperability Priorities, Policies, Standards, and Communication ..... 19
- 6.4. Improve Health Information Exchange Across Platforms, Networks, and Geographies ..... 20
- 6.5. Investigate Telehealth Policy, Planning, Use, and Research in Long-Term and Post-Acute Care ..... 21

**SECTION 7. Conclusion** ..... 22

**References** ..... 23

**APPENDICES**

APPENDIX A. Electronic Health Record Adoption Statistics Over Time by Setting ..... 26
APPENDIX B. Detailed Methods ..... 30
APPENDIX C. Electronic Health Record Functionality Comparison..... 32

# Exhibits and Tables


EXHIBIT 1. LTPAC Providers Identified for Study ..... 4

EXHIBIT 2. Percent EHR Adoption Over Time by Care Setting ..... 7

EXHIBIT 3. Percent EHR Interoperability Domains by Care Setting ..... 8

EXHIBIT 4. Pervasive Barriers and Alleviating Facilitators to HIT Interoperability and Adoption for Data Exchange Over the Past 10 Years ..... 10

EXHIBIT 5. SME Comments on the Current and Emerging Uses for Technology in Care Coordination and Reporting ..... 14

EXHIBIT 6. Byrne et al.'s Care Coordination Framework ..... 15

TABLE A-1. EHR Adoption Over Time for Hospitals Participating in CMS Promoting Interoperability Programs ..... 26

TABLE A-2. EHR Adoption Over Time for Office-based Physicians ..... 26

TABLE A-3. EHR Adoption and Interoperability for SNFs and NHs ..... 27

TABLE A-4. EHR Adoption and Interoperability for HHAs and Hospice ..... 28

TABLE A-5. EHR Adoption and Interoperability for IRFs and LTCHs ..... 28

TABLE A-6. EHR Adoption for Residential Care Communities and Adult Day Services ..... 29

TABLE C-1. Incremental Changes Over Time to Promote Interoperability and Certification Requirements for Eligible Hospitals and Providers Compared to LTPAC EHR Functions ..... 32

# Acronyms

The following acronyms are mentioned in this report and/or appendices.

| | |
|---|---|
| ASPE | Office of the Assistant Secretary for Planning and Evaluation |
| CDC | Centers for Disease Control and Prevention |
| CDS | Clinical Decision Support |
| CEHRT | Certified Electronic Health Record Technology |
| CMS | Centers for Medicare & Medicaid Services |
| COVID-19 | Novel Coronavirus |
| CPOE | Computerized Provider Order Entry |
| CQM | Clinical Quality Measure |
| DEL | Data Element Library |
| dQM | Digital Quality Measure |
| EHR | Electronic Health Record |
| FHIR | Fast Healthcare Interoperability Resources |
| HHA | Home Health Agency |
| HIE | Health Information Exchange |
| HIN | Health Information Network |
| HIT | Health Information Technology |
| HL7 | Health Level Seven |
| IRF | Inpatient Rehabilitation Facility |
| KFF | Kaiser Family Foundation |
| LTCH | Long-Term Care Hospital |
| LTPAC | Long-Term and Post-Acute Care |
| NCHS | National Center for Health Statistics |
| NF | Nursing Facility |
| NH | Nursing Home |
| NHSN | National Healthcare Safety Network |

| | |
|---|---|
| ONC | Office of the National Coordinator for Healthcare Technology |
| PACE | Program of All-inclusive Care for the Elderly |
| PACIO | Post-Acute Care Interoperability project |
| SME | Subject Matter Expert |
| SNF | Skilled Nursing Facility |
| USCDI | U.S. Core Data for Interoperability |

## EXECUTIVE SUMMARY

***Background***: The United States health care system is progressing incrementally toward an electronically connected ecosystem with the goals of delivering high-quality health care, lowering costs, and enabling digital health. To achieve interconnectedness, some providers were eligible to adopt certified electronic health record (EHR) technology. Progress continues for these providers as programs, requirements, and standards are evolving in a coordinated way to advance interoperability. Other providers including long-term and post-acute care (LTPAC) were not targeted to adopt interoperable health information technology (HIT) in a similar manner as their care partners in hospitals and physician-offices. The industry is relying instead on market forces to drive interoperability in LTPAC. Lessons from the COVID-19 pandemic are highlighting the challenges of this approach and the need for seamless interconnectivity not only between hospitals and physician-offices, but also with public health entities and LTPAC. This study aimed to understand the latest information available on the LTPAC sector's adoption and use of HIT and health information exchange (HIE) including the barriers, facilitators, and policy levers.

**Study Findings**

- LTPAC providers are adopting EHRs to support their clinical and business needs (80% for nursing homes and home health) but interoperable exchange of health information is not routine or widely used.
- Data is needed from LTPAC organizations by others but LTPAC providers lack monetary incentives, policy requirements, or a strong business case to increase interoperability.
- LTPAC use of interoperability features available in their EHRs lags without a driver or policy lever.
- Many LTPAC providers struggle to prioritize EHR optimization and few have available resources for training and workflow changes.
- Innovators in LTPAC HIT are focusing on telehealth, remote patient monitoring, medication management, functional assessment and activity monitoring, shared care planning, social connectedness and engagement, safety, and data analytics.
- There are opportunities for emerging policies to support interoperability in LTPAC.

***Adoption***: Findings gathered through an environmental scan and subject matter expert (SME) interviews show that LTPAC providers are adopting EHRs (80% for nursing homes and home health) with many similar features to certified HIT requirements, but they lack alignment with standards and use cases to support interoperable HIE. There are champions in LTPAC using HIT in innovative ways. However, most LTPAC providers struggle to prioritize EHR optimization and few have the resources (financial and workforce) to change clinical and administrative workflows that better use interoperability features available to them.

***Barriers and Facilitators***: This study, consisting of an environmental scan and SME interviews, found consistent themes regarding barriers and facilitators. We found little evidence of programs that effectively promote the widespread use of HIE by LTPAC in the same way that the Meaningful Use/Promoting Interoperability Program were effective for hospitals and physician-office settings. Lack of alignment with these programs or equivalent policy levers could further widen the gap between LTPAC and their care partners. Some existing barriers and

facilitators are unique to specific key users such as providers, vendors, policy makers, payers, and public health experts.

***Use of HIT and HIE for Care Coordination and Reporting*:** LTPAC EHRs have functionality to support their specific clinical, care coordination, and reporting needs but lack alignment with the standards and requirements used by hospitals and physician-offices. For clinical care, system functionality includes demographics, problem lists, vital signs, computerized physician order entry, medication lists, electronic notes, assessments, reporting, and more (described further in ***Appendix C***). While these features may be available to LTPAC providers, the extent of their use varies widely. Health information is regularly exchanged between LTPAC and their care partners to support transition of care, care coordination during a stay, and for administrative purposes (quality reporting, public health reporting, payment, and oversight). Few interoperable solutions are deployed to support the exchange. For care coordination, work around processes are established rather than interoperable solutions. Today's reporting systems for quality measurement and public health reporting include electronic exchange of data, but do not use interoperable standards and data to do so.

***Policy Considerations*:** Based on the environmental scan findings and SME interviews, the following policy considerations and approaches were identified to advance interoperable EHR adoption and use in LTPAC

- Understand and address the barriers that limit policy makers from including LTPAC in HIT and interoperability programs including ***s****tatutory limitations to include LTPAC in HIT policies and regulations.*
- Spur adoption of interoperable HIT in LTPAC settings by c*onsidering policy options to increase adoption.* Understand the effectiveness of past policies, funding, and interventions and look at future program changes to support LTPAC interoperability such as with digital quality measures (dQMs) and reporting, public health reporting modernization, and targeted payer process such as pre-claim review and prior authorization programs.
- Improve HIE across platforms, networks, and geographies by understanding the va*lue proposition for LTPAC to participate in HIEs/health information networks (HINs), improving the ease of data sharing, and clarifying* HIE/HIN vendor and provider relationships.
- Investigate telehealth policy, planning, use, and research in LTPAC, including *barriers, facilitators, policies, reimbursement, and technology readiness* for greater telehealth adoption in LTPAC settings.

## SECTION 1
## INTRODUCTION

Through strategic investments meant to spur HIT adoption in the form of certified EHRs by ambulatory practices and hospitals, many providers, patients, caregivers, public health entities, payers, and other stakeholders in the United States health care system are connected via interoperable data. After 10 years of these investments, over 85% of ambulatory practices and over 95% of hospitals have adopted and use some form of EHR to document patient care and share data to varying degrees. This amounts to a transformation in United States health care whereby stakeholders who have adopted EHRs can generate and share electronic patient data directly with each other or by way of intermediaries known as HIEs or HINs. Interoperable electronic patient data enable advances in care coordination, telemedicine, patient and public safety, and patient-centeredness.

LTPAC providers too have been adopting and using HIT including EHRs to support their clinical and business needs. Yet the level of adoption of interoperability features lags behind its counterparts in ambulatory and hospital settings. This is due to a variety of factors including a lack of systematic HIT investment for adoption, worker training, and more. This has led to capability gaps between the LTPAC settings and other parts of the United States health care system resulting in missed opportunities to share patient data and coordinate care among providers and caregivers in LTPACs, primary care, and hospitals. These gaps are becoming increasingly apparent due to a multitude of factors that include the general trend of an aging population and a health care system that is increasingly asked to deliver care for older adults with multiple chronic conditions.

Most acutely, the COVID-19 pandemic has put in stark relief the gaps between LTPAC and other health care settings (see ***Exhibit 1*** for a typology of LTPAC providers). The Kaiser Family Foundation (KFF) found that as of June 30, 2021, over 35,000 LTPAC settings nationwide reported COVID-19 cases and that COVID-19 in long-term care facilities accounted for close to one-third (31%) of deaths as a share of state-level deaths (KFF, 2022). HIT and access to interoperable data via EHRs may benefit LTPAC and related settings with tools to better monitor signs and symptoms and coordinate responses with local and state public health departments (Andersen et al., 2021).

Increasingly, LTPAC settings rely on EHRs and the programs, standards, and requirements issued by federal and state agencies to define data standards and reporting requirements. Making policy choices that promote effective coordination among stakeholders requires an understanding of the LTPAC sector's current state of EHR adoption and data exchange via HIE/HINs. This 2021-2022 study aimed to identify and summarize the latest information available on the LTPAC sector's adoption and use of HIT and HIE/HINs including the barriers, facilitators, and policy levers. A description of the settings and providers reviewed for this study are described in ***Exhibit 1***.

| Exhibit 1. LTPAC Providers Identified for Study* | | |
|---|---|---|
| **Institutions and Providers** | **Specialty Hospitals** | **Other Residential Care and Home and Community-Based Service Providers** |
| Skilled Nursing Facility (SNF)<br>Nursing Homes (NF)<br>Home Health Agencies (HHA)<br>Hospice Agencies | Inpatient Rehabilitation Facility (IRF)<br>Long-Term Care Hospital (LTCH) | Assisted Living Facilities (ALF)<br>Senior Living Communities (Sr. Living)<br>Continuing Care Retirement Communities (CCRC)<br>Program of All-inclusive Care for the Elderly (PACE)<br>Adult Day Services |
| * Study Limitation: Comprehensive information about HIT/HIE adoption, use, and policies was not found on all settings listed in Exhibit 1. The majority of information found in the literature and discussed through SME interviews reflected a focus on SNF, NF, and HHA settings in LTPAC | | |

To understand the adoption and use of HIT/HIE, the study team conducted an environmental scan including a literature review from 2011 to 2021 to identify and describe prior efforts to assess and analyze barriers and facilitators to adopting and using EHRs in LTPAC settings and potential policy levers influencing the sector's decisions. The study focused upon three key questions:

1. What are the barriers and facilitators to LTPAC settings adopting interoperable EHRs for data exchange with key stakeholders?
2. How are LTPAC providers using EHRs to coordinate care and/or report public health or quality data for patients via HIE/HINs?
3. What are potential policy levers to increase EHR adoption and use among LTPAC providers to provide better care, public health reporting, etc.?

The environmental scan helped identify gaps in the published literature such as a lack of information about new and emerging technologies and opportunities within the sector. The research team explored these through interviews with SMEs. See ***Appendix B*** for detailed methodologies of the environmental scan, SME interviews, and study limitations. The seven interviews targeted researchers, providers/developers, HINs/HIEs, payers, public health reporting experts, and federal experts at the Centers for Medicare & Medicaid Services (CMS) and the Office of the National Coordinator for Healthcare Technology (ONC) with expertise in Interoperability Rule and Value Based Care. We chose these seven areas and identified SMEs to speak to each area based upon their critical work in the subject area in conjunction with the HIE and LTPAC space.

The SMEs provided unique insight on the gaps in the existing literature and how barriers and facilitators discussed in the literature were generally targeted for nursing homes and HHAs but not the broader LTPAC sector. The barriers and facilitators discussed often addressed areas specific to providers. When speaking with the SMEs, they shared additional barriers and

facilitators from their perspectives (e.g., payer, public health, HIE/HINs, CMS/ONC). The SME interviews included researchers to hear their points of view regarding why there are gaps in the literature for barriers and facilitators. Additionally, we asked them to describe any current innovations that support better integration of EHRs into LTPAC settings. The researcher SMEs provided insight regarding ongoing studies and future research needs. These insights helped hone the interview questions for the other SME groups, such as payers and providers/developers who are integral to promoting HIE adoption and integration across the LTPAC sector.

## SECTION 2
## CURRENT STATE OF HEALTH INFORMATION TECHNOLOGY ADOPTION IN LONG-TERM AND POST-ACUTE CARE

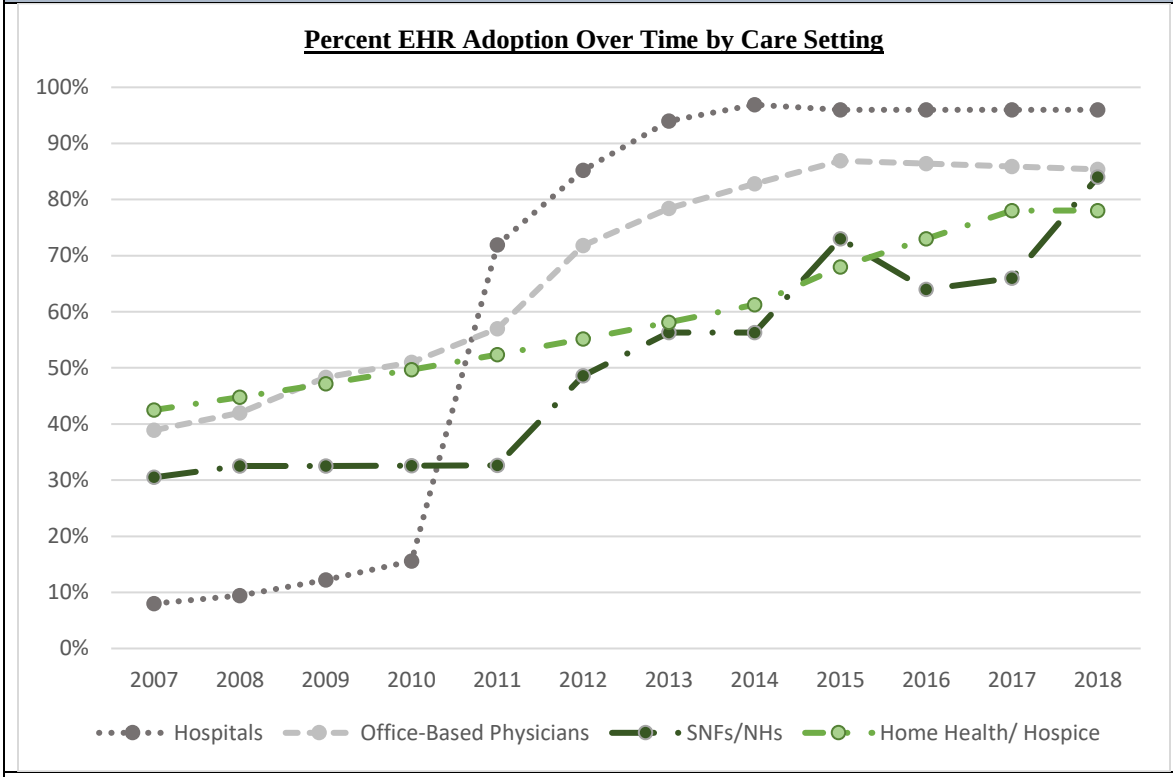
Environmental scan results and focus group interviews with SMEs provided insight as to the current state of HIT adoption among LTPAC providers. SMEs provided insight into how LTPAC settings are currently adopting and using interoperable EHRs as well as telehealth to coordinate care, report quality and public health measures, and utilize HIE networks.

LTPAC providers individually use EHRs to support clinical and administrative processes. See ***Appendix C*** for LTPAC EHR functions. While clinical and administrative information is routinely exchanged between providers for admission, transition of care, and care coordination, the use of EHRs and HIE/HINs to share the information is less common (i.e., most LTPACs are using some type of an EHR within their organization but not using it to interact with other providers' HIT systems or to integrate with key service providers such as pharmacy, rehab therapy, lab, and others). The lack of interoperability by LTPAC impedes continuity of care across settings and limits patient-centric and value-based care approaches.

The rate of EHR adoption varies by LTPAC setting type as shown in ***Exhibit 2***. Full EHR adoption data are available in ***Appendix A***. Nursing homes, skilled nursing facilities (SNFs), and HHAs have the highest estimated rates of adoption (84% in 2018 and 78% in 2017, respectively). It is somewhat difficult to compare functionality of LTPAC EHRs with hospital or office-based physician EHRs because, although they share some of the same functions (e.g., storing patient clinical care and medical histories, conveying alerts for known allergies, enabling electronic physician order entry), there is no federal program or requirement for incremental progress toward interoperability for LTPAC settings. See ***Appendix C*** for EHR functionality comparison and alignment. This resource provides a guide to features available for use and how they align to requirements in the Meaningful Use/Promoting Interoperability program.

Yet despite the lack of a federally-funded program and policy requirements, estimates of EHR adoption rates among nursing home and SNF providers, as well as HHAs, were greater than 78% in 2018, which is on par with EHR adoption in office-based primary care settings. Residential care settings were estimated to be much lower overall, at 26% -- higher than that for larger facilities and much lower for small facilities. Little adoption data is available on specialty hospitals since 2009.

**Exhibit 2. Percent EHR Adoption Over Time by Care Setting**




Notes: The definition of an EHR varied between surveys and over time, precluding comparisons between the surveys. Full EHR adoption data sources are shown in ***Appendix A***. For comparison across care settings, IRFs and LTCHs and Residential Care Communities and Adult Day Services were excluded due to limited and or single year data across study period.

Hospitals*: Percent Basic EHR Adoption data from 2008-2010 and switches to certified EHR adoption data in 2011which is consistent with the meaningful use program regulations. Earliest surveyed year 2008 and latest surveyed year 2015 with all other years applied natural growth rate.

Office-Based Physicians**: Percent EHR Adoption of any EHR type (Basic, Certified, Other). Earliest surveyed year 2008 and latest surveyed year 2017 with all other years applied natural growth rate.

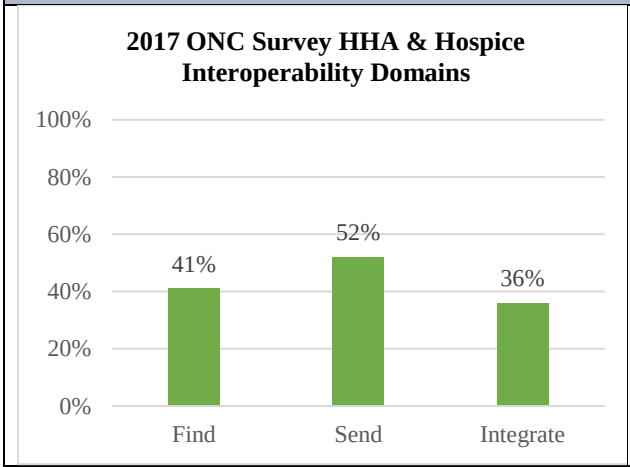
SNFs/NHs^: Results from EHR adoption surveys between 2004 and 2018 reflect variations in the definition of EHR between surveys and over time, however the observed incremental increase in adoption and use in NHs and SNFs parallels findings related to the adoption of "any EHR" among physician practices in this same time period. In the absence of a national standard such as for a certified EHR, surveys independently defined and described functions in a NH/SNF EHR. Earliest survey year was 2008 with a range of survey results and average included for Percent EHR Adoption Over Time analysis. Additional years of results were 2012, 2013, 2015, 2016, 2017 and 2018 with all other years applied natural growth rate.

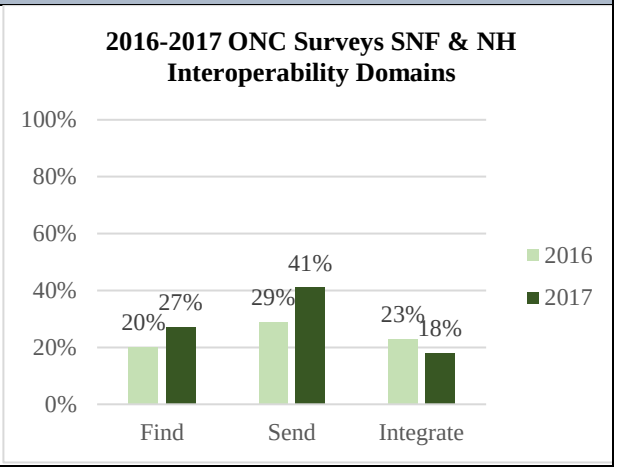
Home Health/Hospice^^: Similar to NH/SNFs, HHAs and hospice providers adoption of EHRs has doubled over a decade between 2007 and 2017 and consistent with adoption of "any EHRs" by office-based physicians. Studies since 2013 have included both EHR functions and use of mobile technologies and telehealth. ONCs latest survey of SNFs and HHAs compared and found higher EHR adoption and interoperability domain use in HHAs. Survey data available for 2007, 2015, and 2017 with all other years applied natural growth rate.

The COVID-19 pandemic has demonstrated the need for more effective interoperability of data among LTPACs and other care providers. Although there is broad consensus that LTPACs and their patients would benefit from greater access to HIT and information exchange,

results from our interviews with SMEs suggest that those expectations do not match LTPAC financial resources. Policy makers and commercial vendors noted that, unlike with the Meaningful Use/Promoting Interoperability program, there are no levers or drivers requiring LTPAC providers to share information with hospitals and office-based settings. ***Exhibit 3*** shows interoperability domains from the 2016-2017 ONC Survey of HHA, hospice, nursing home, and SNFs. ***Appendix A*** also provides summary data from EHR adoption studies and findings on interoperability domains published through 2021. Lacking a comprehensive federal strategy leaves LTPAC providers to contend with a web of state-level regulations and restrictions that act as barriers to any single comprehensive strategy for LTPAC EHRs.

**Exhibit 3. Percent EHR Interoperability Domains by Care Setting**




Note: ONC survey of EHR adoption and interoperability of HHAs including medication management (reconcile and record), methods of exchange, telehealth, and mobile technology use. (Henry et al., 2018)

ONC survey of EHR adoption and interoperability of SNFs including medication management (reconcile and record), electronic exchange, and methods of exchange. (Alvarado, Zook, & Henry, 2017; Henry, Pylypchuk, & Patel, 2018)

Survey questions assessing interoperability:

- Find: Do you or your staff electronically search or query for your patients' health information from sources outside your facility?
- Send: Do staff at your skilled nursing facility electronically send key clinical information such as labs, medications or problem lists to outside organizations on a routine basis? Electronic does not include fax, e-fax or MDS (minimum data set) quality reporting
- Integrate: Is staff easily able to integrate patient health information that you electronically receive into your EHR without manual entry or scanning?

In interviews, SMEs explained that although SNFs and nursing homes have made some inroads connecting to HIEs and HINs, their participation remains low unless there was an ongoing funding mechanism or program in place. The potential reasons are multi-factorial, but SMEs pointed to barriers in care workflows and gaps in incentives to engage in data exchange. In the current climate, any connection SNFs and nursing homes have with other providers is seen as a win.

## SECTION 3
## EVOLVING CURRENT STATE: LONG-TERM AND POST-ACUTE CARE INNOVATORS AND CHAMPIONS

As one SME described, LTPAC providers that have champions who see the value of interoperability and willingness to "push" to "make it happen" have generally made the greatest strides with respect to EHR use and data exchange. Champions have been critically important for EHR use and data exchange in hospitals and office-based settings (Shea, 2016). So, it is no surprise that they too are critically important for the LTPAC sector. These champions are up against challenges in convincing clinic staff who are reticent to take on additional reporting burdens and adopt HIT that does not fit into natural workflows.

Champions often see the early technologies and developments that improve operations. It is widely believed that new technologies have, and will continue to, impact how LTPAC providers deliver care. Telehealth, for example, experienced a 63-fold increase among fee-for-service Medicare beneficiaries between 2019 and 2020 (840,000 to 52.7 million visits) (Samson et al. 2021). Telehealth for SNFs and patient transfers or hospice only accounted for 7% of those 52.7 million visits. Improved training and support for telehealth may help alleviate workflow and technology challenges. The University of Missouri found that "despite the challenges, more skilled nursing facilities are recognizing the benefits of telehealth and are planning for post-pandemic use. With the right strategies in place, clinicians and administrators can help prevent the struggles that may accompany telehealth adoption" (Bailey, 2021; Powell & Alexander, 2021).

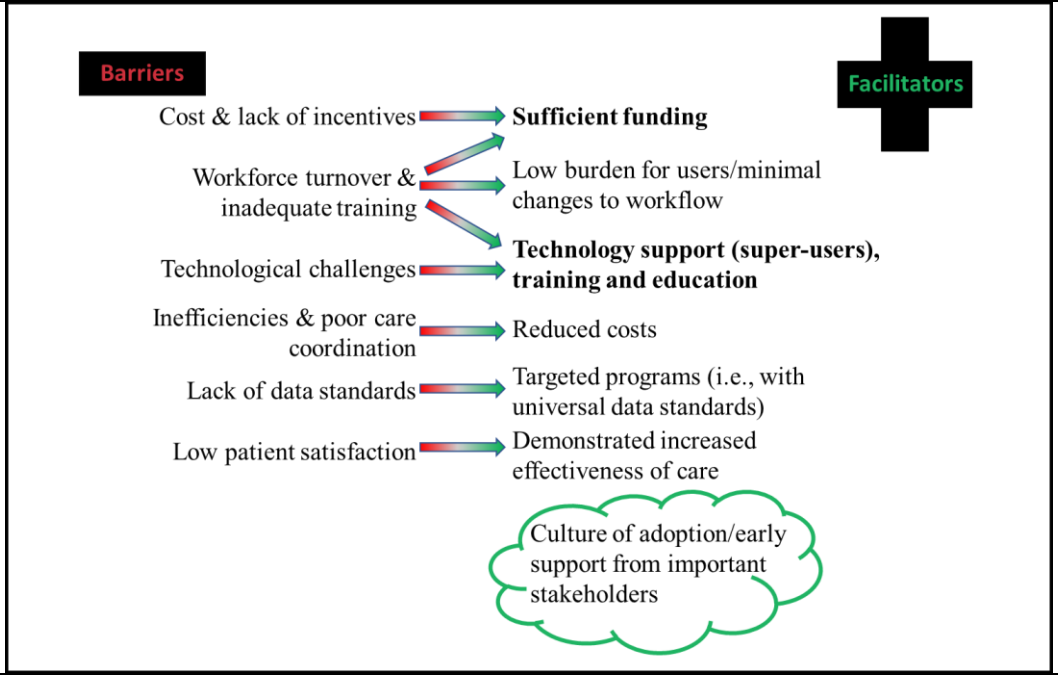
In addition to telehealth, early adopters are exploring or investing in an array of other technologies: remote patient monitoring, medication management, functional assessment and activity monitoring, shared care planning and coordination, social connectedness and engagement, safety, and data analytics (LeadingAge, 2021).

## SECTION 4
## BARRIERS AND FACILITATORS TO HEALTH INFORMATION TECHNOLOGY ADOPTION

Our environmental scan identified several barriers and facilitators to LTPACs adopting interoperable EHRs for data exchange with key stakeholders, and SME interviews supplemented these findings. Most have persisted over the past decade highlighting the challenge of finding solutions that make a widespread, sustainable impact.

We sorted the barriers and facilitators based on themes to bundle related topics. ***Exhibit 4*** shows the applicable themes and demonstrates how certain barriers and facilitators are related to, and interact with, each other. All barriers could be alleviated with one or more corresponding facilitator -- except for culture of adoption/early support from important stakeholders, which was an overarching facilitator. Although there is some overlap in the general themes across these groups, the specific details of the barriers and facilitators, and potentially the solutions to the barriers, depend on the perspective from which they are experienced. SMEs generally agreed with the barriers and facilitators identified in the environmental scan.

**Exhibit 4. Pervasive Barriers and Alleviating Facilitators to HIT Interoperability and Adoption for Data Exchange Over the Past 10 Years**




### 4.1 Barriers to Health Information Technology Interoperability and Adoption for Data Exchange

Cost and lack of financial incentives were consistently mentioned as primary barriers, and they have a direct relationship to the sufficient funding facilitator. SMEs reiterated that

sufficient operational funding facilitates successful interoperable HIT systems. Multiple SMEs referenced the lack of Meaningful Use/Promoting Interoperability program EHR requirements in the LTPAC setting as a driver of this incentive issue. Due to thin operating margins, lack of adequate financial incentives has made it difficult to fund and implement interoperable HIT systems. SMEs mentioned that without the proper financial incentives, it can be challenging to align policy, measures, and enforcement. The policy maker SMEs further indicated a general lack of authority to enforce existing HIT standards. Organizations need a system or market reason to exchange data. Without the proper financial and policy incentives, it will be difficult to make organic progress toward interoperability.

Sufficient funding, low user burden, and technology support all help alleviate workforce turnover and staffing shortage issues. As ***Exhibit 4*** shows, the workforce turnover and inadequate training barrier is associated with multiple facilitators. Broadband connectivity issues are a serious barrier as related to staff education and user burden, especially in rural and underserved urban areas, thus highlighting a further technological challenge.

Organizations are afraid of sharing proprietary data with one another due to lack of communication between systems and across geographies. Public Health SMEs highlighted the inconsistency in state-level HIT interoperability policies and their use of standardized data across jurisdictions. Different requirements within and between states creates confusion, and these inconsistencies create extra expenses for organizations. SMEs from industry expressed frustration with a lack of guidance and communication from federal regulators. Except for interoperability initiatives related to the federally required assessment instruments mandated in the IMPACT Act, these SMEs noted that LTPAC organizations and vendors are left to do what they think is best, with limited guidance resulting in the lack of standardized and codified data to support interoperability. This general lack of consistency and lack of clear vision for future policies has also inhibited successful HIT adoption in LTPAC. There are startup costs to implement new requirements, but providers and vendors do not have a clear understanding of what data reporting and interoperability requirements will be in the future. Results from SME interviews suggest there is general frustration over a lack of sustainable strategy to implement interoperable HIT in LTPAC settings.

> *Data is needed from LTPAC organizations but the value proposition and business model to motivate interoperability organically doesn't exist today.*

### 4.2 Facilitators and Strategies that Increase Adoption and Interoperability

Although barriers create frustration and reduce adoption, SMEs also described recent programs and strategies that lead to increased adoption and interoperability by LTPAC. SMEs discussed the Fast Healthcare Interoperability Resources (FHIR) standard and described it as a useful tool for establishing clinical guidelines and incorporating them into reporting to facilitate care coordination and reporting by LTPAC providers. SMEs stressed the way to get regulatory traction is to integrate the quality measure and quality of care components together. Multiple

SME groups identified the CMS Data Element Library (DEL) and PACIO (Post-Acute Care Interoperability) project supported by CMS as being helpful to engage the LTPAC providers and vendors in identifying and testing common information exchange scenarios using the emerging FHIR standards. Other SMEs cited the ONC 360X referral and transition of care projects as being helpful in increasing vendor participation by enabling providers to use existing health data exchange standards and technologies to exchange referral requests and relevant patient clinical information. The DEL, PACIO project and 360X projects all leverage the standardized and codified data elements from required CMS assessment instruments as the baseline for HIE. These targeted programs display how explicit data standards can facilitate integration of interoperability approaches, offering concrete steps to alleviate some potential adoption barriers. Despite this engagement by vendors, concern remained with the SMEs that providers will not revise their workflow to use the implementation tools in absence of a policy, program, or requirement for its use.

To address the interoperability gap and challenges identified with the COVID-19 pandemic, stakeholder advocacy efforts have emerged. The 2022 consensus report by the National Academies of Science, Engineering and Medicine recommended five strategies for HIT to improve nursing home quality. These strategies align with a coordinated advocacy effort underway by LTPAC association and organizations to request legislative funding to ensure that the policies and priorities for interoperability include the providers across the continuum of care.

**National Academies of Science, Engineering and Medicine 2022 Study on the National Imperative to Improve Nursing Home Quality including Recommendations for HIT**

- Identify pathways to provide financial incentives to nursing homes for certified EHR adoption.
- Develop and report measures of HIT adoption and interoperability.
- Measure and report nursing home staff, resident, and family perceptions of HIT usability.
- Development and ongoing implementation of training in core HIT competencies for nursing home leadership and staff.
- Rigorous evaluation studies of HIT use, disparities in HIT adoption and use, innovative HIT applications, and assessment of perceptions of HIT usability.

Source: *The National Imperative to Improve Nursing Home Quality: Honoring Our Commitment to Residents, Families, and Staff*. National Academies Press. https://nap.nationalacademies.org/catalog/26526/the-national-imperative-to-improve-nursing-home-quality-honoring-our.

### 4.3 New and Developing Barriers and Facilitators

SMEs mentioned several barriers and facilitators not identified in the environmental scan. With respect to facilitators, the SMEs noted the need or existence of a strong relationship between two or more providers. Strong relationships allowed for good communication regarding expectations and what modalities to use. A new barrier highlighted by the HIN SMEs was ownership and management of HIT data. From their perspective, some of the prominent HIT vendors perceive data ownership centering around the vendor and HIE rather than as the HIE and

covered-entity relationship. The perception or perceived ownership of the data and the relationship when it comes to sharing that data can be a major barrier to interoperability. The lack of agreement about who owns the HIT data, can, and has, lead to legal disputes that inhibit interoperability and reduce operational efficiency.

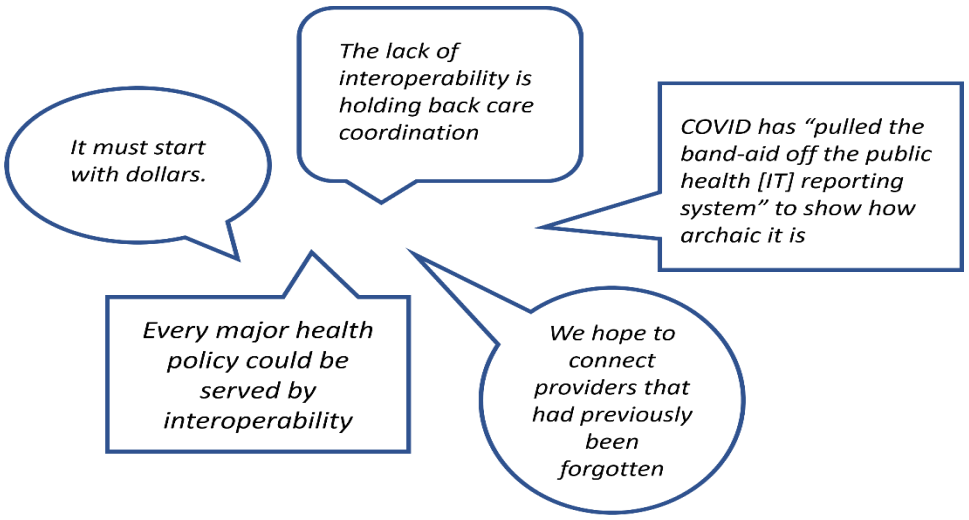
The barriers and facilitators identified from the environmental scan predominantly reflected the provider perspective. While all SMEs agreed with the barriers and facilitators found in the literature, groups from other areas of the LTPAC industry may have different perspectives or nuanced opinions regarding the importance of certain barriers and facilitators, as well as the best methods to alleviate barriers and thus facilitate interoperable HIT adoption as seen through current and emerging uses in care coordination and reporting.

## SECTION 5
## CURRENT AND EMERGING USES FOR TECHNOLOGY IN CARE COORDINATION AND REPORTING

Adoption data shows that the majority of LTPAC providers use EHRs in varying ways to support their specific clinical and administrative needs (see ***Appendix A*** for adoption studies and summary data). LTPAC EHRs have functionality including demographics, problem lists, vital signs, computerized physician order entry, medication lists, electronic notes, assessments, care plans, reporting, and more. While these features may be available to LTPAC providers, the extent of their use may vary based on barriers and facilitators described in Section 4. ***Appendix C*** provides a summary of EHR functionality available by vendors serving LTPAC providers based on the Center for Aging Services Technology EHR Selection Matrix. Ancillary service providers such as pharmacy, rehabilitation therapy, lab, and imaging are integral to the care team, but typically maintain separate systems that are not well-integrated with LTPAC EHRs. SMEs identified the lack of system integration is a pain point and opportunity to improve interoperability. ***Appendix C*** provides a detailed breakdown of LTPAC EHR functions in comparison to the EHR Incentive Program for hospitals and physician-offices.

To understand current and emerging uses for technology in care coordination and reporting, SMEs discussed: How are LTPAC providers using EHRs to coordinate care and/or report public health or quality data for patients via HIEs or exchange networks? ***Exhibit 5*** and the supporting text capture the perspectives that SMEs provided about HIT's current state and changes that are necessary to promote standards and interoperability for EHRs in LTPAC.

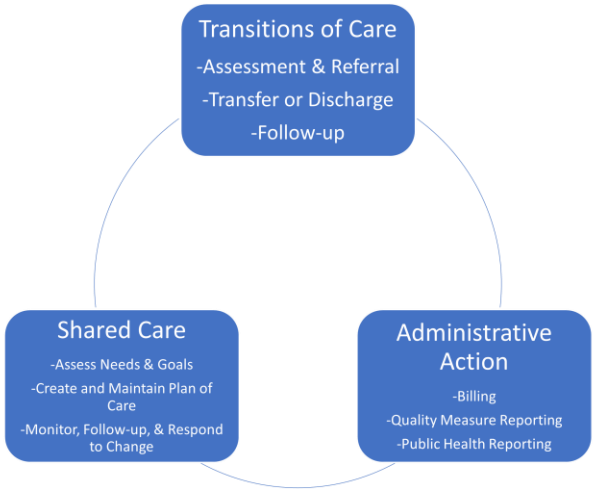
**Exhibit 5. SME Comments on the Current and Emerging Uses for Technology in Care Coordination and Reporting**



## 5.1 Uses for Technology in Care Coordination

Our search for examples of how LTPAC providers use EHRs generally yielded examples of HIT to support clinical and administrative processes. When discussing use of HIE for these clinical processes, the literature noted the challenges and resources needed to revamp the clinician's workflow to include technology. (Alexander et al., 2015) The framework for describing types of care coordination from 2014 is still relevant based on our environmental scan, however there are new emerging examples and refinements that could be added to reflect a more contemporary picture of today's care delivery and new administrative processes.

**Exhibit 6. Byrne et al.'s Care Coordination Framework**




The care coordination framework characterizing three key activities involving LTPAC settings: transitions of care (between settings), shared care (e.g., physician working with a nursing home or HHA), and administrative actions. ***Exhibit 6*** shows the structure and main elements of this framework. Transitions of care is further divided into three stages of the transition. These are assessment/referral, transfer or discharge, and follow-up. Shared care is also described in three parts: assess needs and goals; create and maintain plan of care; and monitor, follow-up, and respond to change. Administrative actions include billing, quality measure reporting, and public health reporting.

HIT can improve care coordination, but many care coordination benefits are unrealized because of the lack of interoperability. SMEs confirmed the importance of interoperable health IT to improve transitions of care, shared care, and administrative actions. They also mentioned that interoperability can help optimal sharing of information among stakeholders in value-based care settings. Interoperability could enable more access to patient data as patients move across care settings, particularly in and out of LTPAC settings. These gaps in information-sharing were

made more publicly apparent during the COVID-19 pandemic and serve as a rationale for including LTPAC in interoperability discussions.

HIE/HIN SMEs called out their efforts to create an online case management system as a way to address interoperability gaps. They held out the example of the Carequality Interoperability Framework, a trusted bidirectional information exchange that integrates directly into EHRs (CareQuality, n.d.). A growing number of LTPAC settings as well as behavioral health stakeholders are utilizing the Carequality exchange environment. Underlying this is FHIR exchange (HL7 FHIR Exchange Network, n.d.) and, as with so many other health data interoperability efforts, HIE/HIN stakeholders are working with providers and vendors to make interoperable EHRs the catalysts for data exchange for care coordination.

### 5.2 Uses for Technology in Reporting

The sources we identified via the environmental scan generally do not provide examples of LTPAC providers using EHRs for reporting quality data or public health information via interoperable HIE or through HINs. For quality reporting today, post-acute care providers (SNF/nursing homes, HHAs, hospice, IRFs, and LTCHs) are required to electronically submit required assessment instrument or item set data to CMS through a web portal. This data may also be used for payment and regulatory oversight depending on the setting. In 2021, CMS shared plans to use FHIR as part of their dQM strategy including opportunities for post-acute care submissions. Today's quality reporting programs provide a siloed view by care setting of quality measure performance. The dQM vision seeks to build an infrastructure that aligns quality measures across settings and patient populations to provide real-time data feedback and support value-based care. For LTPAC providers, SMEs note that aligning measures and moving toward interoperable solutions provides an opportunity to expand the use of clinical decision support (CDS), analytics, and artificial intelligence tools to enhance care delivery and coordination.

As previously discussed, SMEs shared the challenges of today's public health reporting system with different reporting processes and data requirements by local and state governments. LTPAC providers report data as required by their local jurisdiction. The specific data requirements and reporting process varies widely from use of spreadsheets to state-specific systems. To address these issues, the Centers for Disease Control and Prevention (CDC) has released a 2022 roadmap for modernizing public health reporting in the United States. An example of an emerging innovation discussed by the SMEs is the National Healthcare Safety Network (NHSN) for infection tracking data and resources including for LTPAC providers. The COVID-19 pandemic highlighted the importance of technology tools for reporting, and public health infrastructure improvements to enable real-time data analysis and decision-making. For example, interoperable Health IT allow providers to efficiently report cases and other critical population health information to federal agencies, state, local, territorial, and tribal partners during public health emergencies. The Biden Administration issued an Executive Order in January 2021 on protecting public health and ONC is prioritizing both data standardization and

workforce to improve the public health infrastructure (White House, 2021). This is an emerging area, and it is important for LTPAC providers to be included in both the technology planning and deployment.

Public health SMEs who participated in discussions with RTI emphasized that the COVID-19 pandemic has, "*pulled the band-aid off the public health reporting system*," and revealed how archaic the public HIT infrastructure is. This was most apparent with regard to immunization data; LTPAC providers were not reporting to Immunization Information Systems. The SMEs discussed how the voluntary process of reporting leads to gaps or delays in the information the CDC and other agencies receive about reportable conditions from localities and states. The COVID-19 pandemic has shown that the public health challenge is compounded since LTPAC clinical documentation and pharmacy systems are not well-integrated with interoperable EHRs and they are hampered by a lack of uniform reporting.

SMEs noted that for comprehensive EHR reporting to succeed at any level within the United States, there needs to be a culture of data standardization at the national level. Otherwise, fragmented EHR reporting will remain across local, state, and federal levels, across care settings, and across care services. Adopting new standards like FHIR will be essential if LTPAC settings are to use EHRs to share data such as immunization information and social determinants of health with public health agencies.

## SECTION 6
## POLICY CONSIDERATIONS AND RESEARCH

Recommendations in the literature and from SME interviews pointed to several potential policy levers to increase interoperable EHR adoption and use among LTPAC providers. They indicated that the population served in LTPAC represents patients with multiple chronic conditions and high health care costs presenting opportunities for great potential impact with new policies and innovations. SME groups identified emerging opportunities with policy changes such as with dQMs and public health reporting. Across the SME groups they shared a desire to increase conversations between care settings and providers, between payers and CMS/ONC, and across HIE/HINs to coordinate on needs, priorities, policies, standards, initiatives, and communication. The themes and ideas for policy considerations and research based on the environmental scan and SME interviews are discussed below.

### 6.1 Address the Policy Barriers that Limit Long-Term and Post-Acute Care Inclusion in Health Information Technology and Interoperability Advances

- ***Consider Statutory Limitations to Include LTPAC in HIT Policies.*** Policy makers in the literature and from SME interviews pointed to several potential policy levers to increase interoperable EHR adoption and use among LTPAC providers. They indicated that the population served in LTPAC represents patients with multiple chronic conditions and high health care costs presenting opportunities for great potential impact with new policies and innovations. SME groups identified emerging opportunities with policy changes such as with dQMs and public health reporting. Across the SME groups they shared a desire to increase conversations between care settings and providers, between payers and CMS/ONC, and across HIE/HINs to coordinate on needs, priorities, policies, standards, initiatives, and communication. The themes and ideas for policy considerations and research based on the environmental scan and SME interviews are discussed below.

- ***Explore Barriers and Facilitators to Participate in CEHRT and ONC Health IT Certification Program.*** Use of certified HIT according to the CMS Certified Electronic Health Record Technology (CEHRT) definition is a foundational requirement for some programs (e.g., electronic quality measure reporting, some value-based care models and innovations). The requirement to adopt and use CEHRT does not apply to LTPAC, however, SMEs noted challenges with participating in current CMS value-based care and innovation models due to this requirement and the potential future impact if not addressed.

  The ONC Health IT Certification Program promotes a modular ecosystem of HIT for settings beyond those previously eligible for the EHR Incentive Programs, such as for LTPAC. Through the ONC Health IT Certification Program, providers across the care continuum have improved access to technical standards that form an essential foundation for interoperability and help ensure that key data is consistently available to the right person, at the right place, and at the right time. Certification criteria supports settings and

use cases across the care continuum – including for LTPAC where such criteria are voluntary to adopt as part of the CMS payment program. SMEs shared that the lack of drivers for voluntary certification, such as a CMS payment model, quality or public health reporting requirement, or regulation, has resulted in limited awareness of LTPAC providers to request certification of their vendors.

### 6.2 Spur Adoption of Interoperable Health Information Technology in Long-Term and Post-Acute Care Settings

- ***Consider Policy Options to Increase Adoption.*** Investigate interest and considerations for incentive programs (financial and other) to increase adoption and use of interoperable/certified EHRs and reward information-sharing by LTPAC. Evaluate opportunities such as those with quality payment programs, payment models that provide opportunities for LTPAC (e.g., institutional special needs plan, dual eligible special needs plan, and accountable care organizations), and new innovations in value-based care models targeting LTPAC populations and settings.

- ***Understand the Effectiveness of Past Policies, Funding, and Interventions.*** Understand past policy interventions applied to LTPAC and their effectiveness (e.g., Promoting Interoperability, funding to HINs, and financial matching programs) to determine outcomes achieved, feasibility for roll-out on a national scale, and potential impact.

- ***Recognize Related Workforce Training and Support Needs.*** Findings in the literature and feedback from SMEs stress that policies to increase adoption and use of interoperable HIT must consider workforce training and resources needed to support implementation and workflow redesign. Investments that support staff training could incorporate HIT skills-building to promote use of HIT.

### 6.3 Coordinate on Interoperability Priorities, Policies, Standards, and Communication

- ***Convene a Cross-HHS LTPAC Interoperability Working Group.*** Increase communication and coordination across agencies focused on including LTPAC in broader HIE/HIN planning, requirements, or activities. The workgroup could explore opportunities to further coordinate and collaborate on data harmonization/alignment to advance LTPAC interoperability using existing tools/resources (e.g., CMS DEL or CDC NHSN) and the ONC USCDI, etc. Collaboration could also include engaging HIE/HINs to share opportunities, policies, and case studies that have increased LTPAC participation. For example, one state HIN supports their state Medicare Advantage Dual-Eligible Special Needs Plan data-sharing requirements and onboarded all SNFs who report admission, discharge, and transfer information with the HIN.

- ***Understand Bidirectional Data Sharing Priorities and Standards for Providers***. Policy makers seeking to align requirements, standards initiative, funding opportunities, and analytic strategies would be well-served to stay informed of providers' data sharing priorities and gaps. Data sharing/exchange priorities and policies identified include increasing electronic data sharing compatibility for two-way communication between

hospitals and LTPAC providers via national standards. Priority areas include information exchange for transition and continuity of care, such as:

- Transition of care, referral, and detailed aspects of medication management (additions, changes, and discontinuation of medications).
- Sharing of advance directive with an individual's care team including their pharmacist.
- Use of an electronic shared care plan that includes therapies implemented, revised, or stopped.
- Patient status changes.

- ***Utilize HHS Communication Tools to Build Awareness and Educate LTPAC Settings on Interoperability***. In the absence of policy levers and programs to advance interoperability, it may be helpful to strengthen communication and education approaches to discuss the importance of interoperability and use of HIE standards in LTPAC EHRs. Include real-world case studies, standards implementation success stories such as from the PACIO project, and findings from research studies on information-sharing. Lastly, discuss the value and efficiency gains from utilizing standardized data collected at the point of care to support administrative reporting requirements.

### 6.4 Improve Health Information Exchange Across Platforms, Networks, and Geographies

- ***Consider Value Proposition for LTPAC to Participate in HIE/HINs.*** To commit both financially and data resources to an HIE/HIN, LTPAC providers must receive a benefit or have a business reason to participate. Investigate how the value proposition can be improved for LTPAC. HINs noted a misaligned incentives -- LTPAC patient data is needed by stakeholders for population health, public health, care coordination, quality management and cost management -- but value back to the LTPAC setting is limited because they are not receiving the data needed.

- ***Improve Ease of Data Sharing.*** The current state for HINs does not allow for easy data sharing and thus there is very little insight into who owns, manages, and controls the data. Common standards and technical approaches for interoperability and information exchange will help overcome barriers to data sharing. An emerging opportunity to address this is the Trusted Exchange Framework and Common Agreement.

- ***Clarify HIE/HIN, Vendor, and Provider Relationships.*** In the LTPAC market, a few technology platform vendors support a large number of providers. Issues have emerged with ownership, management, and control over data exchange. Clarification and policies are needed on data governance policies for HIE including the data ownership is centered around the vendor and HIE or the HIE and provider/covered-entity. The 2020 ONC Cures Act Final Rule could help address potential information blocking concerns and data governance policies as noted by SMEs.

### 6.5 Investigate Telehealth Policy, Planning, Use, and Research in Long-Term and Post-Acute Care

- ***Explore Opportunities in Telehealth by LTPAC Settings.*** COVID-19 has had an impact on telehealth regulations and caused states and LTPAC providers to re-evaluate their ability to use technology and telehealth to perform care. Preliminary work suggests LTPAC, specifically nursing homes, are likely to use telehealth post-pandemic (Wicklund, 2021). Identifying opportunities for telehealth in LTPAC can support policies including reimbursement, regulations, technology preparedness, and potential outcomes. Study domains could address these domains plus the following questions:
    - Who is not eligible for the expansion of telehealth services? Who would be left out (providers or patient populations)?
    - What barriers exist? For example, what communities do not have access to broadband internet? How will challenges with technology adoption to support telehealth be overcome if knowledge does not exist and training is needed? Will cost and workflow changes deter adoption in LTPAC?

## SECTION 7
## CONCLUSION

While LTPAC providers are adopting EHRs, the lack of alignment of systems and standards to support interoperability with their clinical partners continues to be a challenge. Across all levels of the LTPAC space, from providers to HIN/HIEs, government entities to public health entities, there are differing interpretations of needs and reasons for lagging adoption and use of interoperable EHRs. Through an environmental scan and SME interviews, we identified potential policy considerations to help bridge the gaps. This report serves to broaden the understanding of the evolving ecosystem and to illustrate that there is no singular driver of changes in the LTPAC sector. Although consistent themes emerged on barriers and facilitators across the industry, there exist barriers and facilitators that are unique to specific key users such as payers and public health reporting. Policy levers such as incentives and requirements have resulted in widespread adoption of EHRs for hospitals and physician-offices providing the foundation for incremental progress toward interoperability in a coordinated way. This progress alone has not provided enough market force for LTPAC to adopt interoperable solutions. The COVID-19 pandemic has highlighted the need for seamless exchange mechanisms between hospitals, physicians, and LTPAC providers, and prioritizing public health reporting in policy would be an opportunity to leverage and build HIE/HIN adoption.

## REFERENCES


Abramson, E.L., Edwards, A., Silver, M., & Kaushai, R. (2014). Trending health information technology adoption among New York nursing homes. *American Journal of Managed Care*, 20(11 Spec No. 17), eSP53-59.

Alexander, G.L., Steege, L.M., Pasupathy, K.S., & Wise, K. (2015). Case studies of IT sophistication in nursing homes: a mixed method approach to examine communication strategies about pressure ulcer prevention practices. *International Journal of Industrial Ergonomics*, 49, 156-166.

Alvarado, C.S., Zook, K., & Henry, J. (2017). *Electronic Health Record Adoption and Interoperability among US Skilled Nursing Facilities in 2016. ONC Data Brief*. https://dashboard.healthit.gov/evaluations/data-briefs/electronic-health-record-adoption-interoperability-nursing-facilities-2016.php#:~:text=In%202016%2C%2064%25%20of%20SNFs,location%2C%20nor%20by%20bed%20size.

Andersen, L.E., Tripp, L., Perz, J.F., Stone, N.D., Viall, A.H., Ling, S.M., & Fleisher, L.A. (2021). Protecting nursing home residents from COVID-19: federal strike team findings and lessons learned. *NEJM Catalyst Innovations in Care Delivery*. https://catalyst.nejm.org/doi/full/10.1056/CAT.21.0144.

Bailey, V. (2021). Skilled nursing facilities had mixed reviews of telehealth use. *MHealthIntelligence*. https://mhealthintelligence.com/news/skilled-nursing-facilities-had-mixed-reviews-of-telehealth-use.

Bercovitz, A., Sengupta, M., & Jamison, P. (2010). *Electronic Medical Record Adoption and Use in Home Health and Hospice*. NCHS Data Brief, no 45.

Bercovitz, A.R., Park-Lee, E., & Jamoom, E. (2013). Adoption and use of electronic health records and mobile technology by home health and hospice care agencies. *National Health Statistics Report*, (66), 1-11.

Caffrey, C., Cairns, C., & Rome, V. (2020). *Trends in Electronic Health Record Use among Residential Care Communities: United States, 2012, 2014, and 2016*. National Health Statistics Reports, no 140. https://www.cdc.gov/nchs/data/nhsr/nhsr140-508.pdf.

CareQuality. (n.d.). *Home Page*. Retrieved February 3, 2022, from https://carequality.org/.

Dougherty, M., Williams, M., Millenson, M., & Harvell, J. (2013). *EHR Payment Incentives for Providers Ineligible for Payment Incentives and Other Funding Study*. https://aspe.hhs.gov/basic-report/ehr-payment-incentives-providers-ineligible-payment-incentives-and-other-funding-study.

Felix, H., Dayama, N., Morris, M.E., Pradhan, R., & Bradway, C. (2021). Organizational characteristics and the adoption of electronic health records among nursing homes in one southern state. *Journal of Applied Gerontology*, 40(5), 481-488. https://doi.org/10.1177/0733464820906685.

Henry, J., Pylypchuk, Y., & Patel, V. (2018). *Electronic Health Record Adoption and Interoperability among US Skilled Nursing Facilities and Home Health Agencies in 2017*. ONC Data Brief. https://www.healthit.gov/sites/default/files/page/2018-11/Electronic-Health-Record-Adoption-and-Interoperability-among-U.S.-Skilled-Nursing-Facilities-and-Home-Health-Agencies-in-2017.pdf.

Henry, J., Pylypchuk, Y., Searcy, T., & Patel, V. (2016). *Adoption of Electronic Health Record Systems among U.S. Non-Federal Acute Care Hospitals: 2008-2015*. https://www.healthit.gov/sites/default/files/briefs/2015_hospital_adoption_db_v17.pdf.

HL7 FHIR Exchange Network. (n.d.). *FHIR Exchange Module*. Retrieved February 3, 2022, http://www.hl7.org/fhir/exchange-module.html.

Kaiser Family Foundation (KFF). (2022). *State COVID-19 Data and Policy Actions*. Retrieved February 3, 2022, https://www.kff.org/coronavirus-COVID-19/issue-brief/state-COVID-19-data-and-policy-actions/#long-term-care-cases-deaths.

LeadingAge. (2015). *Electronic Health Record Adoption and Health Information Exchange among Long Term and Post Acute Care Providers: A Survey of LeadingAge New York Members*. http://www.leadingageny.org/?LinkServID=2E102FA3-007E-0553-F50E1E2BB975E3DC.

LeadingAge Center for Aging Services Technology. (2021). *Technology Selection Tools*. https://leadingage.org/technology-selection-tools?_ga=2.69199569.1524041378.1628129418-1365451774.1616156820.

Office of the National Coordinator for Healthcare Technology (ONC). (2019). *Office-based Physician Electronic Health Record Adoption*. Retrieved July 26, 2021, https://dashboard.healthit.gov/quickstats/pages/physician-ehr-adoption-trends.php.

Powell, K.R., & Alexander, G.L. (2021). Consequences of rapid telehealth expansion in nursing homes: Promise and pitfalls. *Applied Clinical Informatics*, 12(4), 933-943. https://doi.org/10.1055/s-0041-1735974.

Richard, A., Kaehny, M., May, K., & Kramer, A. (2008). *Literature Review and Synthesis: Existing Surveys on Health Information Technology, including Surveys on Health Information Technology in Nursing Homes and Home Health*. https://aspe.hhs.gov/sites/default/files/private/pdf/75641/HITlitrev.pdf.

Samson, L., Tarazi, W., Turrini, G., & Sheingold, S. (2021). *Medicare Beneficiaries' Use of Telehealth Services in 2020--Trends by Beneficiary Characteristics and Location*. Issue Brief No. HP-2021- 27. https://www.aspe.hhs.gov/sites/default/files/documents/a1d5d810fe3433e18b192be42dbf2351/medicare-telehealth-report.pdf?_ga=2.234995651.313728446.1638808754-1494035394.1632321790.

Shea, C.M., & Belden, C.M. (2016). What is the extent of research on the characteristics, behaviors, and impacts of health information technology champions? A scoping review. *BMC Med Inform Decis* Mak, 16:2. doi: 10.1186/s12911-016-0240-4. PMID: 26754739; PMCID: PMC4709871.

Schreiber, M., Holland, E. Andress, J., & Wickiser, L. (2021). *Advancing Digital Strategies for Quality Measurement and Improved Care*. 2021 CMS Quality Conference.

Vest, J.R., Jung, H.Y., Wiley, K. Jr., Kooreman, H., Pettit, L., & Unruh, M.A. (2019). Adoption of health information technology among US nursing facilities. *Journal of the American Medical Directors Association*, 20(8), 995-1000.e1004. https://doi.org/10.1016/j.jamda.2018.11.002.

White House. (2021). *Executive Order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*. https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-protecting-public-health-and-environment-and-restoring-science-to-tackle-climate-crisis/.

Wicklund, E. (2021). Is the time right for skilled nursing facilities to embrace telehealth? *MHealthIntelligence*. https://mhealthintelligence.com/news/is-the-time-right-for-skilled-nursing-facilities-to-embrace-telehealth.

Wolf, L., Harvell, J., & Jha, A.K. (2012). Hospitals ineligible for federal meaningful-use incentives have dismally low rates of adoption of electronic health records. *Health Affairs*, 31(3), 505-513. https://doi.org/10.1377/hlthaff.2011.0351.

## APPENDIX A.
## ELECTRONIC HEALTH RECORD ADOPTION STATISTICS OVER TIME BY SETTING

Tracking LTPAC EHR adoption rates is challenging because there is no unifying definition of EHRs for the LTPAC sector. Therefore, it is difficult to compare adoption rates over time by EHR and setting types and therefore this is a limitation of this study. Data included either full or partial implementation of an EHR system. What is known about HIE is included by provider setting. Several surveys assessed on standard domains: access to a HIN, ability to view, send, receive, and integrate. We describe the findings and surveys on EHR adoption rates by setting below.

**Table A-1. EHR Adoption Over Time for Hospitals Participating in CMS Promoting Interoperability Programs (Formerly EHR Incentive Programs)**

| EHR | Percent | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Basic | 9.4 | 12.2 | 15.6 | 27.6 | 44.4 | 59.4 | 75.5 | 83.8 |
| Certified | | | | 71.9 | 85.2 | 94.0 | 96.9 | 96.0 |

Source: Adoption of Electronic Health Record Systems among U.S. Non-Federal Acute Care Hospitals: 2008-2015 (healthit.gov) (Henry et al., 2016).

**Table A-2. EHR Adoption Over Time for Office-based Physicians**

| EHR | Percent | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2017 |
| Any | 42.0 | 48.3 | 51.0 | 57.0 | 71.8 | 78.4 | 82.8 | 86.9 | 85.9 |
| Basic | 11.8 | 16.9 | 21.8 | 27.9 | 33.9 | 39.6 | 48.1 | 50.5 | |
| Certified | | | | | | | 74.0 | 77.9 | 79.7 |

Source: Office-based Physician Electronic Health Record Adoption (healthit.gov). ONC, 2019. https://www.healthit.gov/data/quickstats/office-based-physician-electronic-health-record-adoption.

| Table A-3. EHR Adoption and Interoperability for SNFs and NHs | | | | |
|---|---|---|---|---|
| **Year** | **EHR Adoption Rate, # Facilities Surveyed, (% with EHR)*** | **Interoperability Domains** | **Description** | **Citation** |
| 2008 | Range across 4 surveys**:<br>36 - 1,174 (18% - 47%) | Not applicable | ASPE study on the estimate of EHR adoption rate and electronic provider order entry | Richard et al. (2008) |
| 2012 | 472 (48.6%) | Not applicable | Survey of all New York state NHs in 2012 | Abramson et al. (2014) |
| 2013 | 472 (56.3%) | Not applicable | Survey of all New York state NHs in 2013 | Abramson et al. (2014) |
| 2015 | 126† (73%) | HIE across all survey participants:<br>▪ Engage with a HIN: 31%<br>▪ View or exchange with hospital: 53%<br>▪ View only: 24%<br>▪ Send to hospitals: 16%<br><br>Receive electronically from hospital: 27% | NHs in New York conducted by LeadingAge New York Members | LeadingAge (2015) |
| 2016 | 63 (69.8%) | Not applicable | Survey of Arkansas Facilities | Felix et al. (2021) |
| 2016 | 813 (64%) | ▪ Find (20%)<br>▪ Send (29%)<br>▪ Receive (23%)<br>▪ Integrate (9%)<br>▪ All 4 domains (7%) | ONC survey of EHR adoption and interoperability in SNFs | Alvarado et al. (2017) |
| 2017 | 1,000 (66%) | ▪ Find (27%)<br>▪ Send (41%)<br>▪ Receive (41%)<br>▪ Integrate (18%)<br>▪ All 4 domains (not reported) | ONC survey of EHR adoption and interoperability of SNFs including medication management (reconcile and record), electronic exchange, and methods of exchange | Henry et al. (2018) |
| 2018 | 586 (84%) | ▪ Find (32%)<br>▪ Send (22%)<br>▪ Receive (41%)<br>▪ Integrate (12%)<br>▪ All 4 domains (3%) | Survey of EHR adoption and interoperability | Vest et al. (2019) |

Notes:
*: The definition of an EHR varied between surveys and over time, precluding comparisons between the surveys.
**: The separate surveys were conducted among 1,174 NHs, 36 multi-facility long-term care organizations, 68 facilities of various types, and 297 NHs. The surveys were conducted from 2004 to 2007.
†: 126 facilities responded, these represent 117 organizations including NHs, HHAs, PACE programs, assisted living, and adult day facilities. Many offered multiple services.

| Table A-4. EHR Adoption and Interoperability for HHAs and Hospice | | | | |
|---|---|---|---|---|
| **Year** | **EHR Adoption Rate, # Facilities Surveyed, (% with EHR)*** | **Interoperability Domains** | **Description** | **Citation** |
| 2007 | 14,500 (41% all,<br>37% HHA only,<br>49% hospice only,<br>63% HHA and hospice) | Not available | NCHS study on EHR adoption and use in HHA and hospice | Bercovitz et al. (2010) |
| 2007 | 13,100 (44%; includes 28% EHRs and mobile technology and 16% EHR only) | Not available | Study on HHA and hospice use of EHRs and mobile technologies | Bercovitz et al. (2013) |
| 2015 | 126** (68%) | HIE across all survey participants:<br>▪ Engage with a HIN: 31%<br>▪ View or Exchange with hospital: 53%<br>▪ View only: 24%<br>▪ Send to hospitals: 16%<br>▪ Receive electronically from hospital: 27% | HHAs in New York conducted by LeadingAge New York members | LeadingAge (2015) |
| 2017 | 1,004 (78%) | ▪ Find (41%)<br>▪ Send (52%)<br>▪ Receive (53%)<br>▪ Integrate (36%)<br>▪ All 4 domains (not reported) | ONC survey of EHR adoption and interoperability of HHAs including medication management (reconcile and record), methods of exchange, telehealth, and mobile technology use | Henry et al. (2018) |
| Notes:<br>*: The definition of an EHR varied between surveys and over time, precluding comparisons between the surveys.<br>**: 126 facilities responded, these represent 117 organizations including NHs, HHAs, PACE programs, assisted living, and adult day facilities. Many offered multiple services. | | | | |

| Table A-5. EHR Adoption and Interoperability for IRFs and LTCHs | | | | |
|---|---|---|---|---|
| **Year** | **EHR Adoption Rate, # Facilities Surveyed, (% with EHR)*** | **Interoperability Domains** | **Description** | **Citation** |
| 2009 | IRF, 108 (4%)<br>LTCH, 144 (6%) | Not available | HIT supplement from the American Hospital Association survey of 32 clinical functions of an EHR system | Wolf et al. (2012) |
| Note:<br>*: The definition of an EHR varied between surveys and over time, precluding comparisons between the surveys. | | | | |

| Table A-6. EHR Adoption for Residential Care Communities and Adult Day Services | | | | |
|---|---|---|---|---|
| **Year** | **EHR Adoption Rate, # Facilities Surveyed, (% with EHR)*** | **Interoperability Domains** | **Description** | **Citation** |
| 2012 | 4,319 (20%) Overall, (35.5%) Over 100 beds | Not available | NCHS EHR Use in Residential Care Communities (all types) | Caffrey et al. (2020) |
| 2015 | 126** (46%) | HIE across all survey participants:<br>▪ Engage with a HIN: 31%<br>▪ View or Exchange with hospital: 53%<br>▪ View only: 24%<br>▪ Send to hospitals: 16%<br>▪ Receive electronically from hospital: 27% | Assisted Living Facilities in New York conducted by LeadingAge New York members | LeadingAge (2015) |
| 2015 | 126** (56%) | | Managed long-term care plans/PACE programs in New York conducted by LeadingAge New York members | LeadingAge (2015) |
| 2015 | 126** (24%) | | Adult Day Programs in New York conducted by LeadingAge New York members | LeadingAge (2015) |
| 2016 | 4,489 (26%) Overall, (50.0%) Over 100 beds | Not available | NCHS EHR Use in Residential Care Communities (all types) | Caffrey et al (2020) |

Notes:
*: The definition of an EHR varied between surveys and over time, precluding comparisons between the surveys.
**: 126 facilities responded, these represent 117 organizations including NHs, HHAs, PACE programs, assisted living, and adult day facilities. Many offered multiple services.

## APPENDIX B.
## DETAILED METHODS

***Environmental Scan Methods (Task 1)*:** Based on the three research questions and concept map we worked with a health sciences librarian to construct search strategies related to HIT adoption, EHRs, HIEs, patient populations, quality measurement and reporting, policies, workforce, care coordination, usability, and the LTPAC settings of interest in order to pull full text literature results to review.

Two members of the RTI team reviewed abstracts to identify sources for full-length review. We excluded 132 sources after title and abstract review. Two reviewers independently screened the remaining 119 full-length articles and consulted with another team member to resolve uncertainties. After completing the screening process, we included 68 sources for this report.

The RTI team read the 68 sources meeting our inclusion criteria and categorized them by research question and key themes or topics addressed. The team captured key concepts, findings, and conclusions from the included sources. Additionally, we identified gaps in the literature, topics for discussion with SMEs in Task 2, and potential opportunities for research or policy action based on the literature reviewed.

*Limitations of Environmental Scan Methods*: First, we searched only two electronic databases and we limited the environmental scan to sources available in English from 2011 to 2021 and pertaining to LTPAC settings in the United States. Some of these limits may have led to the exclusion of relevant publications, but we believe the literature we identified via PubMed, Google Scholar, and manual searches is representative of the available sources published after 2011 and specifically addressing the research questions. Further, these limits increase the applicability of the information to policy makers in the United States concerned with a field that is changing rapidly in terms of technology and accessibility. Second, given the scope and purpose of the environmental scan to identify barriers, facilitators, and potential policy levers, and describe how LTPAC providers are using EHRs, we did not conduct a thorough extraction of study characteristics and outcomes from primary research studies, reports, or program evaluations. The information we captured was descriptive and qualitative to aid in efficiently categorizing and grouping similar concepts from an array of sources. This limits the conclusions we can draw with respect to the availability of evidence regarding provider, patient, and utilization outcomes associated with HIT utilization in LTPAC settings.

***SME Interview Analysis Methods (Task 2)*:** To confirm/fill in gaps from the environmental scan findings, gather insights, and discuss policy/research opportunities, RTI engaged SMEs who are experts, leaders, policy analysts, and/or researchers in HIT in LTPAC. RTI interviewed seven SME groups (Researchers, Payers, Provider and Developer Organizations/Technical, Public Health Specialists, HIEs/HINs and two CMS/ONC groups focusing on Interoperability Rule and Value Based Care). The SMEs included, but will not be

limited to, academic researchers, state officials, federal officials, and individuals who represent organizations actively engaged in federal and state HIT in LTPAC policy.

SMEs who agreed to participate in an interview were sent a project one pager, final environmental scan, and interview questions. All SME interviews were capped at nine participants and were 60 minutes in length and were recorded solely for notetaking purposes. The research questions varied across the group and discussed current state of HIT adoption in LTPAC settings, barriers, and facilitators to EHRs in LTPAC settings, challenges to LTPACs accessing and sharing data, and potential policy solutions that could promote EHR adoption and use. The one-hour RTI led interviews contained an RTI lead staff member and a primary notetaker. Office of the Assistant Secretary for Planning and Evaluation (ASPE) representatives were included on all SME interview invitations. The lead used a semi-structured interview technique so that the key questions were asked while also allowing space for the interviewer and SME to explore relevant topic areas that may not have been considered when the question guide was developed. SMEs could also follow-up to the interview will written feedback or comments.

RTI synthesized anonymous pieces of the interviews to include in the final report as well as work to include SME quotes in cases where the quotes added further emphasis or context. The final report is to be shared with the SMEs after the conclusion of the project.

## APPENDIX C.
## ELECTRONIC HEALTH RECORD FUNCTIONALITY COMPARISON

Hospitals and professionals eligible for the EHR Incentive Program saw incremental changes over time to functionality and standards requirements to advance interoperability. ***Exhibit C-1*** compares requirements over time from 2011 through 2021 to LTPAC EHR Functions. LeadingAge Center for Aging Services Technology maintains an EHR Selection Matrix Resource that includes information on system functionality gathered from 17 vendors that support the spectrum of LTPAC settings. Because LTPAC providers and settings were not eligible for the EHR Incentive Program or the current Promoting Interoperability Program, the functionality and standards may not align due to lack of requirements and/or customer request. The purpose of the exhibit is to help the reader understand the LTPAC system functions and uses compared to the interoperability programs.

**Table C-1. Incremental Changes Over Time to Promote Interoperability and Certification Requirements for Eligible Hospitals and Providers Compared to LTPAC EHR Functions**

| EHR Incentive Program | | | | LTPAC EHR Function |
|---|---|---|---|---|
| **Base EHR (2011) *** | **2014 Edition Certification Criteria**** | **2015 Edition Certification Criteria**** | **2015 Edition Cures Update***** | **LeadingAge Center for Aging Service Technology EHR Selection Matrix******** |
| **CLINICAL** | | | | |
| Patient demographic | Demographics (§ 170.314(a)(3)) | Demographics (§ 170.314(a)(3)) | | Yes |
| Medical history | | | | Yes |
| Problem List | Problem List (§ 170.314(a)(5)) | Problem List (§ 170.315(a)(6)) | Removed | Yes |
| Vitals | Vital Signs, Body Mass Index, and Growth Charts (§ 170.314(a)(4) | | | Yes |
| Clinical decision support | CDS (§ 170.314(a)(8)) | CDS (§ 170.315(a)(9)) | | Yes, Alerts and Notification<br><br>Yes, CDS Falls, Infections, Readmission Prevention, Antipsychotic Reduction, Pressure Ulcer Healing, Preventable Transfer, and Others |
| Physician order entry | Computerized Provider Order Entry (CPOE) § 170.314(a)(1) | CPOE -- Medications (§ 170.315(a)(1) | | Yes, Physician Orders and Physician Order Recap |
| | | CPOE -- Laboratory (§ 170.315(a)(2)) | | Yes, Physician Orders and Physician Order Recap |
| | | CPOE -- Diagnostic Imaging (§ 170.315(a)(3)) | | Yes, Physician Orders and Physician Order Recap |
| | Optional -- CPOE -- Medications (§ 170.314(a)(18)) | CPOE -- Medications (§ 170.315(a)(1)) | | Yes, Physician Orders and Physician Order Recap |

| Table C-1 (*continued*) | | | | |
|---|---|---|---|---|
| **EHR Incentive Program** | | | | **LTPAC EHR Function** |
| **Base EHR (2011) *** | **2014 Edition Certification Criteria**** | **2015 Edition Certification Criteria**** | **2015 Edition Cures Update***** | **LeadingAge Center for Aging Service Technology EHR Selection Matrix******** |
| | Optional -- CPOE -- Laboratory (§ 170.314(a)(19))<br><br>CPOE -- Laboratory (§ 170.315(a)(2)) | Optional -- CPOE -- Laboratory (§ 170.314(a)(19))<br><br>CPOE -- Laboratory (§ 170.315(a)(2)) | | Yes, Lab Orders |
| | Optional -- CPOE -- Diagnostic Imaging (§ 170.314(a)(20))<br><br>CPOE -- Diagnostic Imaging (§ 170.315(a)(3)) | Optional -- CPOE -- Diagnostic Imaging (§ 170.314(a)(20))<br><br>CPOE -- Diagnostic Imaging (§ 170.315(a)(3)) | | Yes, Diagnostic Testa and Radiology Orders |
| | Medication List (§ 170.314(a)(6)) | Medication List (§ 170.315(a)(7)) | Removed | Yes |
| | Medication Allergy List (§ 170.314(a)(7)) | Medication Allergy List (§ 170.315(a)(8)) | | Yes, Allergy |
| | Electronic Notes (§ 170.314(a)(9)) | | | Yes, Clinical Notes and Charting |
| | Drug-Formulary Checks (§ 170.314(a)(10)) | Drug-Formulary and Preferred Drug List Checks (§ 170.315(a)(10)) | Removing January 1, 2022 (sunset of Medicaid Promoting Interoperability program) | Yes, Closed-Loop Medication Verification |
| | Drug-Drug, Drug-Allergy Interaction Checks (§ 170.314(a)(2)) | Drug-Drug, Drug-Allergy Interaction Checks for CPOE (§ 170.315(a)(4)) | | Yes, Medication Management (Drug-Drug, Drug-Dietary, and Drug-Allergy Interaction) |
| | Drug-Formulary and Preferred Drug List Checks (§ 170.315(a)(10)) | | | Yes, Medication Management (Drug-Drug, Drug-Dietary, and Drug-Allergy Interaction) |
| | | Implantable Device List (§ 170.315(a)(14)) | | |
| | | Social, Psychological, and Behavioral Data (§ 170.315(a)(15)) | | Yes, Assessments and Notes |
| | Smoking Status (§170.314(a)(11)) | Smoking List (§ 170.315(a)(11)) | Removed | |
| | Image Results (§ 170.314(a)(12)) | | | Yes, Third Party Ancillary Integration including Lab, Radiology (Imaging), and Pharmacy |
| | Family Health History (§ 170.314(a)(13)) | Family Health History (§ 170.315(a)(12)) | | Yes, Assessments |
| | Family Health History (§ 170.315(a)(12)) | | | |
| | Patient-Specific Education (§ 170.314(a)(15)) | Patient-Specific Education Resources (§ 170.315(a)(13)) | Removing January 1, 2022 (sunset of Medicaid Promoting Interoperability program) | |

| Table C-1 (*continued*) | | | | |
|---|---|---|---|---|
| **EHR Incentive Program** | | | | **LTPAC EHR Function** |
| **Base EHR (2011) *** | **2014 Edition Certification Criteria**** | **2015 Edition Certification Criteria**** | **2015 Edition Cures Update***** | **LeadingAge Center for Aging Service Technology EHR Selection Matrix******** |
| | Inpatient Setting Only -- Electronic Medication Administration Record (§ 170.314(a)(16)) | See Patient Health Information Capture (§ 170.315(e)(3)) | | Yes, Medication Administration Record and Treatment Administration Record |
| | Inpatient Setting Only -- Advance Directives (§ 170.314(a)(17) | | | Yes, Advance Directives |
| | | | | Yes, Assessments (Regulatory and Clinical) |
| | | | | Yes, Pharmacist Drug Review |
| | | | | Yes, Controlled Drug Management |
| | | | | Yes, Dose Reduction Schedules |
| | | | | Yes, Resident Client Scheduling |
| | | | | Yes, Staff Scheduling |
| | | | | Yes, Census |
| | | | | Yes, Single Medical Record Support |
| | | | | Yes, Customizable Templates |
| | | | | Yes, Workflow Management, Alerts and Prompts |
| | | | | Yes, Incident Management |
| | | | | Yes, Consent (Informed Consent, Notice and Authorizations) |
| **CARE COORDINATION** | | | | |
| | Transitions of Care -- Receive, Display, and Incorporate Transition of Care/Referral Summaries (§ 170.314(b)(1)) | Transitions of Care (§ 170.315(b)(1)) also see (§ 170.315(b)(2) and § 170.315(h)(1) and (2)) | USCDI Update to (§ 170.315(b)(1)) | Yes, Summary of Care Report (Transfer and Discharge)<br><br>Yes, Summary Report Consults<br><br>Yes, Continuity of Care Document (CCD)<br><br>Yes, Transfer Form |
| | Electronic Prescribing (§ 170.314(b)(3)) | Electronic Prescribing (§ 170.315(b)(3)) | Updated standard (§ 170.315(b)(3)) | Yes, Electronic Prescribing, Bidirectional |
| | Clinical Information Reconciliation and Incorporation (§ 170.315(b)(2)) | Clinical Information Reconciliation and Incorporation (§ 170.315(b)(2)) | USCDI Update to (§ 170.315(b)(2)) | Yes, Medication Reconciliation |
| | Data Portability (§ 170.314(b)(7)) | Data Export (§ 170.315(b)(6)) | Removing 36 months from publication date | |

| Table C-1 (*continued*) | | | | |
|---|---|---|---|---|
| **EHR Incentive Program** | | | | **LTPAC EHR Function** |
| **Base EHR (2011) *** | **2014 Edition Certification Criteria**** | **2015 Edition Certification Criteria**** | **2015 Edition Cures Update***** | **LeadingAge Center for Aging Service Technology EHR Selection Matrix******** |
| | Optional -- Transitions of Care (§ 170.314(b)(8)) | Transitions of Care (§ 170.315(b)(1)) | | |
| | Optional -- Clinical Information Reconciliation and Incorporation (§ 170.314(b)(9)) | Clinical Information Reconciliation and Incorporation (§ 170.315(b)(2)) | | |
| | | Common Clinical Data Set Summary Record -- Create (§ 170.315(b)(4)) | Removed | |
| | | Data Segmentation for Privacy -- Send (§ 170.315(b)(7)) | Standards Revision (§ 170.315(b)(7))<br><br>Security Tags -- Summary of Care (send) (formerly, DS4P -- Send) | |
| | | Data Segmentation for Privacy -- Receive (§ 170.315(b)(8)) | Standards Revision (§ 170.315(b)(8))<br><br>Security Tags -- Summary of Care (receive) (formerly, DS4P -- Receive) | |
| | | Common Clinical Data Set Summary Record -- Receive (§ 170.315(b)(5)) | Removed | |
| | | Care Plan (§ 170.315(b)(9)) | | Yes, Shareable Plan of Care (including goals and instructions) |
| **CLINICAL QUALITY MEASURES (CQMs)** | | | | |
| Capture information for health care quality<br><br>Query information for health care quality | CQMs -- Capture and Export (§ 170.314(c)(1)) | CQMs -- Record and Export (§ 170.315(c)(1)) | | Yes, CMS Required Assessment Instruments (used to calculate quality measures) |
| Integrate information received from other sources | CQMs -- Import and Calculate (§ 170.314(c)(2)) | CQMs -- Import and Calculate (§ 170.315(c)(2)) | | |
| Exchange information | CQMs -- Electronic Submission (§ 170.314(c)(3)) | CQMs -- Report (§ 170.315(c)(3)) | Standards Revision (§ 170.315(c)(3))<br><br>CQMs -- Report | Yes, Electronic Submission of CMS Required Assessment Instruments (used to calculate quality measures) |
| | | CQMs -- Filter (§ 170.315(c)(4) | | |
| Meets certification criteria adopted by Sec. | | | | |

| Table C-1 (*continued*) | | | | |
|---|---|---|---|---|
| **EHR Incentive Program** | | | | **LTPAC EHR Function** |
| **Base EHR (2011) *** | **2014 Edition Certification Criteria**** | **2015 Edition Certification Criteria**** | **2015 Edition Cures Update***** | **LeadingAge Center for Aging Service Technology EHR Selection Matrix******** |
| Meets certification criteria adopted by Sec for Quality Measure domains for eligible professionals (9 measures; 3 domains) and eligible hospitals; (16 measures and 3 domains) | | | | |
| **PRIVACY AND SECURITY** | | | | |
| | Authentication, Access Control, and Authorization (§ 170.314(d)(1)) | Authentication, Access Control, and Authorization (§ 170.315(d)(1)) | | |
| | Auditable Events and Tamper-Resistance (§ 170.314(d)(2)) | Auditable Events and Tamper-Resistance (§ 170.315(d)(2)) | | |
| | Audit Report(s) (§170.314(d)(3)) | Audit Reports (§ 170.315(d)(3)) | Standards Revision (§ 170.315(d)(3)) | |
| | Amendments (§ 170.314(d)(4)) | Amendments (§ 170.315(d)(4)) | | |
| | Automatic Log-Off (§ 170.314(d)(5)) | Automatic Access Time-Out (§ 170.315(d)(5)) | | |
| | Emergency Access (§ 170.314(d)(6)) | Emergency Access (§ 170.315(d)(6)) | | |
| | End-User Device Encryption (§ 170.314(d)(7)) | End-User Device Encryption (§ 170.315(d)(7)) | | |
| | Integrity (§ 170.314(d)(8)) | Integrity (§ 170.315(d)(8)) | | |
| | Optional -- Accounting of Disclosures (§ 170.314(d)(9)) | Accounting of Disclosures (§ 170.315(d)(11)) | | |
| | | Trusted Connection (§ 170.315(d)(9)) | | |
| | | Auditing Actions on Health Information (§ 170.315(d)(10)) | Standards Revision (§ 170.315(d)(10))<br><br>Auditing Actions on Health Information | |
| **PATIENT ENGAGEMENT** | | | | |
| | View, Download, and Transmit to Third Party (§ 170.314(e)(1)) | View, Download, and Transmit to Third Party (§ 170.315(e)(1)) | USCDI Updates to (§ 170.315(e)(1)) | |
| | Ambulatory Setting Only -- Clinical Summary (§ 170.314(e)(2)) | See Common Clinical Data Set Summary Record -- Create (§ 170.315(b)(4)) and Common Clinical Data Set Summary Record -- Receive (§ 170.315(b)(5)) | | Yes, Summary of Care<br><br>Yes, Patient Education Resources |

| Table C-1 (*continued*) | | | | |
|---|---|---|---|---|
| **EHR Incentive Program** | | | | **LTPAC EHR Function** |
| **Base EHR (2011) *** | **2014 Edition Certification Criteria**** | **2015 Edition Certification Criteria**** | **2015 Edition Cures Update***** | **LeadingAge Center for Aging Service Technology EHR Selection Matrix******** |
| | Ambulatory Setting Only -- Secure Messaging (§ 170.314(e)(3)) | Secure Messaging (§ 170.315(e)(2)) | Removing January 1, 2022 (sunset of Medicaid Promoting Interoperability program) | Yes, Secure Text Messaging |
| | | Patient Health Information Capture (§170.315(e)(3)) | | |
| | | | | Yes, Global Search Capabilities |
| **PUBLIC HEALTH** | | | | |
| | Immunization Information (§ 170.314(f)(1)) | | | Yes, Immunization tracking |
| | | | | Yes, Infection Surveillance and Management |
| | Transmission to Immunization Registries (§ 170.314(f)(2)) | Transmission to Immunization Registries (§ 170.315(f)(1)) | | |
| | Transmission to Public Health Agencies -- Syndromic Surveillance (§ 170.314(f)(3)) | Transmission to Public Health Agencies -- Syndromic Surveillance (§ 170.315(f)(2)) | | |
| | Optional -- Ambulatory Setting Only -- Transmission to Public Health Agencies -- Syndromic Surveillance (§ 170.314(f)(7)) | | | |
| | Inpatient Setting Only -- Transmission of Reportable Laboratory Tests and Values/Results (§ 170.314(f)(4)) | Transmission to Public Health Agencies -- Reportable Laboratory Tests and Values/Results (§ 170.315(f)(3)) | | |
| | Optional -- Ambulatory Setting Only -- Cancer Case Information (§ 170.314(f)(5)) | | | |
| | Optional -- Ambulatory Setting Only -- Transmission to Cancer Registries (§ 170.314(f)(6)) | Transmission to Cancer Registries (§ 170.315(f)(4)) | | |

| Table C-1 (*continued*) | | | | |
|---|---|---|---|---|
| **EHR Incentive Program** | | | | **LTPAC EHR Function** |
| **Base EHR (2011) *** | **2014 Edition Certification Criteria**** | **2015 Edition Certification Criteria**** | **2015 Edition Cures Update***** | **LeadingAge Center for Aging Service Technology EHR Selection Matrix******** |
| | | Transmission to Public Health Agencies -- Electronic Case Reporting (§ 170.315(f)(5) | USCDI Update to 170.315(f)(5) | Yes, Public Health Reporting |
| | | Transmission to Public Health Agencies -- Antimicrobial Use and Resistance Reporting (§ 170.315(f)(6)) | | |
| | | Transmission to Public Health Agencies -- Health Care Surveys (§ 170.315(f)(7)) | | |
| **DESIGN AND PERFORMANCE/UTILIZATION** | | | | |
| | Automated Numerator Recording (§ 170.314(g)(1)) | Automated Numerator Recording (§ 170.315(g)(1)) | | |
| | Automated Measure Calculation (§ 170.314(g)(2)) | Automated Measure Calculation (§ 170.315(g)(2)) | | |
| | Safety-Enhanced Design (§ 170.314(g)(3)) | Safety-Enhanced Design (§ 170.315(g)(3)) | | |
| | Quality Management System (§ 170.314(g)(4)) | Quality Management System (§ 170.315(g)(4)) | | |
| | | Accessibility-Centered Design (§ 170.315(g)(5)) | | |
| | | Consolidated Clinical Document Architecture Creation Performance (§ 170.315(g)(6) | USCDI Update to § 170.315(g)(6) | |
| | | Application Access -- Patient Selection (§ 170.315(g)(7)) | | |
| | | Application Access -- Data Category Request (§ 170.315(g)(8)) | Removing 24 months from publication date | |
| | | Application Access -- All Data Request (§ 170.315(g)(9)) | USCDI Update to § 170.315(g)(9)) | |
| **TRANSPORT METHODS AND OTHER PROTOCOLS** | | | | |
| | Optional -- Applicability Statement for Secure Health Transport (§ 170.314(h)(1)) | Direct Project (§ 170.315(h)(1)) | | Yes, Send/Receive via ONC's DIRECT Project |
| | Transport and XDR/XDM for Direct Messaging (§ 170.314(h)(2)) | Direct Project, Edge Protocol, and XDR/XDM (§ 170.315(h)(2)) | | |

| Table C-1 (*continued*) | | | | |
|---|---|---|---|---|
| **EHR Incentive Program** | | | | **LTPAC EHR Function** |
| **Base EHR (2011) *** | **2014 Edition Certification Criteria**** | **2015 Edition Certification Criteria**** | **2015 Edition Cures Update***** | **LeadingAge Center for Aging Service Technology EHR Selection Matrix******** |
| | Optional -- SOAP Transport and Security Specification and XDR/XDM for Direct Messaging (§ 170.314(h)(3) | | | |
| **OTHER LTPAC SPECIFIC** | | | | |
| | | | | Yes, Safety Monitoring |
| | | | | Yes, Mobile/Wearable Devices |
| | | | | Yes, Voice Recognition |
| | | | | Yes, Digital Camera |
| | | | | Yes, Information Exchange with HIE |
| | | | | Yes, Export to Personal Health Record |
| | | | | Yes, Integrate with Hospital/Discharge/Referral System |

Notes:
* Dougherty et al., 2013.
** Comparison of the 2014 Edition & 2015 Edition Certification Criteria (healthit.gov). https://www.healthit.gov/sites/default/files/playbook/pdf/2014-and-2015-edition-comparision.pdf.
*** 2015 Edition Cures Update (healthit.gov). https://www.healthit.gov/topic/information-blocking.
**** LeadingAge Center for Aging Services Technology. (Accessed 9/2021). Technology Selection Tools. https://leadingage.org/technology-selection-tools?_ga=2.69199569.1524041378.1628129418-1365451774.1616156820.