APPENDIX B. FRAMEWORK TO CHARACTERIZE HEALTH INFORMATION EXCHANGE TO SUPPORT CARE COORDINATION FOR PERSONS RECEIVING LTPAC/LTSS SERVICES

Table of Contents

B.1. Care Coordination Model Functions, Care Integration Constructs and Activities

TABLE B-1. Coordination of Care Model Activities by Functions and Integration Constructs			
Care Coordination Model Functions, Integration Constructs, and Examples of Activities			
Care Coordination Mechanisms/Function[1]	By Care Integration Constructs (information exchange participants)[2]	Examples of Care Coordination Mechanisms and Activities	Important to Capture for LTPAC HIE
	Coordinated care integration: • Across members of the care team within affiliated organization. • Between staff in an organization & other non-affiliated care providers including community services. • Between staff in an organization & patient/ family members.		

TABLE B-1 (*continued*)			
Care Coordination Model Functions, Integration Constructs, and Examples of Activities			
Care Coordination Mechanisms/Function[1]	**By Care Integration Constructs (information exchange participants)[2]**	**Examples of Care Coordination Mechanisms and Activities**	**Important to Capture for LTPAC HIE**
Transitions in Care & Hand-offs		• Obtain updated core data elements from multiple sources including those listed below. • The flow of information, such as medical history, medication lists, test results, laboratory & radiology tests & results, & other clinical data, from 1 participant in a patient's care to another. • Transfer of disk with CT images from a hospital to primary care or LTPAC provider. • Referrals & consultations. • Reconcile discrepancies in medication use in order to avoid ADEs. Specific to Transitions: • Review of patient's complete medication regimen at the time of ADT, including assessing use of over-the-counter medications, supplements.	• Affiliation of exchange partners--within same integrated health care network or with non-affiliated networks. • Medication reconciliation tools that include/import medication data from other sources, displaying medication lists, show new, changed, & discontinued medications. • Community pharmacies that support LTPAC. • Involvement of team during hospitalization. • Communication between team members.
Shared Care			
Assess Needs & Goals		• Identify problems, issues, risks & their severity. • Determine the patient's needs & goals for care & for coordination, including physical, emotional, & psychological health; functional status; current health & health history; self-management knowledge & behaviors; current treatment recommendations, including prescribed medications; & need for support services. • Record needs, preferences, values, & capabilities of the patient, family members, & other caregivers.	• Ability to assess & exchange functional & cognitive status information.

TABLE B-1 (*continued*)			
Care Coordination Model Functions, Integration Constructs, and Examples of Activities			
Care Coordination Mechanisms/Function[1]	By Care Integration Constructs (information exchange participants)[2]	Examples of Care Coordination Mechanisms and Activities	Important to Capture for LTPAC HIE
Create a Plan of Care (POC)		• Establish & maintain a comprehensive POC, jointly created & managed by the patient/family & health care team, which outlines the patient's current & long-standing needs, goals, & preferences for care. • The plan fills gaps in coordination, establishes patient goals for care, & sets goals for the patient's providers. • Care plan anticipates routine needs & tracks current progress toward patient goals. • POC includes self-management/self-care support. • Educate patient about condition & self-management/self-care.	• Relies on key information that might be relevant later in a patient's care is stored for future access such as medications, allergies, discharge instructions, procedures, & observations. • Patients & care coordinators may benefit from patient portals available from HIE to support self-management/self-care.
Monitor, Followup, & Respond to Change		• Jointly with the patient/family, assess progress toward care & coordination goals. Monitor for successes & failures in care & coordination. • Refine the POC as needed to accommodate new information or circumstances & to address any failures. • Manages/tracks tests, referrals, & outcomes. • Provide necessary followup care to patients. • Monitor patient's knowledge & services over time; intervene as needed. • Reassess patients & care plan periodically.	
Link to Community Resources		• Provide information on the availability of community services. • Referrals & related activities to coordinate & arrange for services with additional community resources that may help support patients' health & wellness, & meet their care goals.	• These might include financial resources (e.g., Medicaid, food stamps), social services, educational resources, support groups, or support programs (e.g., Meals on Wheels).
NOTES: Care coordination functions/mechanisms adapted for HIE and LTPAC/LTSS based on AHRQ Care Coordination Measures Framework;[1] Care Constructs adapted from Singer Integration of Care Constructs.[2] 1. McDonald K, Schultz E, Albin L, et al. Care coordination measures atlas version 3. Rockville, MD: Prepared by Stanford University under Subcontract to Battelle on Contract No. 290-04-0020 for the AHRQ; 2010. AHRQ Publication No. 11-0023-EF. 2. Singer SJ, Burgers J, Friedberg M, et al. Defining and measuring integrated patient care: Promoting the next frontier in health care delivery. Medical Care Research and Review; 2011; 68(1):112-127.			

B.2. Facet: Health Information Exchange Technology Component

The Technology Facet captures information around interoperable HIE in a detailed and uniform manner.

TABLE B-2. Examples of Categories Associated with the Technology Facet			
Category	**Characteristics**	**Examples of Sub-categories and Measures**	**Important to Capture for LTPAC/LTSS**
Functionality	• Describes the functionality & design purpose of the technical application. • Describes where & how technology used, such as point-of-care, assessment tool, tracking tool.	• HIE architecture, design, functionality, interoperability. • HIE interventions, electronic tools, & activities being implemented. • Pre-caching to facilitate retrieval, automated printing of summary record for clinicians at discharge, ED check-in.	• Integration into EHR. • Use of portals, security, login. • Availability of technology in workflow. • Advanced notification of patient with HIE data. • Types & purpose of electronic tools for care coordination such as discharge summaries, preadmission assessments, point-of-care documentation.
Non-functional Requirements	• Indicates how well the system performs.	• Reliability, availability. • Performance. • Security. • Scheduled down time. • Update schedule.	• Aspects that can influence adoption & the value to the user of the HIE.
Data Feeds & Interoperability	• Captures the attributes related to the data & its ability to be shared electronically with other systems. • Includes interoperability & HIT-related standards (transaction, clinical, etc.).	• S&I standards, clinical document standards (e.g., CCDA, CDA). • ADT. • Demographic information used to populate the MPI.	• Data feeds such as EHR, MDS, OASIS, other software that captures information . • Summary of care record. • Care plan. • Use of current standards (e.g., for transitions of care, care plans, electronic signatures).
Data Transport	• Query. • Push. • Subscribe.		• Use of query-based HIE model or DIRECT.
User-based IT Design	• Includes user interface design but also the workflow that the HIT was designed to support.	• Wide range of options & formats.	• If applications & tools were developed based on user-centered design principles. • Assessment of if the HIE application was designed for the users & supports the workflow.
Cost	• There are several layers relating to cost: hardware; software; operation & maintenance; implementation costs.	• Initial & ongoing training costs. • Costs for initial license & recurring yearly cost such as operations & maintenance.	• Implications of cost on development & implementation. • Insights into importance, measurement of ROI of technology. • Resources to support technology.
Hardware, software	• Describes the specific technology product (i.e., hardware, software).	• Includes hardware & software, (e.g., operating system, software version, hardware modules, interface type, programming language).	• HIE matching methods & algorithms.

B.2.1. Data and Information (See Table B-3 for Details)

The Data category of the Technology Facet describes the characteristics of the data and information exchanged, what type of information, in what format, the mechanisms of exchange, and the senders and receivers of the information.

TABLE B-3. Examples of Categories Associated with the Data Category Within the Technology Facet			
Category	**Characteristics**	**Examples of Sub-categories and Measures**	**Important to Capture for LTPAC/LTSS HIE**
Data Content	• Data sources & feeds. • Manual. • Clinical data. • Clinical messaging. • Administrative data. • Transcribed reports (discharge summaries, H&P, operative notes).	• Functional limitations. • Risk assessment. • Activities permitted. • Safety measures. • DME. • Supplies. • Goals, rehabilitation potential. • Discharge plan. • Care plan. • Services (nursing, PT, home health aide, etc.). • Medication, Treatment, Other orders. • Physician certification. • Physician e-signature. • Home health data set. • Continuity of care record. • Patient summary. • Medications, allergies list.	• Transitions, key data elements to support care planning. • ADT & demographics. • Demographic information used to populate the MPI & for other patient notifications. • Data elements required to meet MU Requirements.
Data Coding & Standards	• Industry standards specifying the data elements, structure of data.	• Clinical codes & terminologies. • Clinical data standards (e.g., LOINC). • Billing & reimbursement codes.	• Some data requirements for payment use non-standard formats.
Quality, Availability, & Timeliness	• Quality. • Completeness. • Timeliness.		• Timely receipt of data. • If data available before treatment relationship. • If data are available at time when patient is at greatest risk.
Data Format	• Electronic reports (e.g., PDF, images). • Dictated notes. • E-mail/secure messaging. • Hard-copy. • Fax. • Data Segmentation.	• Summary of care documents. • Ability to segment data. • Images.	• Reliance on fax, phone, & paper to exchange information. • "All-or-nothing" data availability. • E-referrals. • Standards-based exchange.

B.3. Facet: Use and Workflow Related to Health Information Exchange

Categories that are tied to the actual use of exchanged health information, including exchange through more conventional means (e.g., paper print out, fax, in person) are captured under this facet. This facet covers not only the "individual" user but also the "group" user discussed in many of the models that were used to develop the HIT organizational framework. Also included are the individual factors relevant to many

of the care coordination models such as type of LTPAC/LTSS provider, clinical disciplines involved in the HIE intervention, "ownership," usability, motivation, workflow, perception of usefulness, adequate training, and comfort with an HIE intervention and related technology.

Capturing details around user attitudes, usability and workflow, ownership, and knowledge provides insights critical to understanding how HIE is used to support care coordination and its impact on care. This information can help to identify user-related barriers and facilitators.

TABLE B-4. Examples of Categories Associated with the Use and Workflow Facet			
Category	**Characteristics**	**Examples of Sub-categories and Measures**	**Important to Capture for LTPAC/LTSS HIE**
HIE User	• Type. • Clinical discipline. • Role.	• Clinical discipline: RN, care coordinator, social worker, discharge planner, MD, interdisciplinary care teams, therapy, pharmacy, other clinicians, caregivers.	• How different types of users interact with the HIE approach, intervention, tool. • Clinical providers & other types use of HIE to support care (e.g., care managers).
User Attitudes	• Covers a wide range of concepts such as user satisfaction, perceived usefulness & usability, & user acceptance.	• User satisfaction, perceived usefulness & usability, user acceptance, trust in information.	• Value of information that is exchanged for care coordination.
Workflow	• Workflow related to HIE. • How HIE support structures in place to coordinate care.	• Whether workflow considerations & changes were reviewed & implemented. • How exchanged information is available workflow insertion points (e.g., at time of resident admission assessment).	• Who has access to information (providers, team members, care planners, caregivers, regulators). • Insertion of HIE into workflow by mechanism, type of user/provider. • Sequencing: How HIE supports a task or decision that must await completion of another. • Hand-offs: Practitioners' depends on receiving critical information from another.
Ownership/ Buy-in	• Captures level of user involvement & participation in HIE & related implementation process.	• Culture of safety, support, & training for HIE use in care planning.	• User views around value of an HIE to care delivery.
Knowledge	• Includes concepts around adult learning, training, capability to use HIE.	• Adult learning, knowledge, capability, comfort with computers & technology, training effectiveness, modality, staff turnover, & impact on staff with capability to use HIE.	• User comfort & expertise with technology such as EHRs. • Capability of staff to use & support HIE.

B.4. Facet: Environment for Health Information Exchange and Care Coordination

The environment facet captures categories that the contextual factors that can influence HIE care coordination, including which patient population(s), which setting(s) and what timeframe. In addition, care coordination effects may be impacted by facilitators and barriers of care coordination. Examples of factors that may facilitate or

impede care coordination and the exchange of health information include the availability of resources, payment structure, patient complexity and capacity, and local culture.

TABLE B-5. Examples of Categories Associated with the Environment Facet			
Category	**Characteristics**	**Examples of Sub-categories and Measures**	**Important to Capture for LTPAC/LTSS HIE**
Culture/Organizational	• Captures teamwork climate, values, culture or organization.	• Teamwork climate, values, organizational leadership in support of HIE, staffing models.	• Care teams & climate. • Structure & management systems for care coordination & integration.
Business drivers	• Governmental policies & regulations that influence the organization & business factors (e.g., competition). • Organizational policies & procedures which can vary by organization, location within the facility and/or care coordination practices. • Funding initiatives including Medicare & Medicare programs that promote care coordination, ACOs, & payer initiatives.	• Financial incentives & payment factors for HIE (e.g., Medicare demonstration programs, ACOs, Medicaid-funded services, performance reporting & associated incentives & penalties). • QI initiatives. • Local market competition. • Examples of government initiatives included in Appendix A.	• MU incentives include HIE to support care coordination, which will facilitate the exchange of patient summaries. • LTPAC/LTSS providers are not eligible for the MU incentives; however, they will benefit from receipt of standardized patient care information from exchange partners such as hospitals. • QI initiatives.
Leadership	• The leadership for use of HIE to support care coordination.	• Clinical leadership. • Champions. • Teams.	• Leadership within the health care settings supporting the use of HIEs for continuity of care relevant to LTPAC/LTSS.
Setting	• Which environment the HIE is being used.	• Setting where HIE is implemented & used (e.g., acute care, home health, SNFs, LTSS, other community-based services, behavioral health services). • Geographic characteristics.	• Exchange with affiliated providers & with non-affiliated providers. • Organizational models of care (e.g., part of an IDS) within which the HIE intervention is occurring. • HIE in ACOs, HIE in IDSs. • HIE in LTSS & CBOs.
Resources & Support	• This includes the resources available to support the implementation of the HIE such as training. • Includes support for staff who are engaged in HIE & care coordination & potential increased workload.	• Resources cover a broad range from financial & human resources (e.g., HIT & infrastructure that can enable) HIE such as bandwidth, IT support; support for training, users, management of the HIE implementation & ongoing support.	• Community supports that enable the HIE intervention (e.g., HIEOs, IDS). • Funding for HIE (private, state, federal, etc.). • May be increased workload & need for increased staffing due to implementation of EHR & HIE, as well as improved care coordination.

B.5. Facet: Outcomes of Health Information Exchange to Support Care Coordination

The outcomes facet provides the categories of the measures related to HIE approaches and affect care coordination, quality, satisfaction (e.g., with care coordination, care, HIE), efficiency and costs.[1,2,3,4,5,6,7,8,9,10]

---

[1] Forster AJ, Murff HJ, Peterson JF, et al. The incidence and severity of adverse events affecting patients after discharge from the hospital. Ann Intern Med; 2003; 138(3): 161-167.

[2] Frisse ME, Johnson KB, Nian H, et al. The financial impact of health information exchange on emergency department care. J Am Med Inform Assoc; 2012; 19(3): 328-333.

[3] Society of Hospital Medicine. Project BOOST: Better outcomes for older adults through safe transitions. Available at http://www.hospitalmedicine.org/AM/Template.cfm?Section=Home&CONTENTID=27659&TEMPLATE=/CM/HTMLDisplay.cfm. Accessed August 6, 2012.

[4] Kern LM, Wilcox A, Shapiro J, et al. Which components of health information technology will drive financial value? Am J Manag Care; 2012; 18(8): 438-445.

[5] Gordon P, Camhi E, Hesse R, et al. Processes and outcomes of developing a continuity of care document for use as a personal health record by people living with HIV/AIDS in New York City. Int J Med Inf; 2012; 81(10): e63-e73.

[6] Leath B, Mardon R, Atkinson D, et al. NIH-community care coordination performance measures (NIH-CCCPM) project technical report on project: Standardizing community care coordination measures linked to improvements in quality of life and health outcomes among vulnerable populations. Rockville, MD: Westat; 2012.

[7] Wolf L. National Governor's Association long-term care and health information exchange coordinate care to improve outcomes. Kindred Healthcare; 2011. Available at http://www.nga.org/files/live/sites/NGA/files/pdf/1105HIELARRY.PDF.

[8] Bailey JE, Wan JY, Mabry LM, et al. Does health information exchange reduce unnecessary neuroimaging and improve quality of headache care in the emergency department? J Gen Intern Med; 2013; 28(2): 176-183.

[9] Kern LM, Dhopeshwarkar R, Barron Y, et al. Measuring the effects of health information technology on quality of care: A novel set of proposed metrics for electronic quality reporting. Jt Comm J Qual Patient Saf; 2009; 35(7): 359-369.

[10] Kern LM, Blumenthal D, Pincus H, et al. Quality measures for capturing the effects of health information exchange. AMIA Annu Symp Proc; 2008; 1001.

TABLE B-6. Examples of Categories Associated with the Outcomes Facet			
Category	Characteristics	Examples of Sub-categories and Measures	Important to Capture for LTPAC/LTSS HIE

Clinical	• Clinical outcomes related to HIE.
	• Quality measures.
	• Perceived impact on care.
	• Goals & outcomes to optimize function, prevent deterioration, manage acute exacerbations, & support self-management.
		• Metrics used to assess the impact of the intervention on the quality & safety of transitions in care:
		  − Clinical impact & process measures, HIE for care planning, medication review, care monitoring, prevention of adverse outcomes such as pressure ulcers, delirium, falls, cognitive decline.
		  − Hospital admission & readmission rates.
		  − Medication errors & ADEs.
		  − Patient/resident outcomes: morbidity functionality, mortality, cognitive performance.
			• Measures sensitive to HIE such as hospitalization rates, medication errors, compliance with care guidelines, chronic care management.[1]
			• Patient perspectives of their experience, in defining whether or not their care is successfully coordinated.

Business/Financial	• Cost savings or expenditures are part of the business outcomes.	• Includes reductions in utilization (e.g., hospital days, associated patient bed days of care for readmissions, medication errors, laboratory tests, medications), efficiencies, & associated costs.	• ED, inpatient, other care costs & cost savings attributable to HIE use.[2,3,4]
Adoption	• Includes the number of users of HIE, how used, & depth of their use.	• Captured as a percentage of users to potential users; level of use of a HIE system or HIE intervention can be quantified a variety of way such as usage, over time, relative to opportunities, & by type of usage (ED setting, discharge to new care setting, admission, by care planning team, pharmacy).	• Number of users by clinical discipline using an HIE approach, intervention or tool.
Care Coordination Measures	• Measures that reflect how well care is coordinated.	• Care transitions measures, continuity of care, collaboration & satisfaction about care. (See Care Coordination Measures Atlas).[5,6]	• Pioneer ACO measures.

NOTES:

1. Kern LM Dhopeshwarkar R, Barron Y, et al. Measuring the effects of health information technology on quality of care: A novel set of proposed metrics for electronic quality report. Jt Com J Qual Patient Saf; 2009; 35(7): 359-369.
2. Frisse ME, Johnson KB, Nian H, et al. The financial impact of health information exchange on emergency department care. J Am Med Inform Assoc; 2012; 19(3): 328-333.
3. Kern LM, Wilcox A, Shapiro J, et al. Which components of health information technology will drive financial value? Am J Manag Care; 2012; 18(8): 438-445.
4. Bailey JE, Wan JY, Mabry LM, et al. Does health information exchange reduce unnecessary neuroimaging and improve quality of headache care in the emergency department? J Gen Intern Med; 2013; 28(2): 176-183.
5. McDonald K, Schultz E, Albin L, et al. Care coordination measures atlas version 3. Rockville, MD: Prepared by Stanford University under Subcontract to Battelle on Contract No. 290-04-0020 for the AHRQ; 2010. AHRQ Publication No. 11-0023-EF.
6. Leath B, Mardon R, Atkinson D, et al. NIH-community care coordination performance measures (NIH-CCCPM) project technical report on project: Standardizing community care coordination measures linked to improvements in quality of life and health outcomes among vulnerable populations. Rockville, MD: Westat; 2012.

LONG-TERM AND POST-ACUTE CARE PROVIDERS ENGAGED IN HEALTH INFORMATION EXCHANGE: Final Report

Files Available for This Report

MAIN REPORT

Executive Summary http://aspe.hhs.gov/daltcp/reports/2013/HIEengagees.shtml
HTML http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.shtml
PDF http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.pdf

APPENDIX A. SELECTED PROGRAMS AND INITIATIVES THAT SUPPORT CARE COORDINATION AND INFORMATION EXCHANGE FOR PERSONS RECEIVING LTPAC/LTSS

HTML http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.shtml#appendA
PDF http://aspe.hhs.gov/daltcp/reports/2013/HIEengageA.pdf

APPENDIX B. FRAMEWORK TO CHARACTERIZE HEALTH INFORMATION EXCHANGE TO SUPPORT CARE COORDINATION FOR PERSONS RECEIVING LTPAC/LTSS

HTML http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.shtml#appendB
PDF http://aspe.hhs.gov/daltcp/reports/2013/HIEengageB.pdf

APPENDIX C. ENVIRONMENTAL SCAN AND LITERATURE REVIEW SOURCES

HTML http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.shtml#appendC
PDF http://aspe.hhs.gov/daltcp/reports/2013/HIEengageC.pdf

APPENDIX D. PROMISING COMPONENTS AND INTERVENTIONS TO REDUCE READMISSIONS

HTML http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.shtml#appendD
PDF http://aspe.hhs.gov/daltcp/reports/2013/HIEengageD.pdf

APPENDIX E. SUMMARY OF LITERATURE ON HEALTH INFORMATION EXCHANGE OUTCOMES AND RELATED MEASURES

HTML http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.shtml#appendE
PDF http://aspe.hhs.gov/daltcp/reports/2013/HIEengageE.pdf

APPENDIX F. EXAMPLES OF COMMUNITY-BASED CARE TRANSITION PROGRAM WITH LTPAC/LTSS PARTICIPATION
        HTML   http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.shtml#appendF
        PDF   http://aspe.hhs.gov/daltcp/reports/2013/HIEengageF.pdf

APPENDIX G. HEALTH INFORMATION EXCHANGE INTERVENTIONS AND ACTIVITIES IDENTIFIED THAT SUPPORT CARE COORDINATION FOR PERSONS RECEIVING LTPAC/LTSS
        HTML   http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.shtml#appendG
        PDF   http://aspe.hhs.gov/daltcp/reports/2013/HIEengageG.pdf

APPENDIX H. SITE VISIT SUMMARY: RUSH UNIVERSITY MEDICAL CENTER, CARE TRANSITIONS PROGRAM, BRIDGE PROGRAM
        HTML   http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.shtml#appendH
        PDF   http://aspe.hhs.gov/daltcp/reports/2013/HIEengageH.pdf

APPENDIX I. SITE VISIT SUMMARY: BEACHWOOD HOMES
        HTML   http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.shtml#appendI
        PDF   http://aspe.hhs.gov/daltcp/reports/2013/HIEengageI.pdf

APPENDIX J. SITE VISIT SUMMARY: EASTERN MAINE HEALTH SYSTEM, EASTERN MAINE HOME CARE
        HTML   http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.shtml#appendJ
        PDF   http://aspe.hhs.gov/daltcp/reports/2013/HIEengageJ.pdf

APPENDIX K. SUMMARY OF INFORMATION ROUTINELY EXCHANGED BY THE THREE SITES VISITED, BY CARE COORDINATION FUNCTION
        HTML   http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.shtml#appendK
        PDF   http://aspe.hhs.gov/daltcp/reports/2013/HIEengageK.pdf

APPENDIX L. STANDARDS AVAILABLE TO SUPPORT HEALTH INFORMATION EXCHANGE OF LONG-TERM AND POST-ACUTE CARE DATA
        HTML   http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.shtml#appendL
        PDF   http://aspe.hhs.gov/daltcp/reports/2013/HIEengageL.pdf

APPENDIX M. GLOSSARY
        HTML   http://aspe.hhs.gov/daltcp/reports/2013/HIEengage.shtml#appendM
        PDF   http://aspe.hhs.gov/daltcp/reports/2013/HIEengageM.pdf