The Gravity Project:
A Social Determinants of Health Coding Collaborative

Use Case Package

Version 1.2

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siren UCSF   Robert Wood Johnson Foundation   EMI ADVISORS

Version Log

Date	Version Number	Author	Description of Revisions
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1.0   Preface and Introduction

The influence of social determinants on health outcomes is increasingly recognized in emerging payment reform programs, federal and state-based policies, and information technology initiatives. Social determinants of health (SDOH) are defined by the World Health Organization as the conditions in which people are born, live, work, and age.[1]

The growing awareness around SDOH has contributed to efforts to address actionable socioeconomic risk factors through the health care delivery system. Recommendations from national groups, including the American Academy of Pediatrics[2], American Academy of Family Physicians[3], Agency for Healthcare Research and Quality[4], National Quality Forum (NQF)[5,6], and Institute for Health Care Improvement[7] underscore the various roles the health care system could play in helping to identify and reduce patients' social risk factors.

These national "calls to action" for health care systems have spurred innovations, including a wide range of social risk screening tools and practice-based interventions.[8] Some of these innovations have helped to reduce social risks, improve health outcomes, and lower costs.[9] The experimentation in this area has been bolstered by new value-based payment models and accountable care organizations (ACOs), which together offer financial incentives to advance coordinated care between medical and social service organizations and other organizations directly connected to patients.

Many of the recent innovations in this area begin with the strategic collection of SDOH data. As examples, the Centers for Medicare & Medicaid Services Innovation Center (CMS Innovation Center) Comprehensive Primary Care Plus Model requires providers to assess patients' social risks, and the CMS Innovation Center's Accountable Health Communities Model developed a social risk assessment tool to help identify and address social risks across clinical and community-based settings.

These emerging initiatives to collect SDOH data in health care settings present new challenges for national goals to standardize patient data recorded in electronic health records (EHRs).[10,11] Two Health

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[1] About Social Determinants of Health. World Health Organization. 2017. https://www.who.int/social_determinants/sdh_definition/en/.

[2] AAP Council on Community Pediatrics. Poverty and child health in the United States. *Pediatrics* 2016;137.

[3] Social Determinants of Health Policy. AAFP Home. 2016. https://www.aafp.org/about/policies/all/social-determinants.html.

[4] About the National Quality Strategy. U.S. Department of Health & Human Services. 2017. https://www.ahrq.gov/workingforquality/about/index.html.

[5] NQF and the Aetna Foundation Map Approach to Overcome the Health Impact of Social Determinants. National Quality Forum. https://www.qualityforum.org/Overcoming_the_Health_Impact_of_Social_Determinants.aspx.

[6] The National Quality Partners Action Brief: Social Determinants Of Health Data Integration Action Team. 2019. http://www.qualityforum.org/ProjectMaterials.aspx?projectID=88247.

[7] Wyatt R, Laderman M, Botwinick L, et al. Achieving health equity: a guide for health care organizations. Cambridge, MA: Institute for Healthcare Improvement 2016.

[8] Arons A, DeSilvey S, Fichtenberg C, Gottlieb L. Documenting social determinants of health-related clinical activities using standardized medical vocabularies. *JAMIA Open*, ooy051. 24 December 2018; https://doi.org/10.1093/jamiaopen/ooy051.

[9] Gottlieb LM, Wing H, Adler NE. A systematic review of interventions on patients' social and economic needs. *Am J Prev Med* 2017; 53:719-29.

[10] Health Information Technology for Economic and Clinical Health Act of 2009, § H.R.1 *et seq*. (2009).

[11] 21ST Century Cures Act of 2015, § H.R.34 (2015).

Information Technology for Economic and Clinical Health Act (HITECH) Programs[12] require providers to use health IT systems that capture specific patient data in standardized formats to enable interoperable data exchange with other systems.

These programs require that EHRs use a common clinical data set (CCDS)[13], including specific medical codes, to represent concepts such as race, ethnicity, and preferred language, but they include limited requirements to represent social risk assessments and related social care interventions. As an example, though the Office of the National Coordinator (ONC) 2015 Edition includes an optional certification criterion around Social, Psychological, and Behavioral Data, which helps to define codes for SDOH concepts based on the National Academy of Sciences, Engineering, and Medicine Recommended Social and Behavioral Domains and Measures, it does not reflect the wide range of social risk factors being collected in clinical settings.[14]

The capture and exchange of interoperable data allows providers to share specific information with health plan payers who seek to aggregate and analyze population health[15] data for the purpose of stratifying risk, enabling data-driven financial models for value-based payment, addressing the opioid epidemic, supporting prevention and control of chronic disease, encouraging community-based care coordination, and other activities that are proving to substantially reduce overall health care expenditures. Population health data can include patient demographics, patient access points, service delivery histories, outcome breakdowns and referrals. The collection of this data can help inform payer organizations' policies, investment strategies, and community engagement in addition to helping them better understand and address social needs within the community.

Many payers have recently focused on collaborating with providers and local service agencies to stand up community programs that help individuals more easily navigate complex health care systems, provide more revenue to communities from both public and private sources, and support closed-loop referrals. Programs to address SDOH[16,17] have been launched during the past few years by Kaiser Permanente, UnitedHealthcare in partnership with the American Medical Association, Anthem, Humana, University of Pittsburgh Medical Center (UPMC) Health Plan, CareSource, Health Net, Harvard Pilgrim, Blue Cross Blue Shield, WellCare Health Plans, and others.

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[12] CMS Promoting Interoperability Program: https://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/index.html and ONC Certification Program: https://www.healthit.gov/topic/certification-ehrs/about-onc-health-it-certification-program.

[13] In February 2019, ONC proposed to remove the CCDS definition and its references from the 2015 Edition and replace it with the United States Core Data for Interoperability (USCDI) Standard. Final rule updates will be made available here: https://www.healthit.gov/topic/laws-regulation-and-policy/notice-proposed-rulemaking-improve-interoperability-health.

[14] Compendium of Medical Terminology Codes for Social Risk Factors. Research on Integrating Social & Medical Care. SIREN 1970. https://sirenetwork.ucsf.edu/tools-resources/mmi/compendium-medical-terminology-codes-social-risk-factors.

[15] Centers for Disease Control and Prevention. What Is Population Health? https://www.cdc.gov/pophealthtraining/whatis.html.

[16] Beyond the Boundaries of Health Care: Addressing Social Issues. AHIP Report. July 21, 2017. https://www.ahip.org/wp-content/uploads/2017/07/SocialDeterminants_IssueBrief_7.21.17.pdf.

[17] Kent, Jessica. Costs Fell by 11% When Payer Addressed Social Determinants of Health. Health IT Analytics. June 5, 2018. https://healthitanalytics.com/news/costs-fell-by-11-when-payer-addressed-social-determinants-of-health.

2.0   Project Overview

In light of growing interest in capturing SDOH data in health care settings and concerns about the capacity of existing medical terminology standards to effectively capture the necessary data, the Social Interventions Research and Evaluation Network (SIREN) convened a diverse group of stakeholders, including experts in SDOH data from health care, community health, and health information technology (health IT) in November 2017 to develop a strategy for achieving consensus-based comprehensive coding standards for SDOH data capture in EHR systems. Participants concluded that current codes are insufficient to represent the data needed to support clinical care, panel management/quality improvement, community health improvement, payment/risk adjustment, and research. As a next step, participants recommended convening a multi-stakeholder group through an open, public process to better articulate SDOH data use cases. In response, SIREN, with sponsorship from the Robert Wood Johnson Foundation, initiated the Gravity Project: A Social Determinants of Health Coding Collaborative.

2.1   Project Challenge Statement

The systematic documentation and aggregation of SDOH data in EHRs and related systems is limited due to the following:

1. Limited understanding by the health system of the value and use of such data for clinical care and population health management;
2. Capture of SDOH data in unstructured and non-standardized formats, which inhibits the ability to normalize, exchange, and aggregate the data regardless of the data source; and
3. Gaps in and overlap between existing terminologies and codes available to represent SDOH-related activities undertaken in clinical delivery settings.

Based on the growing collection of social risk data in health care systems, an immediate opportunity exists to support data collection, data aggregation, data sharing, quality measurement, benchmarking, and risk adjustment.[18] Many assessment tools are currently in use, but the concepts addressed vary, and some tools merit further validation and testing across a variety of settings and clinical workflows. Health IT can play a critical, untapped role in enabling the seamless electronic exchange and use of this data. However, standardization and harmonization of SDOH concepts, regardless of the social risk assessment tool used, requires a consensus-based approach to maximize buy-in, consistency of implementation, and usefulness of data collected.

3.0   Use Case Scope & Approach

3.1   In Scope

The Gravity Project will:

1. Develop use cases to support documentation of specific social domains across screening, diagnosis, goal setting, and intervention activities within EHR and related systems;

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[18] Framework for Medicaid Programs to Address Social Determinants of Health: Food Insecurity and Housing Instability. Report. National Quality Forum, 2017. 1-57.

2. Identify common data elements and their associated value sets to support the uses cases;
3. Develop a consensus-based set of recommendations on how best to capture and group these data elements for interoperable electronic exchange and aggregation; and
4. Initiate creation of a HL7® Fast Health Interoperability Resource (FHIR®) Implementation Guide based on the defined use cases and associated data sets.

The Gravity Project use cases focus on three priority social domains, **food security, housing stability and quality, and transportation access**, captured across four core health care activities:

- **Screening:** This refers to activities where SDOH data from individual patients are initially captured, whether through a self-administered, provider-administered, or health plan-administered questionnaire. These activities may also be repeated at certain intervals to monitor changes in social risks.
- **Assessment/Diagnosis:** These include activities where providers (clinical and community-based) and health plans analyze the data obtained through screening to determine a patient's social risks and needs.
- **Interventions:** These refer to actions undertaken by providers (clinical and community-based) and health plans to help address identified social needs. These include referrals, case management, care planning, counseling and education, and provision of services and orders.
- **Goals:** These refer to the intention of care—the "why" of treatment/intervention. Goals can be both patient and population specific. Patient goals are best made collaboratively with the patient and care team aligned with principles of [person-centered care](#).

3.2   Out of Scope

The Gravity Project will not focus on evaluating, testing, or harmonizing existing social risk screening tools and instruments, nor will it identify social risk data elements that do not directly support one of the three priority social domains previously listed in the Scope Statement. This project also will not validate or provide incentives for implementation of the identified SDOH data elements.

3.3   Stakeholders

The Gravity Project will count on its stakeholders and interested parties to validate, socialize, and promote the consensus standards it recommends. The Gravity Project stakeholders and interested parties include, but are not restricted to, the following:

- Providers, Provider Associations, and Provider Settings (workplaces)
  - Clinical and non-clinical staff within clinical settings
  - Community-based including Home and Community-Based Services (HCBS)
  - Long-term and post-acute care
  - Medical homes
  - Accountable Care Organizations (ACO)
  - Health systems
  - Hospitals

- o Schools
- Payers and Sponsors
    - o Federal
    - o State
    - o Commercial
    - o Employers
    - o Non-profit foundations
- Patients/Individuals/Consumers
- Patient Advocates
    - o Patient representatives and/or delegates
    - o Caregivers
    - o Family members or other non-paid supports
    - o Other advocates
- Government Agencies
    - o Centers for Disease Control (CDC)
    - o Centers for Medicare & Medicaid Services (CMS)
    - o Department of Housing and Urban Development (HUD)
    - o Department of Transportation (DoT)
    - o Health Resources and Services Administration (HRSA)
    - o HHS Administration of Community Living (ACL)
    - o HHS Agency for Healthcare Research and Quality (AHRQ)
    - o HHS Office of the Assistant Secretary for Planning and Evaluation (ASPE)
    - o HHS Office of the National Coordinator for Health Information Technology (ONC)
    - o National Institutes of Health (NIH): Office of Minority Health and Health Disparities
    - o Social Security Administration (SSA)
    - o State Medicaid offices, state health and public health departments, and state and regional health information exchange (HIE) and community information exchange (CIE) organizations
    - o Substance Abuse and Mental Health Services Administration (SAMHSA)
    - o Veterans' Health Administration (VHA)
- Vendors
    - o Clinical IT Systems including electronic health records (EHR) systems, care management systems, care coordination systems or population health platforms
    - o Patient/consumer tools including patient health record (PHR) portals, mobile health systems, and apps
    - o Health information exchange (HIE) systems, community information exchange (CIE) systems, and system integration platforms
    - o Community-based IT systems including HCBS, Long-Term Services & Supports (LTSS) information systems, and community-referral platforms
    - o Screening tool developers
    - o Quality measure developers
    - o Telehealth technologies

- o Data analytics developers and technologies
- o Digital health technologies
- o Device manufacturers
- o Data warehouse/data mart
- Standards-Related Organizations
  - o Standards development organizations
  - o Vocabulary/terminology organizations
- Health Information, Privacy, and Security Professionals and Advocacy Organizations

3.4   Use Case Approach

The use case development approach builds on the Gravity Project scope and the following goals for documenting and sharing standardized SDOH data:

- Promote the collection and use of SDOH data across settings of care and service delivery;
- Facilitate the sharing of this SDOH data across organizations regardless of the source of the data; and
- Facilitate payment for this SDOH data collection and intervention activities.

The Gravity Project use cases are designed to guide the development of the solution(s) needed to meet the key business drivers. The use cases exemplify the functional requirements, or behaviors a system should express, to support the seamless exchange and use of electronic SDOH data. These requirements help determine what technical standards can be used or what new standards need to be developed to support the electronic information exchange.

The Gravity Project use cases are defined in the context of three primary components: personas, a patient story, and use cases.

3.4.1   Personas

Personas are commonly used in user-centered design to describe a fictional character who would represent a user type that might use a site, brand, or product in a similar way. Personas describe the fictional person in terms of their behaviors, skills, preferences, and needs. From a data interoperability perspective, Personas are used to visualize the data needs of a user type.

The Gravity Project Personas are presented using the following descriptors:

- First and last name
- Role (e.g., patient, practitioner, caregiver)
- Age
- Ethnicity
- Primary language
- Highest education level (for patient and caregiver)
- Qualifications (for practitioner role)
- Employment status
- Clinical health concerns and social risks (for patient role)

- Brief description of persona that addresses their history with health and social conditions identified, marital status and family situation, activities they are currently engaged in, what worries them about their existing conditions or situation, and their preferences and needs.
- Challenges and goals that address the primary issues or barriers faced at the most recent point in time
- Brief description on what the persona wants from the health care system

Patient Story 1 (described in the next section) includes the Personas listed below. Details on the Patient, Primary Care Physician, Care Coordinator, and Clinical Staff Member Personas are available in Appendix A: Patient Story 1 Personas.

- Rebecca Smith (Patient)
- Carla Sanchez (Primary Care Physician)
- Reeza Shah (Care Coordinator)
- Samir Patel (Clinical Staff Member)
- Sylvia Torres (Front Office Staff Member)
- Michael Frank (Community-Based Provider)
- Quality Specialist/ Health Plan Care Manager

3.4.2 Patient Story

The Patient Story describes Personas engaging with a service, technology, or setting over a period of time to accomplish a specific goal. It summarizes the interactions among Personas and specifies what information is captured, shared, and exchanged from a contextual perspective. Patient Stories serve to illustrate examples of real-world applications of technical solutions. Although Patient Stories may not fully represent every real-world scenario in every instance, they are presented in a manner that will support and illustrate the Use Cases defined in this document.

The Patient Story is used to identify a series of value-add transactions among the Personas in the story and the technical systems they use to access and share electronic information. The Gravity Project Patient Story for Rebecca Smith is described in Section 4.0 Patient Story 1.

3.4.3 Use Cases

Use Cases are technical narratives of the interactions between the Personas and the systems they use. They are described using the following elements:

- **Actors and Roles.** Actors may be a person, entity, or system. An Actor describes the role within a specific transaction in a series of steps in a use case. Roles indicate the relationship between the sender and receiver of the data exchange through a specific transaction.
- **Assumptions.** Items expected to be true or to be in place such as a policy, process, or procedure for the execution of a specific transaction.
- **Pre-conditions**. Refer to the initial state of the system before an action or transaction occurs. These describe what must be in place from a systems perspective to support interoperable data sharing for a specific transaction.

- **Post-conditions.** Describe the state of the system that will result after the execution of the transaction.
- **Transactions.** The data exchange between two systems.
- **Message Content or Payload.** The content or substance of what is exchanged within a specific transaction.

Use case elements are typically illustrated using an actor-transaction diagram. The Gravity Project use cases and respective actor-transaction diagrams are presented in Section 6.0 Use Cases.

4.0   Patient Story 1

The following is a detailed story around the Patient Persona of Rebecca Smith. It provides context around the interactions between and among Rebecca and her care team for the purpose of illustrating the Use Cases defined in this document. Some of the scenarios herein may not fully align with every role or experience in a real-world situation. Please refer to Appendix A: Patient Story 1 Personas *for background information around the following four primary roles: patient, physician, care coordinator, and clinical staff member.*

Rebecca schedules an appointment for her annual well visit with her primary care physician, Dr. Carla Sanchez. While making the appointment, the scheduler verifies Rebecca's insurance and finds that it covers an SDOH screening. The scheduler confirms Rebecca's preferences for communication. Rebecca consents to use of her email and text for office communications and provides her email address and cell phone number. The scheduler mentions the practice offers a secure patient portal for sharing of clinical information such as test results and visit summaries. She offers Rebecca the opportunity to learn more about the patient portal during the upcoming office visit. Rebecca agrees and the scheduler adds fifteen minutes extra to the appointment for set-up.

One week prior to her appointment, Rebecca receives an email from Dr. Sanchez' office inviting Rebecca to complete an online screening questionnaire. The email explains the practice has started asking patients to complete a whole-person health questionnaire as part of the annual well visit. The email details what type of information the questionnaire is collecting, how this information will be used, who would have access to the information, and why it is important to help patients improve and maintain their health. The email clarifies the questionnaire is optional and can be filled out digitally or on paper. Rebecca is given the option to complete the questionnaire online via the patient portal or mobile app, on paper, or at a kiosk at the doctor's office. If she needs help with completing the questionnaire either online or in person, she is asked to appear fifteen minutes prior to her scheduled appointment time so a clinical staff member can help her. Since Rebecca has not set up her access to the patient portal, she decides to complete the questionnaire at the doctor's office.

Rebecca arrives at Dr. Sanchez' office and checks in. The front office staff member, Sylvia Torres, notices Rebecca has not yet filled out the screening questionnaire and asks Rebecca if she received the email about the whole-person health questionnaire. Rebecca confirms she received the email and is willing to answer the questions but needs some help with setting up the patient portal. Sylvia explains

Rebecca can complete the questionnaire one of the following three ways: by herself on paper, using the patient portal, or using a new mobile app the practice just rolled out. Rebecca states her preference to complete the questionnaire using the mobile app. Sylvia asks her to sit in the private kiosk area where the training is given.

The clinical staff member, Samir Patel, greets Rebecca at the kiosk station and walks her through the mobile app setup process. He explains the secure mobile app allows the practice to communicate protected health information, so it requires a special step to confirm Rebecca's identity. Mr. Patel helps Rebecca go through a couple of screens to set up her account. He then scans her identification information and uploads it with the account application. He helps her download the app to her phone and gets her started on answering the questionnaire. When Rebecca finishes, Mr. Patel shows her to the exam room. He logs into the EHR and sees Rebecca's responses waiting to be reviewed in her record. He then proceeds to collect and record all of Rebecca's vital signs in the EHR as part of the visit process.

Dr. Sanchez uses her EHR to review the social risk screening responses and Rebecca's past history prior to entering the exam room. She enters the exam room and begins the consult by inquiring how Rebecca has been since their last visit. Rebecca shares that over the past year the family has experienced significant life changes including her recent separation from her husband, who is not paying child support. She notes the frequent moves and the toll this has taken on the family. She tells Dr. Sanchez she has missed three days of work in the past two months from being short of breath from her asthma. She states that even when she is consistent with her medication, she still suffers from acute symptoms. She is struggling to live on one salary to pay for rent, medications, childcare, and food. She feels overwhelmed, guilty, and too tired after work to do anything but get the children fed and ready for the next day.

Dr. Sanchez examines Rebecca and hears scattered expiratory wheezes. She administers a peak flow measurement that reads in the yellow zone. Other clinical details in Rebecca's records showing a recent trip to the emergency room (ER) and two previous acute office visits during the past few months indicate that Rebecca's asthma has worsened.

Dr. Sanchez also notes Rebecca is overweight. Rebecca states she saves money by buying low-cost foods such as macaroni and cheese and pizza. She wishes she could buy more fruits and vegetables, but they are expensive. She also notes that she cannot always afford medications and spaces out her asthma controller medication to every other day instead of every day. Dr. Sanchez inquiries about Rebecca's home environment regarding allergen triggers such as mold or cigarette smoke. Rebecca says no one has been smoking in her apartment and that she does not know if other allergen triggers like mold are present.

To address the asthma concern, Dr. Sanchez and Rebecca identify goals to reduce environmental triggers and reduce the medication cost. Dr. Sanchez reviews the cost of Rebecca's asthma controller medication and determines an equally effective metered dose inhaler (MDI) medication is available. She explains this type of medication does not require electricity for use and can often effectively reduce or

eliminate the need for a nebulizer, which could help reduce Rebecca's treatment costs. She presents this alternative to Rebecca, who agrees to try this more affordable treatment option. Dr. Sanchez and Rebecca discuss how Rebecca can respond to exacerbations by adjusting her medications and how she can more effectively control her asthma to prevent acute office or ER visits. They agree on an asthma treatment plan and Dr. Sanchez uses her EHR to document the asthma plan and prescribe the new asthma medication.

Dr. Sanchez is aware that food insecurity is a barrier to weight loss, so she suggests that Rebecca visit a Registered Dietician Nutritionist (RDN) to help her make healthy food choices and unique, positive lifestyle changes. Rebecca responds that this would be helpful to her, so Dr. Sanchez enters the referral order into the EHR.

Dr. Sanchez asks Rebecca if she would like to talk a bit more about her food, housing, and transportation challenges as identified in Rebecca's questionnaire responses. Rebecca is open to this. She confirms these are three areas of concern for her as well, and that she would appreciate any assistance Dr. Sanchez could provide.

To better address Rebecca's non-medical and financially driven needs, Dr. Sanchez refers Rebecca to Reeza Shah, her practice's in-house care coordinator. Dr. Sanchez invites Ms. Shah into the examination room and asks Ms. Shah to help connect Rebecca to available resources, either those available in-house or in the community. Ms. Shah can help Rebecca assess her eligibility for federal assistance benefits (e.g., Supplemental Nutrition Assistance Program (SNAP) and Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)).

Considering Rebecca's transportation needs, Ms. Shah explains that the new asthma medication can be shipped for home delivery. Ms. Shah also confirms Rebecca is eligible to receive an asthma home visit that will help identify environmental triggers in the home. Ms. Shah updates Rebecca's record to include home delivery for the new asthma medication and submits an electronic request for a home visit to assess for asthma triggers.

To address the three social risk factors, Ms. Shah and Rebecca identify the following goals: 1) find more affordable housing solutions; 2) identify and connect Rebecca to food resources and education to help her feed herself and her family well; and 3) check if Rebecca may qualify for transportation assistance to cover trips to the doctor and work. They discuss an action plan to address the goals by working with a care coordinator who will identify and secure available services and supports.

Ms. Shah documents the agreed upon health concerns, patient goals, and action plan (planned interventions and referrals) in the EHR. She asks Rebecca if she would like a copy of the plan and checks to see if Rebecca prefers an electronic or paper copy. Rebecca confirms she would like an electronic copy she can access on her mobile app. Ms. Shah authorizes the EHR to make a copy available in the mobile app.

Mr. Patel returns to the exam room and works with Rebecca to find another date/time to schedule a telephone consultation with Ms. Shah. Mr. Patel schedules Rebecca's appointment with Ms. Shah for

the following week and a followup appointment with Dr. Sanchez within three months of the appointment with Ms. Shah so both Dr. Sanchez and Rebecca can monitor the progress with goals established. Rebecca confirms her preference to schedule the appointment after Rebecca's working hours.

The following week, Rebecca has a phone consultation with Ms. Shah. Ms. Shah has reviewed Rebecca's care plan and identified several resources available to support the care plan goals including federal assistance benefits (SNAP/WIC benefits), transportation service to and from appointments, vouchers to cover public transportation (e.g., Commuter Checks), school lunch programs, and a local food pantry.[19, 20]

Ms. Shah walks Rebecca through the California SNAP eligibility and enrollment process. Ms. Shah determines Rebecca is eligible for SNAP benefits and offers to assist Rebecca with the SNAP application online or, alternatively, visiting the local SNAP Office. Rebecca confirms she would prefer to apply online and Ms. Shah adds a planned action step to Rebecca's care plan.

Rebecca completes and submits the online application the next day during her lunch break.

During the same week, the RDN office's referral team contacts Rebecca to set up a telemedicine consultation with an RDN. Rebecca accepts a date and time that works within her schedule and the referral specialist indicates they will contact her to confirm the appointment one day prior.

Ms. Shah contacts Rebecca within one week of their initial consultation and confirms with Rebecca that the SNAP application was submitted. Ms. Shah documents the completed action step in the EHR and confirms the three-month followup appointment with Dr. Sanchez in the EHR. She adds a planned intervention for transportation services and a note that the patient will need a ride to her appointment.

Within two weeks Rebecca receives an email confirmation that her SNAP application has been approved. She also attends the telemedicine appointment with the RDN and receives educational materials and resources as part of that encounter. Rebecca begins to receive SNAP benefits one month later. Over the next month she also receives education on healthier low-cost food options through SNAP Education.

Michael Frank, a community health worker from an organization that provides asthma home visit services, contacts Rebecca by phone to schedule the asthma site visit. The visit is scheduled outside of Rebecca's working hours.

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[19] A care coordinator is able to provide more comprehensive referrals and application assistance such as but not limited to the following: rent and utility assistance, legal assistance for landlord mold remediation, air filtration system assistance, low or no cost medications for household members, discounted or subsidized transportation programs, and nutrition counseling.

[20] The Gravity Project recognizes the role of the in-house care coordinator can also be executed by a health plan care manager. In an alternative patient story, the health plan care manager can consult with Rebecca and provide information about the social risk screening, unmet social needs, and patient goals. Alternative patient stories may also include an actor or order placer that is a community navigator or coordinator not located in that practice (e.g. 2-1-1 or community service organization-based staff member working longitudinally with the client and/or patient).

Mr. Frank arrives at Rebecca's house at the agreed upon date and time. He conducts the environmental assessment and discovers there is slight mold in the apartment that is aggravating Rebecca's asthma. Mr. Frank emails Rebecca, Dr. Sanchez, and Ms. Shah a copy of the home-visit report and recommends Rebecca be referred to a housing coordinator. Ms. Shah reviews Mr. Frank's report and uploads it into the EHR. Within one week, Ms. Shah emails Rebecca with the name of a housing coordinator (e.g., Metropolitan Housing Agency (MHA)).

One week prior to Rebecca's three-month followup appointment, Mr. Patel receives an alert in the EHR that Rebecca needs transportation services (as documented by Ms. Shah in the previous encounter). Mr. Patel generates an electronic message to Rebecca to confirm she is still in need of transportation. Rebecca confirms via text she still needs transportation services. Mr. Patel schedules a pickup and dropoff from Rebecca's apartment to Dr. Sanchez office. Dr. Sanchez' practice has an existing contract with Star Transportation Services. An automated confirmation is sent to the EHR and Rebecca's cell phone on file.

One day prior to the three-month followup appointment, Rebecca receives a text message to confirm the pickup and dropoff time and location. Rebecca confirms the time and address for pickup.

Rebecca is picked up the following day by Star Transportation Services and taken to the appointment.

During the encounter, Dr. Sanchez collects Rebecca's vital signs, performs a lung function test, and reviews the records sent back from the RDN telemedicine encounter. She notes a 2lb weight loss and a better peak flow. Rebecca confirms she has not had any acute care or ER visits since her last appointment and that she has been able to make healthier food choices based on the RDN's recommendations and through the SNAP benefits and education. Dr. Sanchez asks Ms. Shah to discuss Mr. Frank's home visit report results with Rebecca and follow up on the other services and goals they planned during her previous office visit.

Ms. Shah reviews Rebecca's progress toward the goals set during the last encounter. She asks Rebecca about the open action steps she can see in Rebecca's care plan for Rebecca to start a new asthma medication, meet with the housing coordinator, complete a SNAP application, and find more efficient transportation options. Rebecca confirms that she: 1) is consistently taking the less expensive asthma medication; 2) contacted and scheduled a home visit with the housing coordinator Ms. Shah referred her to; 3) completed the SNAP application, is receiving SNAP benefits, and participated in SNAP Education on lower cost healthier food and is starting to feel better; 4) used Star Transportation Services for the followup appointment; and 5) put an inquiry into her employer for public transportation vouchers.[21] Ms. Shah updates Rebecca's care plan in the EHR to mark the medication adherence and completed action steps.

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[21] The San Francisco Commuter Benefits Ordinance requires employers to provide a commuter benefits program that supports and encourages their employees to bike, take transit, and carpool to work. Employers can provide a subsidy to reduce or cover employees' monthly transit or vanpool costs. https://www.wageworks.com/employers/employer-resources/compliance-briefing-center/commuter/commuter-updates/2014/bay-area-employers-required-to-offer-commuter-benefits-to-their-employees-1/.

5.0   Patient Story 1 Assumptions

Assumptions outline what needs to be in place to meet or realize the requirements of the Patient Story. The following are assumptions identified for Patient Story 1.

- Patient lives in a state that incentivizes providers to identify and address social risk factors for low-income or Medicaid eligible patients.
- Patient has health insurance that includes coverage for care coordination services to address the patient's social needs.
- Patient is engaged and willing to share information about medical and non-medical needs and concerns (e.g., patient fills new medication order and takes medication as planned, patient calls and schedules home visit with the housing coordinator, patient is able to articulate social needs clearly).
- Patient has a high school level or greater literacy and comprehension level.
- Patient's preferred language is English.
- Patient has access to health care—can schedule annual wellness visit during after work hours while her children are in daycare.
- Patient's information will be shared and accessed in compliance with a policy and regulatory framework (e.g., privacy and security) and Patient Consent Directives.
- Patient has mobile phone with text messaging and email capabilities.
- Patient has access to patient portal and can use portal to review and update electronic information.
- Patient supplies a valid ID to the practice and the practice uses it to create a trust account. The account uniquely identifies the patient to communicate and share information in a secure manner.
- Patient interprets screening questions as intended and answers questions honestly.
- Questions presented in the screening questionnaire are a subset of value sets needed to document SDOH.
- [Evidence-based patient engagement strategies](#) are used to communicate with the patient and to gather information from the patient.
- Quality clinical documentation is used to assign the appropriate medical codes (e.g., LOINC, SNOMED CT, ICD-10, CPT) to capture the SDOH data.
- Patient is eligible for and is approved to receive community-based services. Service capacity exists to address the patient's social needs.
- Transportation services are offered to the Primary Care Physician's (PCP) patient once a need is identified by the Clinical Staff as part of the screening process.
- PCP offers late afternoon appointments once a week to accommodate different work schedules.
- PCP covers the cost of transportation for the patient. For example, the practice may be eligible to use transportation vouchers provided by the state and/or a private insurer.
- Patient leads and/or directly engages in the creation of goals to address the health concerns and social needs identified through the care planning process.

- PCP initiates and documents the clinical and social need care planning activities in the EHR. The Care Coordinator reviews, manages, and monitors the action plan to address the social needs.
- Patient has the ability to verbally grant consent to selected Care Team Members to view the patient's care plan.
- Patient and Care Team Members have the ability to define notifications and designate notification recipients.
- The Care Coordinator is the facilitator/steward who is responsible for reviewing and reconciling proposed modifications to the care plan.
- Patient's followup appointment is scheduled during the patient's lunch break.
- Necessary access and entry authorization protocols, for any of the systems or users described, are in place.
- Screening information can be accessed and retrieved in a structured and coded format.
- Patient encounter data will be used to generate a claim to the payer.
- EHR is capable of storing captured data and associating it with the specific patient and encounter as part of the permanent medical record.
- EHR is capable of transmitting care coordination documentation (e.g., referral note, consult note, care summary, care plan) either in the HL7® Clinical Document Architecture (CDA) or HL7® Fast Health Interoperability Resources (FHIR)® format.
- EHR has access to all Patient social risk related screening, diagnosis, goal setting, and intervention data.
- EHR is capable of incorporating SDOH data for both encounter and claims-based data exchange with a payer.
- Each of the entry modalities either tie back to a common, singular database, or if they are separate databases, the data elements are consistent across each and the integration is preferably automated and near real-time.
- Acknowledgment and error-handling messages will be handled by standard IT protocols and will not be addressed within the scope of this Use Case Package.

6.0   Use Cases

The Gravity use cases focus on the functionality and interoperability required to allow an end-user to document, retrieve, send, exchange, and aggregate coded[22] social risk data. These use cases are high-level descriptions of the most value-add interactions between the various actors identified within Patient Story 1.

The three use cases for Gravity are as follows:

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[22] Coded data refers to data concepts that use a value set to describe the range of concepts relevant to the definition. The concepts are organized in such a way that encompasses the essential aspects of the concepts and assigned a code to represent the meaning. The Gravity Project recognizes five nationally recognized code systems—LOINC, Standard Nomenclature of Medicine, Clinical Terms (SNOMED CT), International Classification of Diseases Version 10 (ICD-10), Current Procedural Terminology (CPT), and Healthcare Common Procedure System (HCPCS)—used to represent data across the four clinical activities of screening, diagnosis, goal setting, and interventions.

1. Document SDOH Data in Conjunction with the Patient Encounter;
2. Document and Track SDOH Related Interventions to Completion; and
3. Gather and Aggregate SDOH Data for Uses Beyond the Point of Care.

6.1   Document SDOH Data in Conjunction with a Patient Encounter

This use case is relevant to how coded SDOH data are captured in a health care system and how data are shared with other systems. SDOH data are documented either as part of screening or assessment/ diagnosis activities and may be the reason for ordering care activities.

Transactions:

1. Solicited Communication Request
2. Solicited Communication Request Response

Table 1: Use Case 1 Actors

Human Actor	Business Actor	System Actor	Technical Role (Not specific to a System Actor)
Patient	n/a	Screening App	Request Recipient
Clinical Staff Member	PCP Practice	EHR	Requester

Table 2: Use Case 1 Solicited Communication Request

| Use Case Element	Communication Request
Assumptions	Practice determines appropriate questions to address patient consent to share SDOH information and offers options to gather patient preferences regarding whether the patient: - does not want to answer the survey; - would prefer to answer the survey on paper at the appointment; - would prefer to discuss these questions with a care coordinator at the appointment; - would prefer to discuss these questions with his or her provider at the appointment; and - needs assistance to translate or interpret the questions. Patient demographic data is up to date.
Preconditions	Requester system generates the SDOH Screening Questionnaire for patient. The questionnaire is automatically prepopulated with available patient demographic information, date, and medical record number (MRN). The system assigns a unique request ID number to identify the communication request for the associated patient.

Use Case Element	Communication Request
Transaction #1	**Communication Request** Requester system (EHR) sends SDOH Screening Questionnaire to Request Recipient (e.g., Mobile App, PHR, Patient Portal, Kiosk).
Message Content (Payload)	Prepopulated SDOH Screening Questionnaire (with coded questions and answer fields where available).
Post Condition	Prepopulated SDOH Screening Questionnaire has been provided to the Request Recipient system along with information needed to process the Communication Request Response.
Alternate Flow (Paper Form)	Operator at the Requester System generates the SDOH Screening Questionnaire for Patient. The questionnaire is prepopulated with some available patient demographic information, date, medical record number (MRN), and a unique request ID number is assigned. The Operator prints the prepopulated SDOH Screening questionnaire and gives it to the Patient.

Table 3: Use Case 1 Solicited Communication Request Response

Use Case Element	Communication Request Response
Assumptions	System that receives the Communication Request (Request Recipient) includes a user interface that allows the user to complete and return the form to the system indicated as the "Communication recipient" in the Communication Request.
Preconditions	A Communication Request was received. It contains the prepopulated questionnaire to be completed by the Patient. The system automatically prompts the Patient (user) to complete and return the SDOH questionnaire.
Transaction #2	**Communication Response** Request Recipient (Mobile App, PHR, Patient Portal, Kiosk) facilitates gathering SDOH questionnaire information from Patient and sends the completed questionnaire back to Requester system (EHR) based on the original Communication request received.
Message Content (Payload)	Populated digital SDOH questionnaire with Patient's answers (includes the patient identifier and the unique request ID and any other patient demographic information supplied by the Patient).
Post Conditions	The Request Recipient receives the response payload (completed questionnaire). The Request Recipient reviews and then confirms the correct chart for attaching the document to the patient's record.

Use Case Element	Communication Request Response
Alternate Flow	The Clinical Staff Member provides the patient a paper questionnaire to complete privately. The questionnaire is labeled at the point of care with a unique request ID number, medical record number (MRN), and key demographic information. This information is used later by the Clinical Staff Member to securely match the completed questionnaire to the patient in the EHR and select the correct document type. Alternatively, questionnaire responses can be entered into discrete data fields directly by the patient through tablet or kiosk or by clinical staff after completion.

Figure 1: Use Case 1 Document SDOH Data in Conjunction with a Patient Encounter
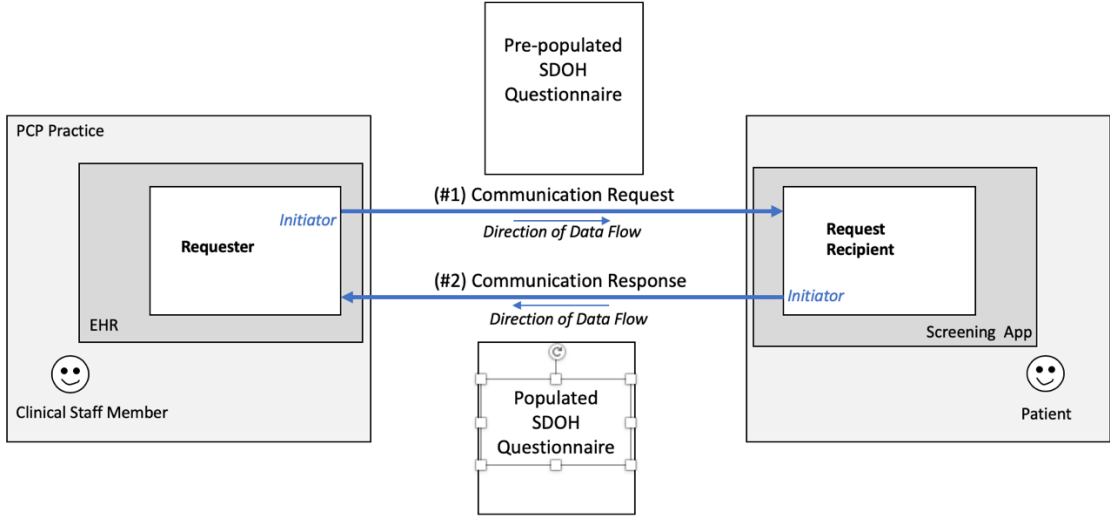
6.2   Document and Track SDOH Related Interventions to Completion

This use case is relevant for documenting actions planned or completed in response to data collected about social risks and social needs in electronic health information systems. Actions can include counseling, education, consults, referrals, case management, care planning, and modifications to treatment.

Transactions:

1. Service Request
2. Request Completion

To illustrate this use case, the role of Order Placer is filled by a Clinical Staff Member (see Table 4 below). The Order Placer can be filled by other human actors to include the Patient and their proxy. In this case, the Patient can use a mobile app, PHR, or patient portal to place the order and interact with the Order Filler.

| Human Actor	Business Actor	System Actor	Technical Role
Clinical Staff Member	PCP Practice	EHR	Order Placer
Support Services Personnel or Case Manager	Provider Organization or Services Organization	Portal or mobile app, another EHR, or other case management system	Order Filler
Quality Specialist/ Health Plan Care Manager	Payer Organization	Health plan management system	Order Filler

Table 5: Use Case 2 Solicited Service Request

Use Case Element	Service Request
Assumptions:	Clinical Staff Member consults the Patient on order options and works with the Patient to understand preferences (e.g., preferred suppliers, out of pocket costs) before placing the order. Order Placer system automatically assigns a unique ID to the service request. Order Filler is able to receive and process the order/request from the Order Placer.
Preconditions:	Clinical system (EHR) has documented assessment information, health concerns, goals, and planned interventions or performed referrals. Clinical system takes on role as Order Placer system and assigns and includes a unique Service Request ID in the order.
Transaction #3:	**Service Request** Order information (referral, planned intervention, ordered activity) is sent from the Order Placer (EHR) to the Order Filler (system used by the person/organization to complete the request such as a Case Management system, pharmacy system, community referral system, or mobile app). Order Filler system responds to indicate receipt of the request transaction.
Message Content:	Relevant information needed for the Order Filler to start the ordered activity.
Post Conditions:	Order Placer system has a receipt of the order/request from the Order Filler. Order Filler has acknowledged receipt of the request and supplied an ID associated with the order in its system.

Use Case Element	Service Request
Alternate Flow 1:	Order Filler rejects order/request. Order Placer sends service request to new Order Filler. Order Placer role is conducted by the Patient or their proxy. User of the Order Filler system acknowledges receipt of order/request manually either by fax, phone, or email.
Alternate Flow 2:	Order Filler transfers service request to new order filler (without sending back to Order Placer). New Order Filler system responds to request from Order Placer.

Table 6: Use Case 2 Solicited Service Request Response

Use Case Element	Service Request Response
Assumptions:	ID of the service request (provided by the Requester System) is maintained by the Order Placer and Order Filler system. The Order Placer also retains the Order ID assigned by the Order Filler system. Order Filler system returns both of these IDs with the Request Completion that indicates the ordered activity has been completed.
Preconditions:	Order Placer system generates and manages request IDs used to track initiated requests and order IDs used to track initiated orders. Order Filler system generates and manages activity IDs and maintains the relationship between tasks and requests/orders based on these IDs.
Transaction #4:	**Request Completion** Information about the completed activity is communicated back to the initiating party/system (Order Placer).
Message Content:	Information about the initial request that was completed and information about the activity that was performed to complete the request (completed interventions). Includes the ID of the original service request and the ID of the ordered activity in the system where completion of the activity is documented.
Post Conditions:	Order Placer uses the ID of the original request to associate incoming information to previously generated requests/orders. Order Placer uses the returned completed activity information to update ordered activities to be completed activities within the system.
Alternate Flow (HumanTask#1):	User of Order Filler system contacts the organization placing the order to report that the ordered activity had been completed.
Alternate Flow (HumanTask#2):	User of Order Placer system validates the return request information and marks the ordered activities as completed in the system.
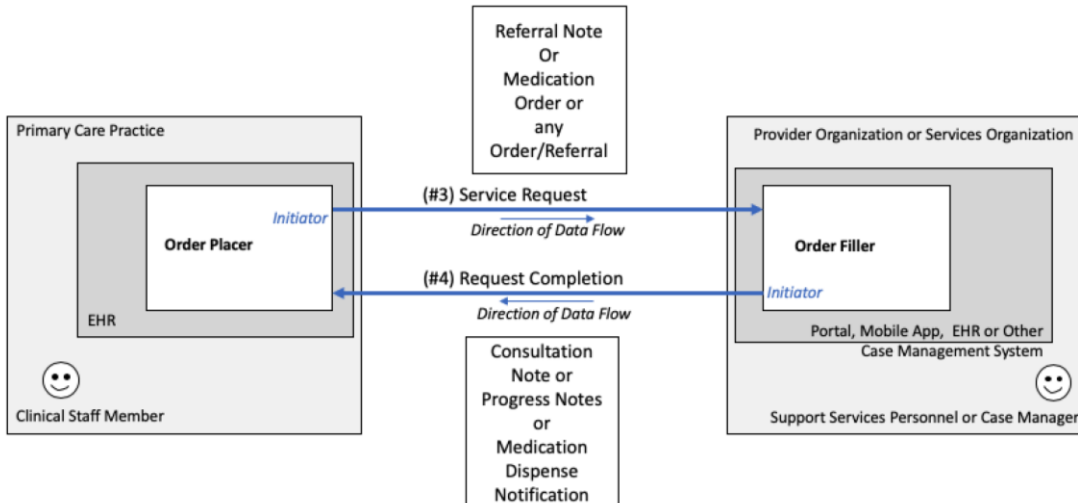
6.3 Gather and Aggregate SDOH Data for Uses Beyond Point of Care

This use case describes how patient-level social risk information documented and shared in the above use cases can be aggregated and analyzed to support clinical, system, and community activities, including but not limited to panel and population health management, risk adjustment, value-based payment, and community health improvement.

6.3.1 Clinical and Payer Scenarios to Support Use Case 3

Population health management: On a monthly basis, the Clinical Manager[23] at the Primary Care Practice reviews EHR data that includes social needs and related referrals. Based on the data, the Clinical Manager sees that one social risk factor (*food insecurity*) is the most frequently reported social risk factor in their patient population. The Clinical Manager notes that the goal of food security is rarely met when the only intervention completed is a referral to a local food pantry.

The Clinical Manager explores how to ensure social risk (food insecure) patients are consistently being referred to appropriate services and how to track whether those referrals are effective.

Quality reporting: The PCP Office is located in a state that recently began requiring providers to identify social risk factors among Medicaid patients on a quarterly basis and to refer patients with risks to appropriate resources.

The Clinical Manager uses the EHR to generate quarterly reports that list the total number of patients screened and the total number of screened patients who were referred to services. The reports are

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[23] The role of the Clinical Manager can also be executed by the Health Plan Care Manager working with the Primary Care Office. In this case, the Health Plan Care Manager would be authorized to collect SDOH data for the Health Plan members receiving care within the Primary Care Office.

electronically submitted to the Payer (State Medicaid Agency or Managed Care Organization) on a quarterly basis.

Risk Adjustment and Risk Stratification: The Clinical Manager uses the EHR to generate annual reports that list the total number of patients screened and the outcomes of identified interventions for screened patients. The report includes demographic information and information about the patients' health concerns. The Clinical Manager sends the report to the Payer.

The Payer uses the report to stratify outcomes for members and to examine the impacts of social risks on outcomes for use in future risk adjustment.

6.3.2   Use Case 3 Patterns and Transactions

Several use case patterns exist to support the use case 3 activities described above. For the purpose of this use case document, the following three patterns were identified to describe the transactions for sending aggregate SDOH data from one system to another.

Use Case Patterns:

- **3A: Unsolicited Communication by Smart Sender.** This pattern describes transactions where the information source system has the capability to aggregate SDOH data and send the aggregated data to another system. Refer to Tables 7 and 8 and Figure 3 below.
- **3B: Unsolicited Communication by Smart Receiver.** This pattern describes transactions where the recipient of the SDOH data performs the data aggregation. Refer to Tables 9 and 10 and Figure 4 below.
- **3C: Unsolicited Communication managed by Middle System**. This pattern describes transactions where a "middleware" system performs the data aggregation activity and sends the aggregated data to another system. Examples of middle systems include clearinghouses, health information system providers (HISP), health information exchanges (HIE), or community information exchanges (CIE). Refer to Tables 11 and 12 and Figure 5 below.

Transactions:

1. Send Aggregate SDOH Data
2. Send Individual SDOH Data

To illustrate this use case, the role of information source/ data aggregator is filled by a Quality Manager (see Table 7, 9, and 11). The information source/ data aggregator can be filled by other human actors to include the patient or their proxy. In this case, the patient can use a mobile app, PHR, or patient portal to gather, aggregate, and send data to the Information Recipient.

Table 7: Use Case 3A Actors

Human Actor	Business Actor	System Actor	Technical Role
Quality Manager	PCP Practice	EHR	Information Source / Data Aggregator
Quality Specialist/ Health Plan Care Manager	Payer Organization	Payer Data Warehouse	Aggregated Data Information Recipient

Table 8: Use Case 3A Unsolicited Communication - Information Source / Data Aggregator

Use Case Element	Unsolicited Communication - Information Source / Data Aggregator
Assumptions:	Information Source has the capability to aggregate SDOH encounter data and share aggregated data with other systems. Information Recipient is able to process and use aggregated SDOH data.
Preconditions:	Quality Manager identifies the data tool (e.g., instruments/scales, case report forms) and related data elements for aggregation and defines aggregation process.
Transaction #5:	**Send Aggregate SDOH Data** Information source/data aggregator (EHR or source clinical info system is acting as a Data Aggregator) pushes aggregated data to an Information Recipient.
Message Content:	Aggregated coded data identified for a particular purpose (quality measure, stratification, risk adjustment).
Post Conditions:	Information Recipient accepts and acts on aggregated data.

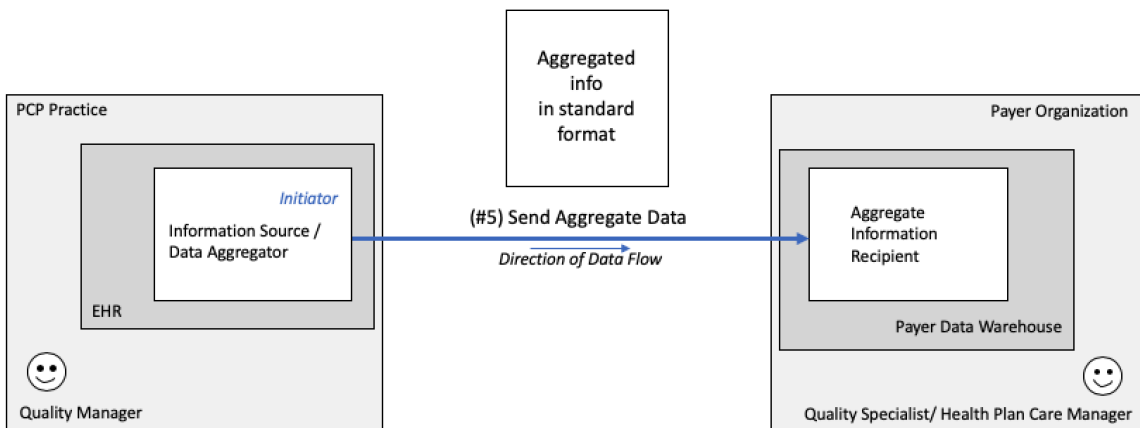## Figure 3: Use Case 3A Gather and Aggregate SDOH Data for Uses Beyond Point of Care

Human Actor	Business Actor	System Actor	Technical Role
Quality Manager	PCP Practice	EHR	Information Source
Quality Specialist/ Health Plan Care Manager	Payer Organization	Payer Data Warehouse	Information Recipient / Data Aggregator

Table 10: Use Case 3B Unsolicited Communication - Information Recipient / Data Aggregator

Use Case Element	Unsolicited Communication - Information Recipient / Data Aggregator
Assumptions:	Information Source only needs to be able to generate the collected SDOH information. Information Recipient has the capability to receive, aggregate, and use submitted SDOH data.
Preconditions:	Quality Specialist identifies the data tool (e.g., instruments/scales, case report forms) and data elements for submission (e.g., Total Medicaid encounters including SDOH data for specific period).
Transaction #6:	**Send Individual SDOH Data** Information Source pushes encounter data to Information Recipient system.
Message Content:	Individual SDOH data documented within a clinical encounter for specific period.
Post Conditions:	Information Recipient accepts encounter data and conducts aggregation based on specific variables for data processing.

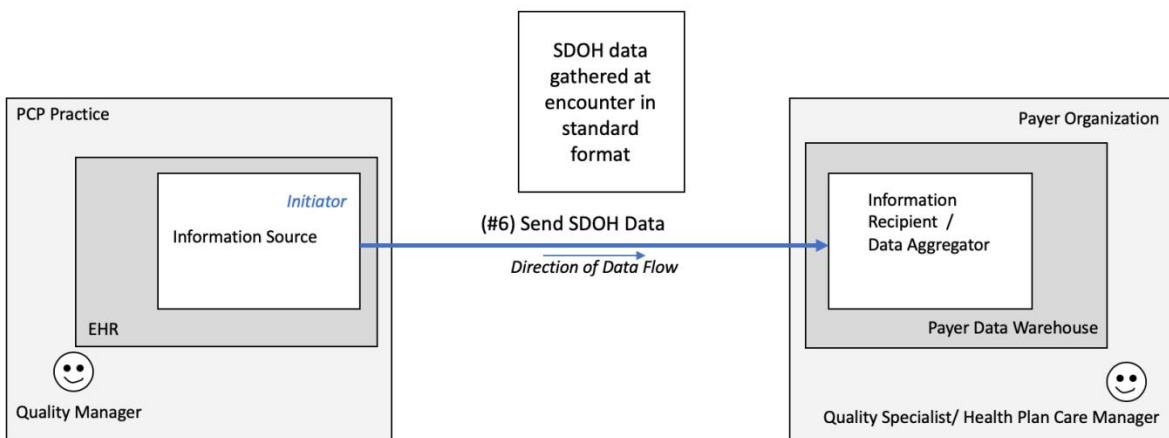Figure 4: Use Case 3B Gather and Aggregate SDOH Data for Uses Beyond Point of Care

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Table 11: Use Case 3C Actors

Human Actor	Business Actor	System/Technical Actor	Technical Role
Quality Manager	PCP Practice	EHR – Data Collector	Information Source
Clearing House Specialist	Clearing House	Clearing House or Health Information System Provider (HISP)	Information Recipient / Data Aggregator
Quality Specialist/ Health Plan Care Manager	Payer Organization	Payer Data Warehouse, Registry/Research System	Aggregate Information Recipient

Table 12: Use Case 3C Unsolicited Communication - Data Aggregator "Middleware System"

Use Case Element	Unsolicited Communication - Data Aggregator "Middleware System"
Assumptions:	Information Source only needs to be able to generate the collected SDOH information. Information Recipient is able to process and use aggregated SDOH data. Information Recipient identifies data variables for data aggregation and data processing. Middleware System can receive and process SDOH data and share aggregated data with other systems.
Preconditions:	Quality Manager identifies data tool (e.g., instruments/scales, case report forms) and data elements for submission.
Transaction #6:	**Send Individual SDOH Data** Information Source pushes individual SDOH encounter data to an Information Recipient / Data Aggregator Middleware System.
Message Content:	Individual SDOH data documented within a clinical encounter for specific period.
Post Conditions:	Information Recipient / Data Aggregator Middleware System accepts encounter data and conducts aggregation based on specific variables for data processing.
Transaction #5:	**Send Aggregate SDOH Data** Data Aggregator Middleware System pushes aggregated data to an Information Recipient.
Message Content:	Aggregated coded data for a particular purpose (quality measure, stratification, risk adjustment).
Post Conditions:	Information Recipient accepts and acts on aggregated data.
Notes:	This is the same transaction as used in the Information Source / Data Aggregator Use Case above (Transaction #5).

Figure 5: Use Case 3C Gather and Aggregate SDOH Data for Uses Beyond Point of Care
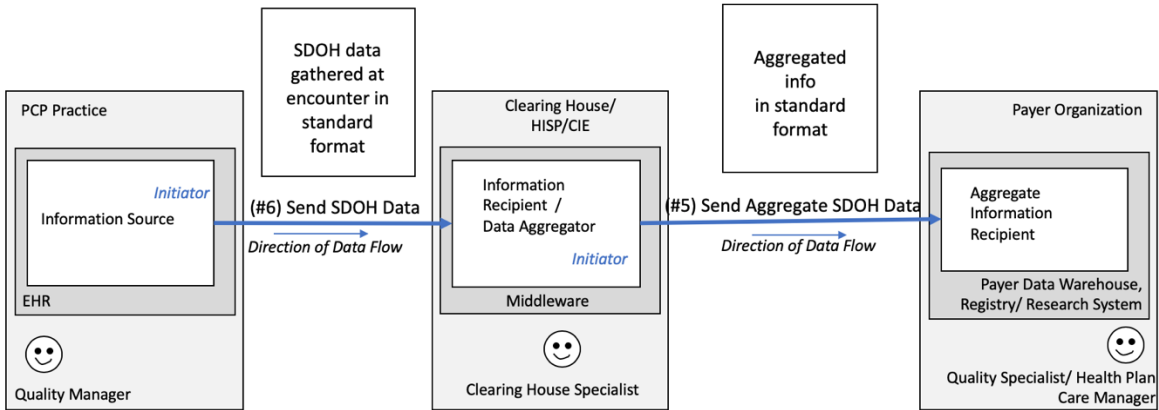
7.0   Message Content Considerations

The following table summarizes the message content required in support of the six transactions highlighted in the three use cases. Nationally recognized interoperability standards available to represent this message content are listed in Appendix B. Available Document and FHIR Resource Standards for Message Content.

Table 13: Use Case Message Content Considerations

Use Case #	Transaction	Message Content
1	1. Solicited Communication Request	Prepopulated SDOH Screening Questionnaire (with coded questions and answer fields where available) with available patient demographic information, date, medical record number (MRN).
1	2. Solicited Communication Response	Populated digital SDOH questionnaire with Patient's answers (includes the patient identifier (MRN) and the unique request ID and any other patient demographic information supplied by the Patient).
2	3. Service Request	Relevant information needed for the Order Filler to start the ordered activity.
2	4. Request Completion	Information about the initial request that was completed and information about the activity that was performed to complete the request (completed interventions). Includes the ID of the original service request and the ID of the ordered activity in the system where completion of the activity is documented.
3	5. Send Aggregate SDOH Data	Aggregated coded data identified for a particular purpose (quality measure, stratification, risk adjustment).
3	6. Send Individual SDOH Data	Individual SDOH data documented within a clinical encounter for specific period.

8.0   Risks, Issues, and Obstacles

Key risks, issues, and obstacles for consideration in the use and implementation of this document include but are not limited to the following:

- Lack of and misaligned incentives across payers for collecting and using social risk data to inform care and provide referrals, particularly in single-payer or non-VBP arrangements.
- Limited experience in clinical workflows for documenting and addressing social risk factors.
- Misaligned incentives for using social risk data to inform care and provide referrals.
- Lack of awareness around SDOH across stakeholder groups.
- Non-standardized or evidence-based workflows available for administration of social risk screening questions.
- Creating trust with patients and their caregivers when administering social risk screening questions.
- Inability of clinical staff to affect social needs within their scope of work and professional expertise.
- Unintended consequences of social risk screening in clinical settings to include medicalizing interventions.
- Risk of diverting clinical staff from accomplishing specific health goals in order to meet patient social needs.
- Inability of patient to share sufficient information during an office visit to appropriately determine an action plan.
- Limitation of referrals to only routine, customary resources (e.g. specific food pantries) in order to more easily document an intervention when other, possibly more appropriate, alternatives are available (e.g. community groups that do not use an electronic system or family members).

Appendix A: Patient Story 1 Personas

<p align="center">**Table 14: Patient Persona**</p>

Persona Name	Rebecca Smith
Role	Patient
Age	32
Ethnicity	African American
Primary Language	English
Highest Education Level	High School
Employment Status	Employed
Clinical Health Concern	Asthma
Social Risk Factors	housing instability, history of food insecurity, transportation barriers
Location	San Francisco
About Persona	Rebecca is an admin assistant at a local community college in town earning $30,000/year. She recently separated from the father of her 3 children (ages 18mo (Lily), 3 (James) and 6 (Anna)). Her children's father has not sent child support and living on her one salary while supporting the needs of three children is difficult. Initially, after the separation, she had to stay with friends, then she found a place briefly, but they got evicted when the landlord sold the building. She has recently found a small apartment in the city, but the rent is high. Much of her salary goes to childcare, diapers, and rent, leaving little left over. Either utilities or rent are late month to month. She gets caught with shutoff letters from the utility company, but she needs electricity for her nebulizer and critical needs of her young children, resulting in healthy and abundant food being sacrificed to pay the bills. It has all happened so fast she has little awareness of the resources that might make it all better. Rebecca's asthma is poorly controlled, and she has missed several days of work after running out of medication. Although she measures her peak flows and found them consistently in the yellow zone, and even red at times, she has not been able to control the asthma by adjusting her medication because it is expensive. To compensate, she tries to space out doses to make them last longer. She feels if she just could settle some of the stresses of living, things would be okay. She does not own a car and relies on public transportation. Between home and daycare and work, she spends two hours on the bus daily.

Persona Name	Rebecca Smith
Typical Routine & Interactions	Rebecca's typical day is to rise at 6am to get the kids up and fed. She needs to drop them off at daycare at 7:30am in order to get the many buses to work and be there by 9am. She picks the children up again at 6:30 pm and then it is home, dinner, baths and bedtime. This repeats daily.
Challenges & Goals	With rent, childcare, utilities and basic necessities of 3 young children, her salary is simply not stretching far enough. She saves money by buying low-cost foods such as macaroni and cheese and cereals and spacing out her asthma controller medication to every other day instead of daily. She cannot afford fresh fruits and veggies. She is so tired at the end of the day she does not have much left to give. She is uncertain whether she will receive child support payments anytime soon.

Rebecca's goals are to control her asthma condition, find more affordable medication options, feed herself and her family well, and to settle into stable, affordable, and environmentally safe housing. |
| What Persona wants from health care system | Treatment plan that addresses both her asthma condition and life situation.
Contact information for social worker or case manager.
List of affordable and accessible food options.
Referral to case management to access available Federal or State benefits. |

Table 15: Primary Care Physician Persona

Persona Name	Dr. Carla Sanchez
Role	Primary Care Physician to Rebecca Smith and Family
Age	40
Ethnicity	Hispanic
Primary Language	English
Qualifications (Practitioner)	MD
Employment Status	Employed
Organization (Practitioner)	Sanchez Family Practice
Location	San Francisco

Persona Name	Dr. Carla Sanchez
About Persona	Carla is a caring, competent, and innovative doctor. She is married with two young children. She really enjoys being part of a community and having long term relationships with her patients. She has been in private practice for 12 years and works alongside another Family Practitioner, an Advanced Nurse Practitioner, a Care Coordinator, two Clinical Staff Members, and two Front Office Staff Members. Carla's practice recently became an NCQA Level 3 Patient Centered Medical Home (PCMH).
Typical Routine & Interactions	Carla's day begins with hospital rounds seeing an average of two to four patients and continues in her office seeing about nineteen patients. She often sees patients with social risk factors that she cannot readily address as a clinician. The practice sees fifty patients per day and makes another fifty phone calls a day for transitions of care and population management. Carla feels her EHR does a good job with prescription writing and medication reconciliation but is not useful with helping her document non-clinical findings.
Challenges & Goals	Carla is becoming overworked and on the verge of burnout. Carla is aware of other practices starting to incorporate social risk screening tools into the clinical workflow. She would like to use her EHR to conduct initial screening for her patients and to document social risk observations during a clinical counter. She is frustrated with the lack of guidance on what codes she can use to document screening, diagnosis, goal setting, and interventions activities and thereby facilitate payment. She also struggles on how to better coordinate referrals to community-based organizations. Most referrals are unidirectional, and she does not know whether the patient was seen by the referred provider or what the outcome of the intervention was. Her practice recently adopted a new screening tool to use for all annual wellness visits.

Persona Name	Dr. Carla Sanchez
What Persona wants from health care system	Carla wants to provide team-based whole person care, and she wants to be able to work with her clinical staff and their EHR system to document both clinical and social risk information for her patients. This will improve her and her team's ability to identify the right interventions to meet their patients' whole person needs. She wants herself and her team to use the EHR system to access relevant patient information existing in clinical and non-clinical settings, including the following: past social risk screenings, problem list, medications and refill pattern, and diet history. She wants herself and her team to use the EHR system to support electronic closed-loop referrals to community-based organizations which can assist with navigation for specific services and programs and, in turn, optimize the care coordinator's time, provide broader mitigation of the needs, enhance the overall results, and lead to higher patient and provider satisfaction. Carla would also like to more efficiently aggregate social risk data on her patients to improve her practice's quality improvement initiatives.

Table 16: Care Coordinator Persona

Persona Name	Reeza Shah
Role	Care Coordinator
Age	30
Ethnicity	Asian
Primary Language	English
Qualifications (Practitioner)	LCSW
Employment Status	Employed
Organization (Practitioner)	Sanchez Family Practice
Location	San Francisco

Persona Name	Reeza Shah
About Persona	Ms. Shah is a compassionate licensed social worker working at the Sanchez Family Practice. She recently joined Carla's practice to support the PCMH care coordination activities. She enjoys working with patients and family members in managing their health and connections to the community.
Typical Routine & Interactions	Ms. Shah's day begins at the clinic reviewing emails and confirming her schedule for the day. Having access to patient data in the EHR is helpful. However, social risk data relevant to some patients is not always available or is recorded as free text in a notes section of the EHR, making it difficult to locate consistently. Not all patients have been screened for social risk factors. Reeza enters her encounter notes in between patient visits, while at lunch, or after seeing all patients for the day. On busy days, she sometimes has to finish charting after working hours.
Challenges & Goals	The ability to administer social risk screening questions from the EHR has been helpful from a workflow perspective; however, it is a challenge to integrate and act on the data as part of the diagnosis, planning, and treatment activities. Ms. Shah wants to be able to document food insecurity in the EHR in a coded way so that it can be readily incorporated in the patient record, inform the care plan, and be used to identify the appropriate interventions. Ms. Shah is unsure how regularly Dr. Sanchez and her partner read her notes in the EHR or whether they are implementing her recommendations into a shared care plan for the high-risk patients.
What Persona wants from health care system	Ms. Shah wants the ability to communicate with Dr. Sanchez and the other clinicians more directly. She would like the referring clinician to complete a standard referral template including reason for referral. For every referral, she wants to know whether they have had a social risk screening completed and what interventions have been identified by the PCP.

Table 17: Clinical Staff Member Persona

Persona Name	Samir Patel
Role	Clinical Staff Member
Age	27

Persona Name	Samir Patel
Ethnicity	Asian
Primary Language	English
Qualifications (Practitioner)	RN, MA
Employment Status	Employed
Organization (Practitioner)	Sanchez Family Practice
Location	San Francisco
About Persona	Mr. Patel is a passionate and dedicated clinical staff member. Mr. Patel recently began administering social risk screening questions to all annual wellness visit patients. This is a new workflow and he often feels uncomfortable asking patients some of the questions.
Typical Routine & Interactions	Mr. Patel spends most of his time triaging all the practice patients. When a patient checks in for a visit, he is responsible for finding and escorting the patient to the exam room. He is the main staff member responsible for administering the social risk screening questionnaire for all annual visits and entering the patient responses in the EHR. He recently completed an Empathic Inquiry training class to help with his administration of the social risk screening questions. He knows some questions are challenging for some patients to answer.
Challenges & Goals	Being able to administer the screening questions while remaining sensitive and empathetic to a patient's need, preferences, strengths, and weaknesses. Creating trust with patients so they feel comfortable answering the questions.
What Persona wants from health care system	Mr. Patel is not fully comfortable asking all the questions in the screening tool. He would like to find other modes of administering the questionnaire before or after the visit.

Appendix B. Available Document and FHIR Resource Standards for Message Content

A core principle of the Gravity Project is the reuse of existing standards to represent and exchange electronic information. Table 18 lists the message content needs identified in the Use Cases developed in section 6 and summarized in section 7. Column 2 describes the coded information the Gravity Project is working toward. Columns 3 and 4 identify relevant HL7® Clinical Document Architecture (CDA) Templates and HL7® Fast Health Interoperability Resources (FHIR) available to format the coded information. Although the Gravity Project is not specifying which templates and profiles implementers must use to share SDOH information, it is helpful for these potential data structures to be considered as the code sets for SDOH information are developed.

Table 18: Applicable Message Content Standards

Message Content	Coded Information	CDA Document Options	FHIR Resources Options

Prepopulated SDOH Screening Questionnaire (with coded questions and answer fields where available).	Assessment questions with potential answers	CommunicationRequest
		   US Realm Header
		   SDOH Status Section or Results Section
		
		   Questionnaire
			CommunicationRequest
			   Questionnaire
			   Observation
			   Bundle/Composition/Observation

Populated digital SDOH questionnaire with patient's answers (includes the patient identifier (MRN) and the unique request ID and any other patient demographic information supplied by the patient).	Assessment questions with patient's answers	Communication
		   US Realm Header
		   SDOH Status Section or Results Section
		
		   Questionnaire Response
			Communication
			   Questionnaire
			   QuestionnaireResponse
			   Observation
			   Bundle/Composition/Observation

Relevant information needed for the Order Filler to start the ordered activity.	Initiated Task
	Referred/Ordered Activity
	Background on Assessments given
	Assessed Needs/Risks
		Task
		   ServiceRequest
		     Referral Note
			Task
			   ServiceRequest
			     Referral Note

Message Content	Coded Information	CDA Document Options	FHIR Resources Options
Information about the initial request that was completed and information about the activity that was performed to complete the request (completed interventions). Includes the ID of the original service request and the ID of the ordered activity in the system where completion of the activity is documented.	Progressing/Completed Task Completed Activity (with associated order/referral information) Other relevant progress notes or consultation notes	Task Consultation Note Progress Note	Task Consultation Note Progress Note Procedure Observation Encounter Enrollment
Aggregated coded data identified for a particular purpose (quality measure, stratification, risk adjustment).	Computed Quality Measure score for a population and a given measure definition	Communication QRDA Cat III	Communication MeasureReport
SDOH data documented within a clinical encounter for specific period.	Patient level data needed for assessing a quality measure with a given measure definition Encounter data which can be harvested as needed Patient summary data which can be harvested as needed Screening information gathered Assessed needs/diagnoses Goals Planned interventions Completed interventions Outcome Observations (progress toward goals)	Communication Encounter Summary Document(s) Patient Summary Document QRDA Cat I	Communication MeasureReport Encounter Summary Document(s) Patient Summary Document