



# Childhood Obesity Data Initiative: Business Process Analysis Report

*Prepared by the Public Health Informatics Institute for the Childhood Obesity Data Initiative Project*

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## Executive Summary

As part of the Centers for Disease Control and Prevention's (CDC) efforts to promote health, prevent disease, injury, and disability, and prepare for emerging health threats, the Division of Nutrition, Physical Activity, and Obesity (DNPAO) and Center for Surveillance, Epidemiology, and Laboratory Services (CSELS) partnered with Public Health Informatics Institute (PHII) for the Childhood Obesity Data Initiative (CODI). CODI's purpose is to facilitate access to health data from pediatric care and support programs based in clinical or community settings.

Business process analysis (BPA) was used in the CODI project to define the landscape of childhood obesity screening and treatment. Data collected from healthcare providers and community programs from the CODI pilot site in Denver, Colorado, were used to identify the stakeholders and business processes, define tasks within each process and relationships between stakeholders, and draft functional requirements that articulate how an information system can support the delivery of childhood obesity treatment and services. Seventeen key informant interviews were conducted with 25 Denver subject matter experts between December 2018 and June 2019.

The BPA led to the creation of a business process matrix, mind map, context diagram, business process map, four task flow diagrams, three detailed annotation documents, and 303 functional requirements. A number of important findings emerged from this work. Key informant interviews identified a high level of variation in clinical workflow that impact what patient data gets collected, recorded, and stored in an information system. Misalignment between what providers, navigators, and interventionists are doing and what the information system can easily record may have contributed to a dearth of structured data about childhood obesity treatment. Unlike in clinical organizations which take a patient-centered approach, workflow within CODI community programs was consistently delivered and dependably documented.

Childhood obesity care and treatment involves a number of patient activities occurring outside of the context of a traditional clinical encounter including texting, phone calls, and in-person exchanges with non-provider staff. While the CODI framework differentiates between medical and behavioral intervention processes, key informant interviews indicated practitioners blend aspects of these activities to suit the patient needs and reach encounter objectives. This examination of childhood obesity screening and treatment showed dramatic variation and complexity within and between the clinical care and community programs that support children and families struggling with obesity and weight. While the feasibility of reaching one common systematic sequence of events and data capture for childhood obesity is uncertain, important progress to optimize existing information technology has been made.

## Acknowledgements

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## Acronyms

**ADHD:** Attention deficit hyperactivity disorder

**BIV:** Biologically implausible values

**BMI:** Body mass index

**BP:** Blood pressure

**BPA:** Business Process Analysis

**CCWG:** CODI Collaborative Work Group

**CHCO:** Children's Hospital Colorado

**CODI:** Childhood Obesity Data Initiative

**DH:** Denver Health

**EHR:** Electronic health record

**GOTR:** Girls on the Run

**HLC:** Healthy Lifestyle Clinic at Denver Health

**LMP:** Lifestyle Medicine Program at Children's Hospital Colorado

**KPCO:** Kaiser Permanente Colorado

**MA:** Medical assistant

**MEND:** Mind, Exercise, Nutrition, Do It!

**MRN:** Medical record number

**NS:** Nutrition Services at KPCO

**NAFLD:** Non-alcoholic fatty liver disease

**PCP:** Primary care provider

**SDOH:** Social determinants of health

**WCC:** Well child check or well child visit

**WMP:** Weight Management Program

## Introduction

### Background

As part of the Centers for Disease Control and Prevention's (CDC) efforts to promote health; prevent disease, injury, and disability; and prepare for emerging health threats, the Division of Nutrition, Physical Activity, and Obesity and Center for Surveillance, Epidemiology, and Laboratory Services partnered with Public Health Informatics Institute (PHII) for the Childhood Obesity Data Initiative (CODI). CODI's purpose is to facilitate access to health data generated by clinical and community-based organizations. The project seeks to build data capacity for research on prevention and treatment of childhood obesity. CODI includes analysis and documentation of the business processes involved in childhood obesity treatment and prevention to inform the development of an infrastructure to identify records belonging to the same child across multiple organizations, and generate a longitudinal dataset for research or surveillance. By doing so, CODI will enable researchers to identify gaps in research efforts and assess effectiveness of childhood obesity interventions. CODI will expand the ability to capture, standardize, integrate, and query existing patient-level electronic health record (EHR), intervention, community, and social determinant data via a common data model. At the end of this initiative, researchers will have a proven solution for using and linking childhood obesity data.

CODI's initial pilot implementation site will occur with a group of clinical and community partners in Denver, Colorado, between October 2018 and June 2020. The CODI pilot implementation is overseen by the CDC CODI team, which includes childhood obesity treatment and informatics experts. The CODI pilot implementation is supported by PHII and the MITRE Corporation. PHII provides contracting support and conducts a business process analysis. MITRE is the technical lead, providing project management and objective advice and technical expertise to support the project to a successful implementation. A selection of childhood obesity researchers and subject matter experts are convened into a work group (CODI Collaborative Work Group or CCWG) to provide feedback and advice on CODI materials and solution design throughout the project duration.

### Purpose

This report was prepared to capture and synthesize findings from the CODI business process analysis (BPA) work conducted by PHII. Business process analysis is designed to assess and document the practices for collecting, managing, processing, reporting, and exchanging data. For CODI, the documented data and information practices will provide improved visibility and understanding of the clinical and community work associated with providing obesity prevention and treatment to pediatric populations.

The expected outcome is a clear understanding of the context of childhood obesity data provided by clinical and community organization information systems leading to a more practical, efficient, and effective approach to childhood obesity research. BPA also served as a framework for recommending functional requirements for information systems supporting CODI.

## **Audience**

The business process analysis used in this initiative was designed to inform the current CODI Denver pilot effort as well as future CODI implementations. This report was prepared for current and future CODI implementers; researchers or public health organizations who want to leverage the CODI architecture to request data; clinical care providers or community organizations seeking a deeper understanding of the childhood obesity landscape; and other partners who are interested in the CODI or similar infrastructure.

## **Document organization**

This report includes a general methods description, one section describing each business process analysis artifact, and a series of appendices which provide more detailed information. Within the task flow section, subsections are dedicated to each of the CODI business processes: deliver medical intervention, deliver behavioral intervention, deliver navigation and coordination intervention, and create research data. The report concludes with high-level discussion of functional requirements, key findings, and recommendations for future work.

## **Project approach**

PHII approaches each project by focusing on our core tenets: collaboration and achieving consensus among participants and stakeholders. In addition, PHII follows a well-established set of best practices designed to keep projects on time and within scope. Among the best practices we employ is our Collaborative Requirements Development Methodology™ (CRDM), which gives project participants tools and a process for documenting business process and defining functional requirements for information systems that support those processes.

## **Project methodology**

PHII performed the following project activities:

1. Literature review. Conducted an environmental scan of available childhood obesity care and treatment literature and tools.
2. Resource inventory. Reviewed results from the CODI project Programmatic Environmental Scan and Technical Environmental Scan provided to CODI stakeholders in order to become familiar with the clinical and community programs relevant to the CODI infrastructure, and used this information to prepare the questionnaires and interviews.
3. Interview guide. Developed a robust questionnaire to collect detailed information required to document childhood obesity and treatment occurring in clinical and community settings. This included identifying the participants, the business processes, and the tasks in each process. The interview guide was utilized during interviews with Denver-based subject matter experts.
4. Data collection. Conducted a series of interviews with designated participants to collect the current state information and in doing so, understand how data are utilized to support the delivery of prevention and treatment for childhood obesity.

5. Business process analysis. Diagrammed stakeholders and their transactions, identified high level business processes, provided an orientation to the relationship between business processes, and described the current state of each business process. Functional requirements for an information system supporting CODI were abstracted from the business process documentation.
6. Report dissemination. Created a final project report that incorporates current state business processes, functional requirements, key findings and recommendations, and a summary of technical assistance provided to the CODI project.

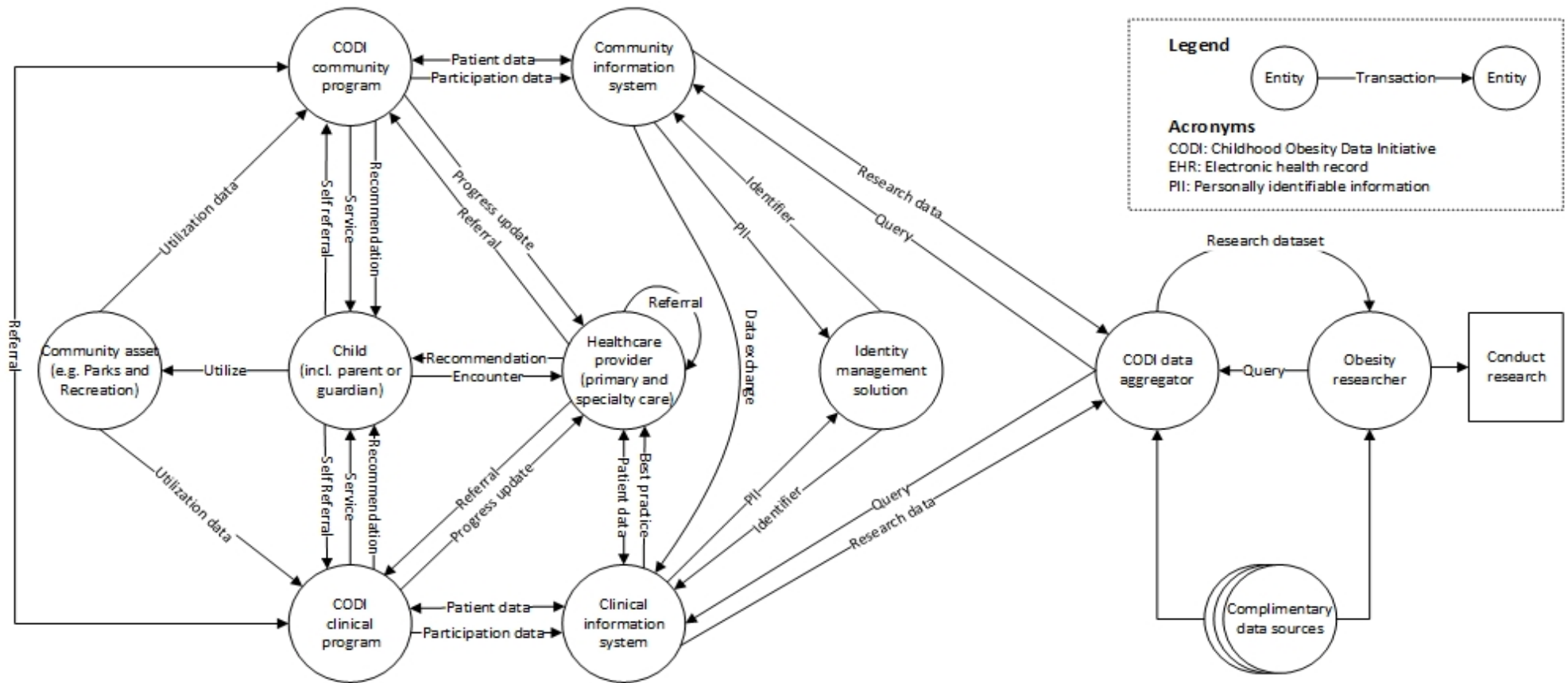
The project included key informant interviews that informed business process analysis and culminated in key findings and recommendations to the CODI stakeholders. Seventeen in-person and telephone key informant interviews were conducted with 25 subject matter experts between December 2018 and June 2019. Task flow diagrams, annotations, and requirements were drafted and shared with the CCWG for feedback and finalized between March and July 2019.

## Context diagram

The context diagram created for this initiative is a high-level graphical representation of the entities that play a role in the CODI project including stakeholders, applications, patients, and providers, as well as the information inputs and outputs into and out from each entity. The context diagram identifies the relevant entities who participate in some aspect of childhood obesity prevention and treatment and communicates the interactions and flow of data between entities. The context diagram does not define how the system operates internally nor how it looks from the point of view of the end user. Subsequent sections of this report will explore and define the tasks conducted by each of these entities within the lens of core CODI business processes.



Figure 1: Context diagram of CODI entities and transactions



## Mind map

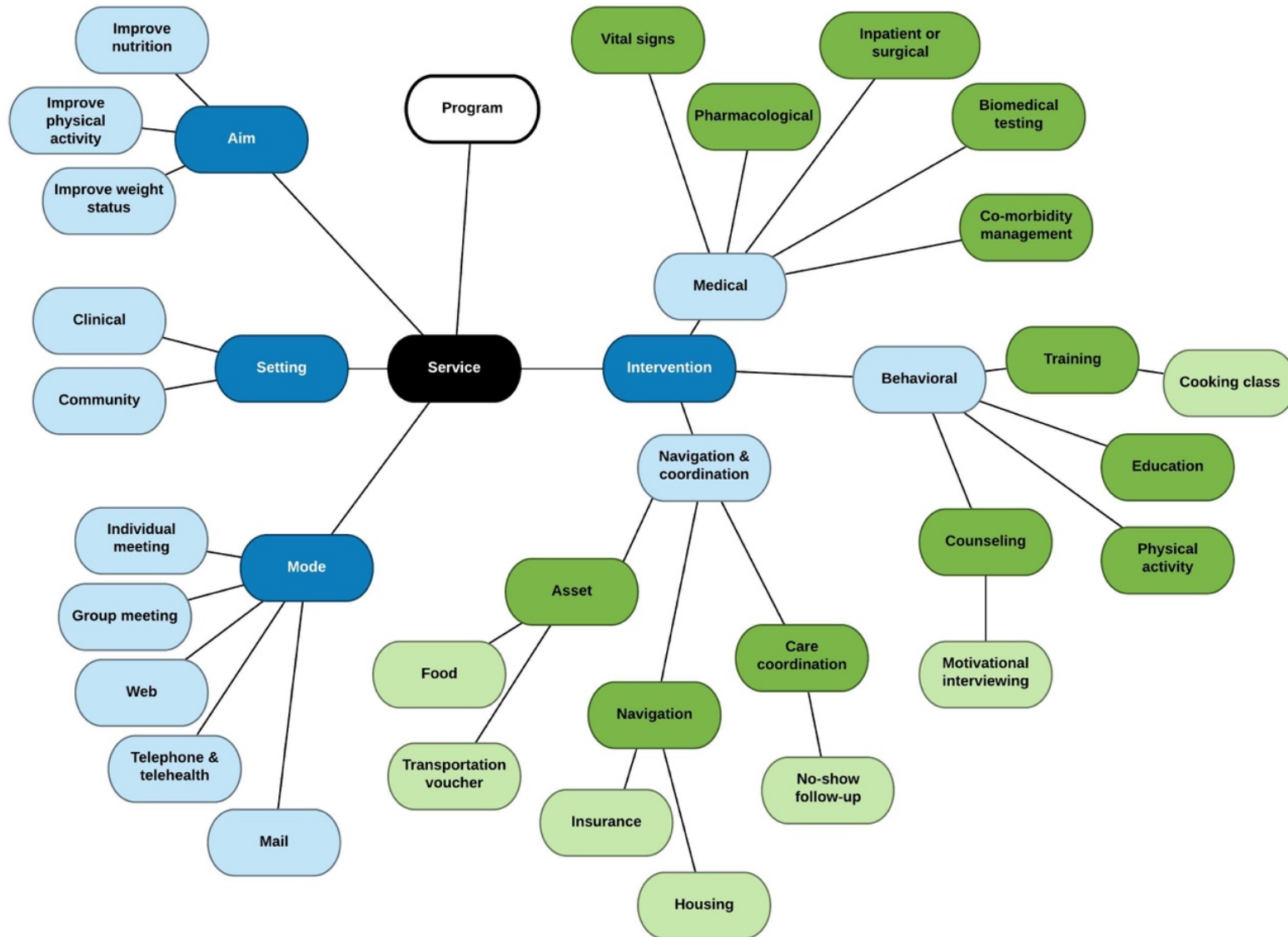
A mind map is a diagramming technique used to organize information. The need for a mind map in the CODI initiative emerged from project discussions seeking a framework to describe a broad continuum of programs and services occurring in Denver as part of childhood obesity prevention and treatment. Because community and clinical programs, and the providing organizations, can vary dramatically in duration, format, included services, eligibility, and intended outcome, CODI stakeholders were struggling to identify a common language and terminology. The mind map was created to provide a framework and a vocabulary to represent and compare the attributes of CODI programs and services.

The mind map classifies important relationships between clinical and community program concepts. The hierarchy depicted within the diagram demonstrates that a program can offer one or multiple services, and a service can consist of one or multiple interventions. Additionally, one or more interventions can be delivered during one visit, meeting, or session. As part of the CODI BPA, three main intervention types were identified and examined: 1) medical intervention, 2) behavioral intervention, and 3) navigation and coordination intervention. The concept of screening, or assessing a patient or participant for risk factors or eligibility, was a frequently reoccurring concept during CODI discussions. Stakeholders ultimately agreed that screening could be viewed as an activity that occurs within the interventions listed above and depicted in the mind map. Obesity-related services and interventions have attributes that are not depicted in the mind map diagram. These include eligibility, materials used, practitioner, and dosage.

## CODI business processes

The processes described in this report include 1) deliver medical intervention, 2) deliver behavioral intervention, 3) deliver navigation and coordination intervention, and 4) create research data. Descriptions are based on a business process map depicting the relationships between the processes, a matrix describing specific details of the processes, and task flow diagrams depicting the sequence of activities contained in each process. Detailed descriptions of each task within a business process are included in the appendices. For create research data, key attributes and an example task flow diagram are included.

Figure 2: Mind map of CODI clinical and community programs and services



**Table 1: Matrix of childhood obesity business processes**

Business process	Objective	Business rules	Entities	Tasks	Inputs	Outputs
Deliver medical intervention	Provide clinical care to patient to achieve and maintain patient health and wellness.	Health Insurance Portability and Accountability Act (HIPAA); American Academy of Pediatrics (AAP) recommendations; US Preventive Services Task Force (USPSTF) recommendations; interoperability standards (HL7, Meaningful Use, Alliance for Information and Referral Systems); and clinical and EHR workflows	Administrative staff, medical assistant, provider, patient	Register patient, collect patient information, collect patient vital signs, screen for lifestyle and risk factors, screen for social determinants, screen for and treat comorbidities, provide data, make recommendations, discuss intervention options, assess readiness for options, make referrals, complete visit, receive after-visit summary, record observations, conduct additional biomedical testing, receive biomedical test results, record observations, conduct follow up, schedule follow-up, bill for services, and receive bill.	Self-referral; referral from clinician	Referral (with patient data); recommendation; patient data
Deliver behavioral intervention	Provide training, education, physical activity, and counseling to patient that may improve weight status,	Health Insurance Portability and Accountability Act (HIPAA); American Academy of Pediatrics (AAP) recommendations; US Preventive Services Task Force (USPSTF) recommendations;	Administrative staff, behavioral interventionist, patient	Self-refer, process referral, register patient, collect patient information, screen for lifestyle and risk factors, screen for social determinants, provide data, provide counselling, provide education, deliver training, facilitate physical activity, set goals, complete visit, receive	Self-referral; referral from clinician; recommendation	Recommendation; patient/participant data

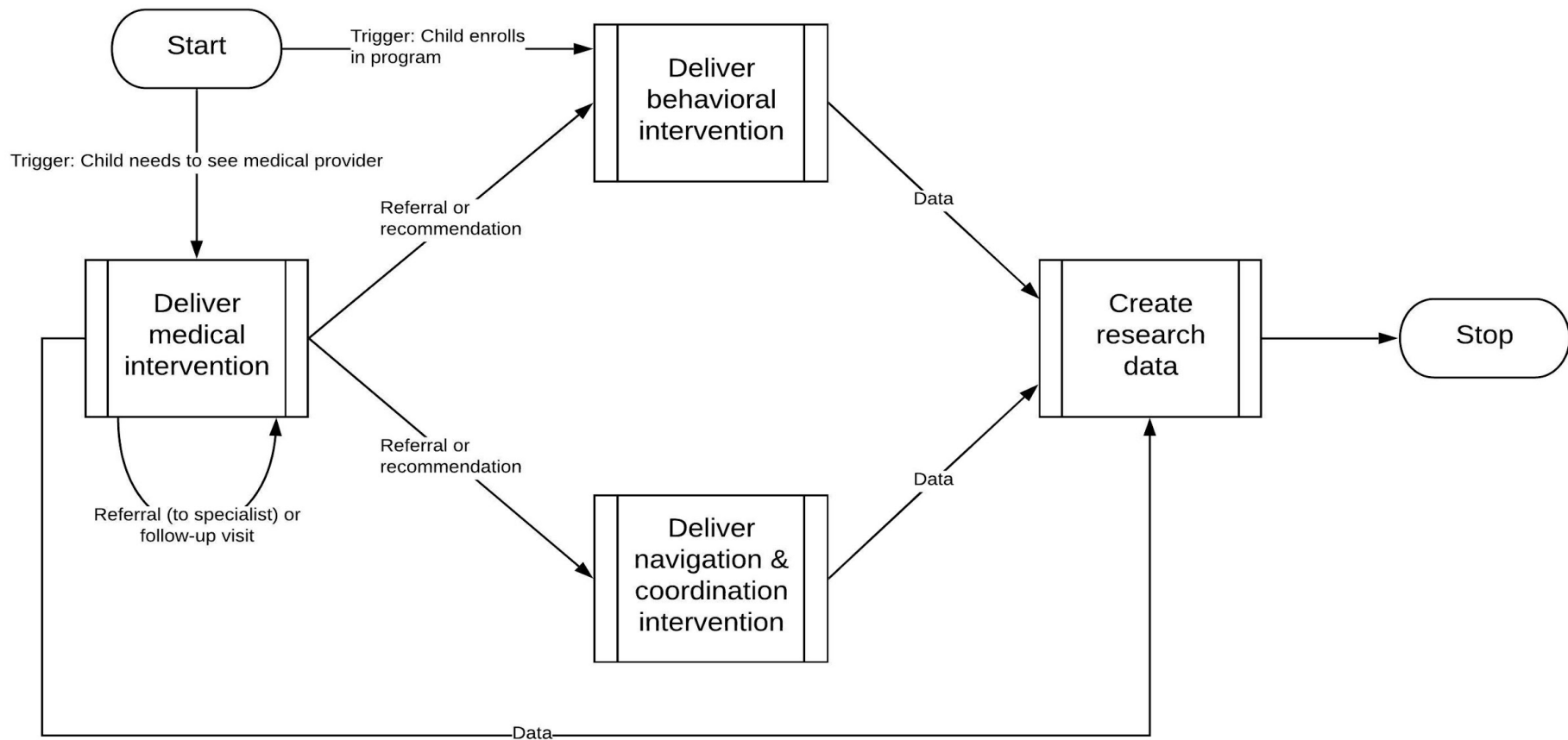
Business process	Objective	Business rules	Entities	Tasks	Inputs	Outputs
	nutrition, physical activity, or other health factors.	interoperability standards (HL7, Meaningful Use, Alliance for Information and Referral Systems); clinical and EHR workflows; and program curricula		after-visit summary, record observations, provide data, complete intervention, schedule follow-up, bill for services, and receive bill.		
Deliver navigation & coordination intervention	Connect patient to resources and interventions that may improve weight status, nutrition, physical activity, or other health factors.	Health Insurance Portability and Accountability Act (HIPAA); American Academy of Pediatrics (AAP) recommendations; US Preventive Services Task Force (USPSTF) recommendations; interoperability standards (HL7, Meaningful Use, Alliance for Information and Referral Systems); and eligibility criteria	Navigator, patient	Receive patient work list, self-refer, process referral, outreach patient, register patient, collect patient information, establish patient needs, deliver care coordination, discuss resource options, select resource for navigation, screen for eligibility, provide navigation, engage with resource, deliver asset, and follow up.	Self-referral; referral from clinician; recommendation	Recommendation; enrollment
Create research data <i>(based on Denver pilot)</i>	Build a dataset for a cohort of children that links clinical and	Health Insurance Portability and Accountability Act (HIPAA); data sharing agreements; business associates agreements;	Data user, data partner, data coordinating center	Submit project request; process project request; make participation decision; receive and compile participation responses; approve participants; create project-	Project request form; clinical data; community data	Executed agreements; project request; project dataset

Business process	Objective	Business rules	Entities	Tasks	Inputs	Outputs
	community data across organizations to form longitudinal records that support research activities.	IRB protocols; data models from Patient Centered Outcomes Research Network (PCORnet) and Colorado Health Observation Regional Data Service (CHORDS); data encryption procedures; and governance policies and procedures		specific DUA; create project-specific query(ies); receive, review and sign DUA; sign, execute, and disseminate DUA; receive executed DUA; respond to query(ies); aggregate query results; assemble longitudinal records; create project dataset; receive project dataset; and archive project dataset according to IRB specifications		

## Business process map

This diagram presents the business processes prioritized for analysis: deliver medical intervention, deliver behavioral intervention, delivery navigation and coordination intervention, deliver asset intervention, and create research data. For the purposes of illustration, the processes are organized to reflect a typical patient journey. However, no specific chronological sequence is prescribed. Each business process is composed of multiple tasks intended to produce outputs and achieve an outcome.

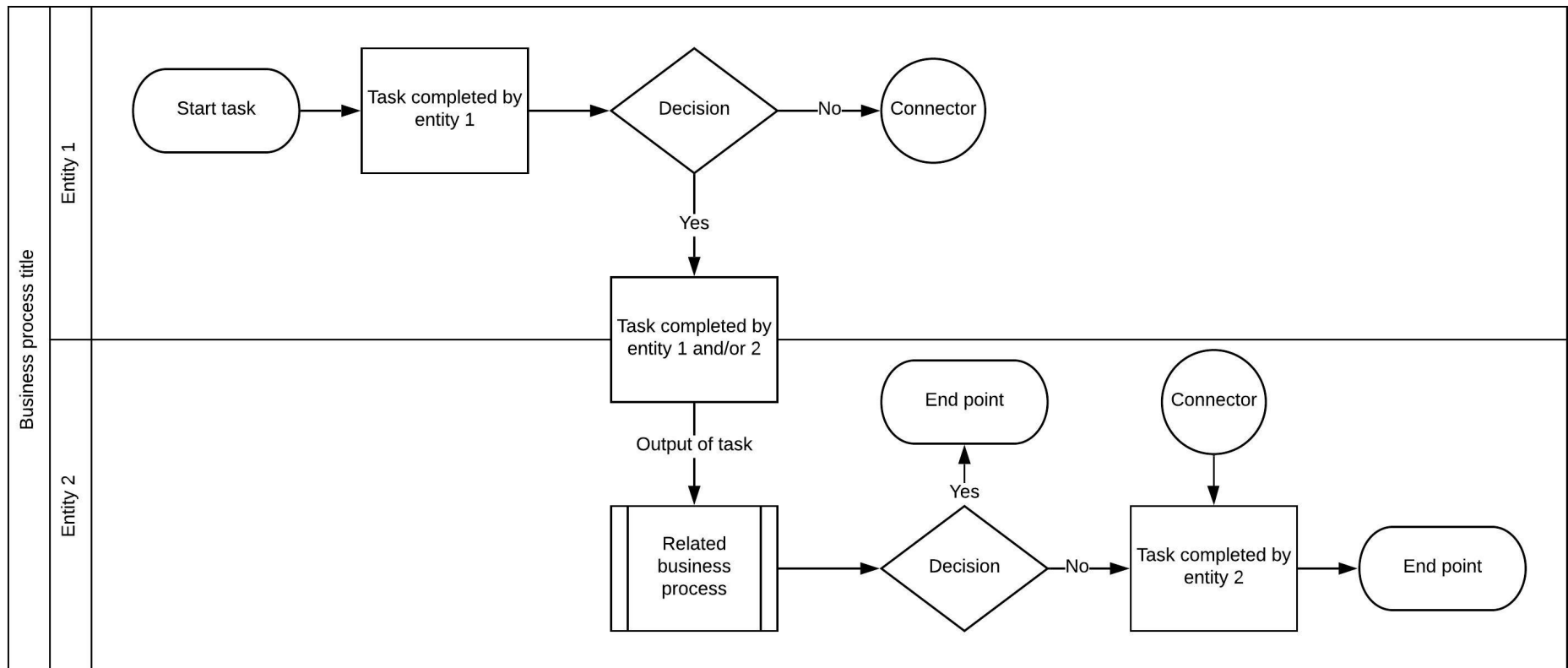
Figure 3: Map of CODI business processes



## Task flow diagrams

The task flow diagrams are included below, and detailed task descriptions created to document CODI business processes are included in the appendices. A reference task flow diagram is displayed in Figure 4 to provide orientation for the subsequent diagrams. Task flows and descriptions were informed by key informant interviews with primary and specialty care providers at Kaiser Permanente Colorado, Denver Health, Girls on the Run, Hunger Free Colorado, and Children’s Hospital Colorado.

Figure 4: Example task flow diagram







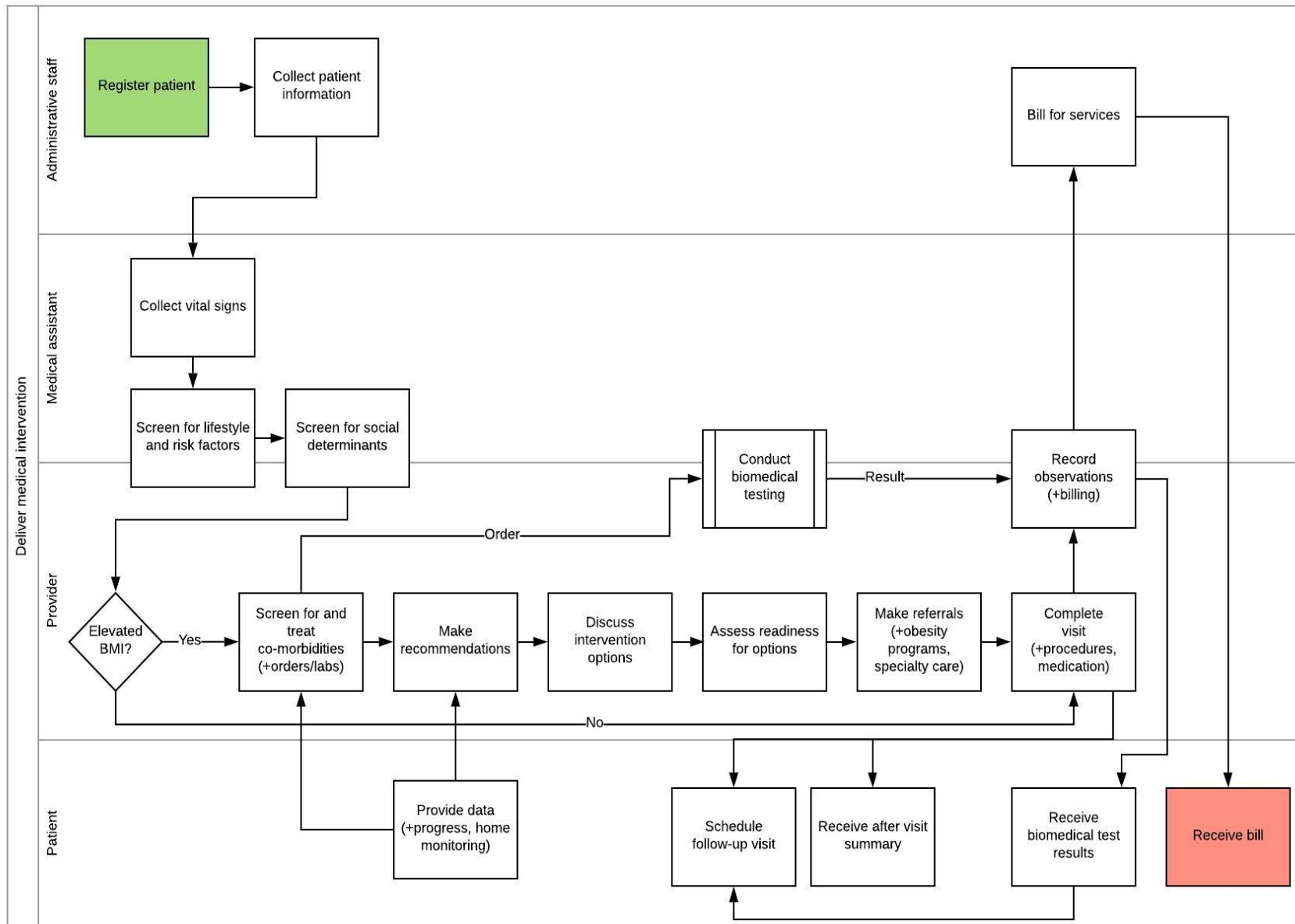
## **Deliver medical intervention**

“Deliver medical intervention” tasks include the following: register patient; collect patient information; collect patient vital signs; screen for lifestyle and risk factors; screen for social determinants; screen for and treat comorbidities; provide data; make recommendations; discuss intervention options; assess readiness for options; make referrals; complete visit; receive after-visit summary; record observations; conduct additional biomedical testing; receive biomedical test results; record observations; conduct follow-up; schedule follow-up visit; bill for services; and receive bill.

The participants acting to deliver medical interventions include:

- Administrative staff (or clerk, scheduler)
- Medical assistant (or healthcare partner, nurse)
- Provider (depending on medical intervention, could be a physician [primary care or specialist], advanced practice provider, or allied healthcare provider)
- Patient (including child and family or legal guardian)

Figure 5: Deliver medical intervention task flow diagram



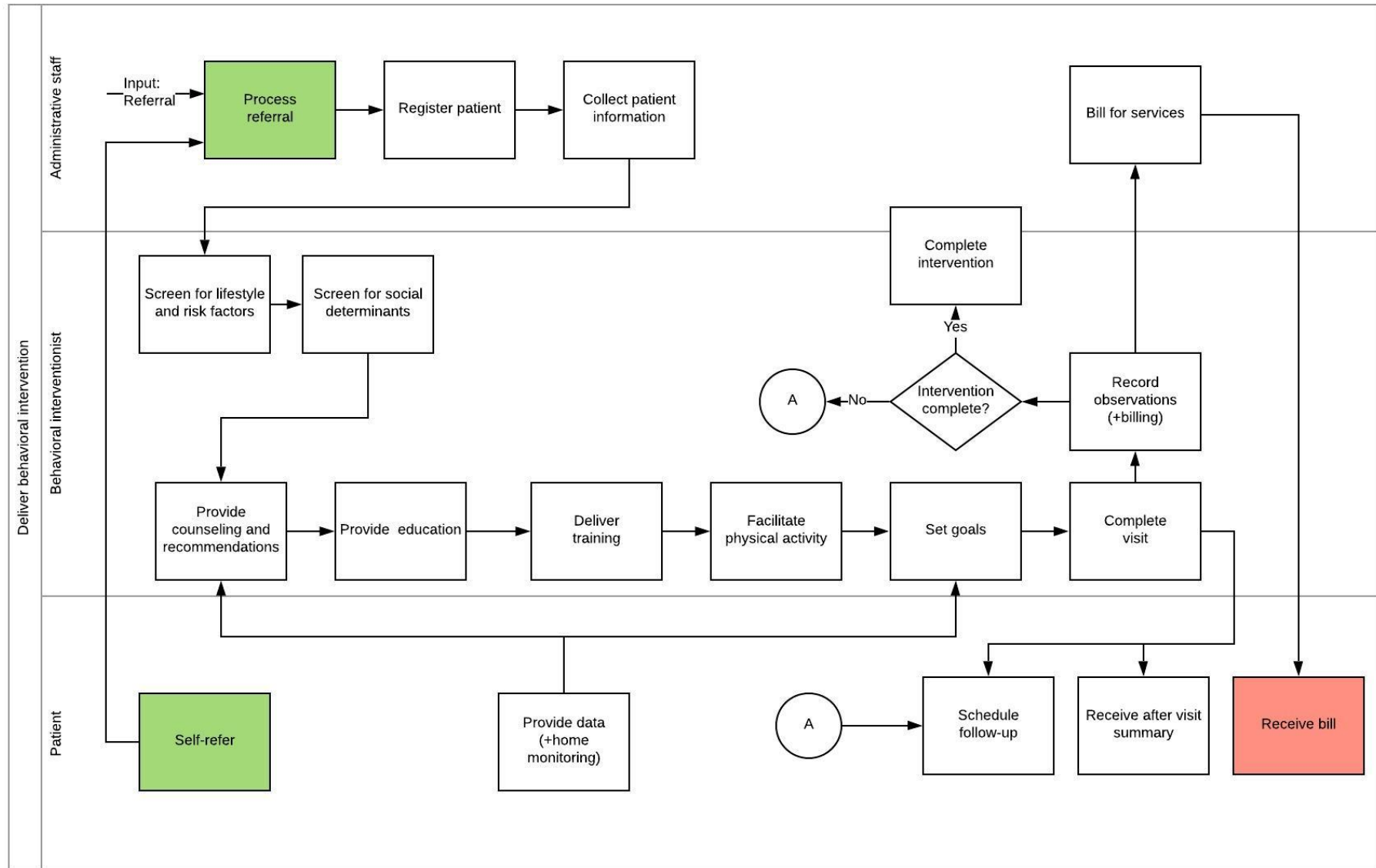
## **Deliver behavioral intervention**

This section describes the “deliver behavioral intervention” tasks: self-refer; process referral; register patient; collect patient information; screen for lifestyle and risk factors; screen for social determinants; provide counselling; provide education; deliver training; facilitate physical activity; provide patient data; set goals; complete visit; receive after-visit summary; record observations; complete intervention; schedule follow-up; bill for services; and receive bill.

Three participants who play a role in the delivery of behavioral interventions include:

- Administrative staff (or clerk, scheduler)
- Behavioral interventionist (depending on intervention, could be a pediatrician, family physician, specialty physician, psychologist, social worker, nurse, dietitian, program staff, or coach)
- Patient (programs may refer to participant instead of patient; patient includes child and family or guardian)

Figure 6: Deliver behavioral intervention task flow diagram



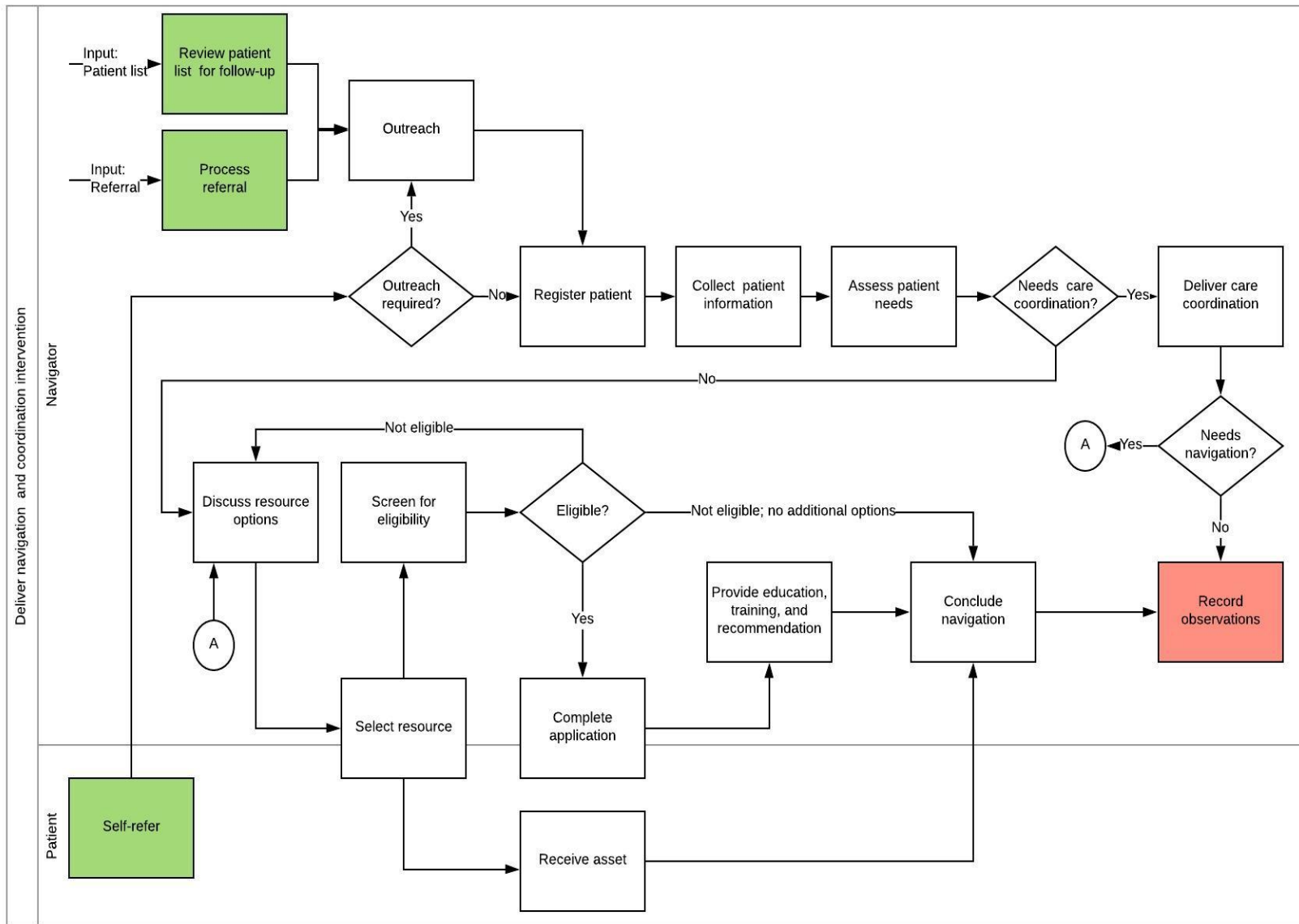
## **Deliver navigation and coordination intervention**

This section describes the “deliver navigation and coordination intervention” tasks: self-refer; process referral; review patient list for follow-up; outreach; register patient; collect patient information; deliver care coordination; discuss resource options; select resource; screen for eligibility; receive asset; complete application; provide education, training, and recommendation; conclude navigation; and record observations.

Two participants who play a role in the delivery of behavioral interventions include:

- Navigator (depending on intervention, could be a patient navigator, care coordination specialist, social worker, scheduler, or health coach)
- Patient (programs may refer to participant instead of patient; patient includes child and family or guardian)

Figure 7: Deliver navigation and coordination intervention task flow diagram



## Create research data

The “create research data” business process is composed of tasks that leverage governance processes and technical infrastructure. Of the CODI business processes, “create research data” is highly tailored to the context and stakeholders specific to each implementation. While requirements to create research data will vary within the context of an implementation, descriptions of key governance and technical functions are included below.

See Figure 8 for an example of a Create Research Data task flow diagram reflecting the flow of governance and technical tasks within the Denver CODI implementation. This diagram is one example of how the CODI required governance and technical functions can be implemented.

### Governance

In order to create research data, CODI must fulfill the following required governance functions:

- Governance body: A group of representative individuals must be identified and convened regularly to oversee the network and discuss related issues.
- Decision-making: A process must be established, codified, and implemented to guide the governance body’s decision-making including communication of decisions with all network stakeholders.
- Project request/intake: A process must be established to receive, review, and approve or deny requests of CODI data. If approved, this process includes triggering the technical work.
- Project tracking: A process or infrastructure must be implemented to track all projects from submission to completion.
- Agreements: An approach to creating the agreements needed for data exchange must be implemented. Agreements will vary depending on the types of data that can be produced and the general approach to data sharing. For example, stakeholders may pursue a reciprocal agreement that limits the need for subsequent data use agreements.
- Expectations of data contributors: The expectations of participation and data contribution must be defined and agreed to by all participating data contributors such that the network can function and provide data efficiently.
- Expectations of data users: The expectations of data users must be defined and agreed to by all participating data contributors including processes for addressing violations. Data contributors need to be confident that the network will function and provide data efficiently and securely.

### Technical

In order to create research data, CODI must fulfill the following technical functions:

- Data model implementation: CODI data contributors must create a CODI database(s), which reflects the exact CODI data model specifications (e.g., structure and format), and populate it with data from an information system such as an EHR.
- Identity management: CODI has selected privacy-preserving record linkage (PPRL) as the approach to linking patients across organizations. PPRL linkage refers to a variety of techniques that allow for the linking of records between organizations while at the same time preserving

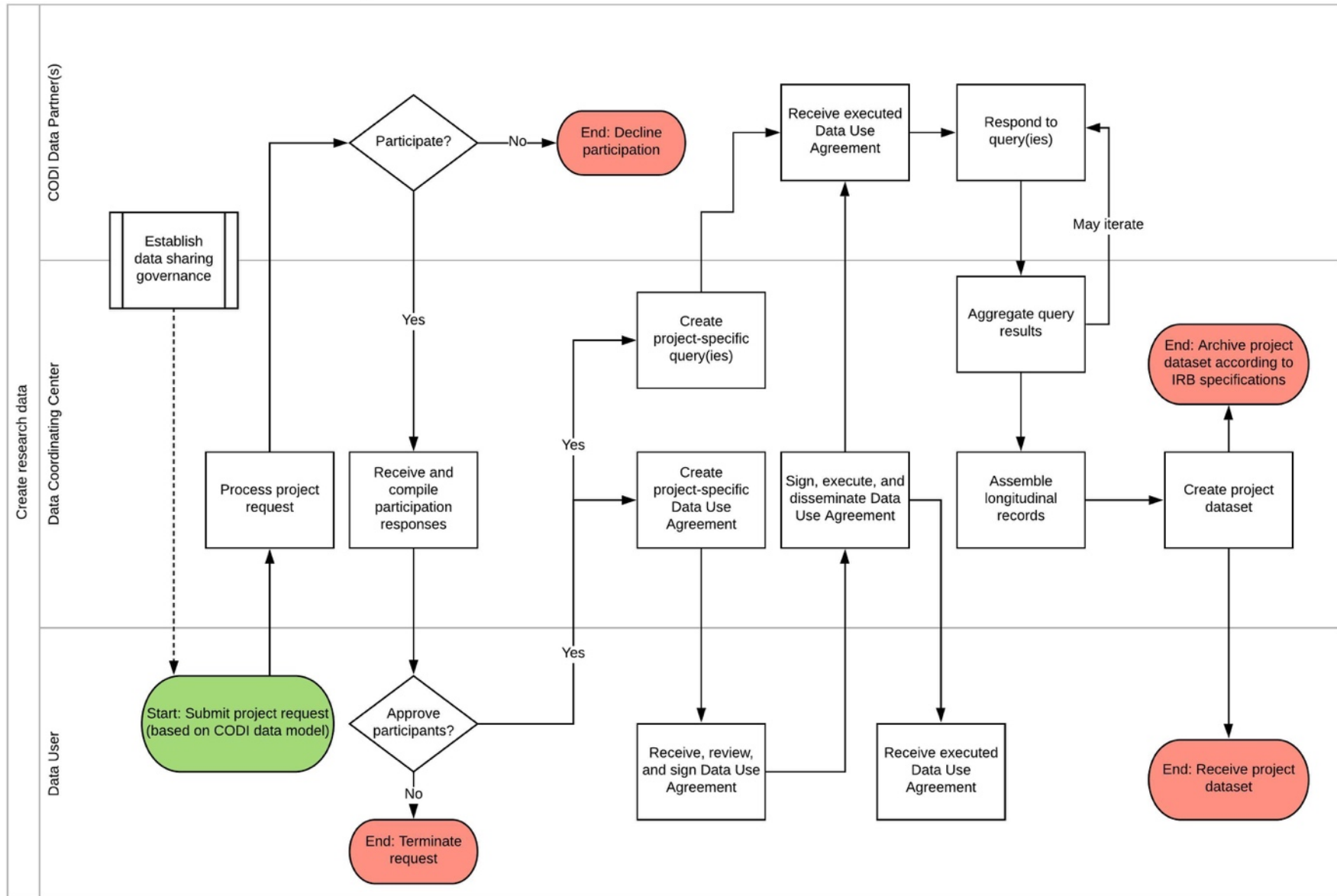


the privacy of the information in the records. PPRL relies on complex encoding of the patient's data, called hashing, that makes personally identified information (PII) unrecognizable. Hashing prevents access to an individual's identity but allows records to be linked across organizations with an identifier that has been encoded. Links can be established between records without disclosing PII outside of the originating organization. A CODI partner organization must implement the necessary infrastructure to compare hashes and generate a network-wide identifier. CODI data contributors must assemble hashes from the needed identifiers and store the network-wide identifier that they receive for each of their patients.

- Query architecture: A CODI partner organization must implement the technical architecture and processes to create customized research queries, distribute queries to data partners, compile results into one longitudinal record for each patient, reconcile discrepant information, and deliver final dataset to data user.

Detailed technical recommendations and specifications were developed by the MITRE Corporation and are available upon request from [CODI@cdc.gov](mailto:CODI@cdc.gov).

Figure 8: Example task flow diagram to create research data



## Functional requirements

Functional requirements were documented for three CODI business processes and are included in Appendix 4. Each of the 303 functional requirements are nested within a business process and a task. The purpose of functional requirements is to identify functions that an information system(s) should or could fulfill, in this case to support CODI business processes. Requirements are intended to represent how an information system(s) can support the providers, community partners, and patients completing the tasks comprising each business process. Some requirements reflect the current state of information systems while others are aspirational. These requirements are a tool to increase the likelihood that the CODI infrastructure is populated with high quality, well-understood data supporting the CODI research questions. Materials from BPA and programmatic environmental scan key informant interviews were used to identify and validate requirements. Requirements are categorized as “the system should” and “the system could” to differentiate near-term future state and long-term future state. Requirements that the system “should” satisfy could be implemented now, while requirements that the system “could” satisfy may be more long-term future state.

CODI requirements include a number of clinical decision support functions, both visible to the provider and embedded in a system. According to the Office of the National Coordinator for Health Information Technology (ONC), clinical decision support (CDS) provides clinicians, staff, patients, or other individuals with knowledge and person-specific information, intelligently filtered or presented at appropriate times, to enhance health and health care. CDS encompasses a variety of tools to enhance decision-making in the clinical workflow. These tools include computerized alerts and reminders to care providers and patients; clinical guidelines; condition-specific order sets; focused patient data reports and summaries; documentation templates; diagnostic support; and contextually relevant reference information, among other tools. Each requirement that is likely to include a CDS component is marked and could be implemented in an information system using configurable business rules. The information system will audit the deployment and use of each CDS requirement by documenting when and for whom each CDS function is invoked in addition to what resulted from the CDS function.

CODI requirements are cross-walked to three research questions prioritized by CODI partners:

1. When is obesity screening (measuring BMI) occurring? In what settings? What actions does it trigger, including comorbidity screening?
2. What “dose” and characteristics of weight management interventions are associated with effectiveness?
3. What is the cost and cost effectiveness of weight management intervention?

A requirement is marked with an X as associated with the research question if it's likely that the system's ability to perform the function would impact the ability to generate data related to that research question. Requirements are mapped to the data model developed by CODI partners. Each requirement is populated with the data model table or tables that the requirement would or could impact. Requirements with no value in the data model column represent a function that could not be represented in the current CODI data model.

## Key findings

Key informant interviews identified a high level of variation in clinical workflow that impact what patient data gets collected, recorded, and stored in an information system. Because variation existed in every task in each of the business processes, it was difficult for any information system to efficiently capture what occurred and what was observed. Stakeholders reported that a large amount of information is recorded in unstructured notes fields, and a modest amount of information is captured on paper and not within any electronic information system. Misalignment between what providers, navigators, and interventionists are doing and what the information system can easily record may have contributed to a dearth of structured data about childhood obesity treatment. Stakeholders' frustration related to childhood obesity workflow and EHR functionality has led to exploration and implementation of custom EHR functionality that compounds inconsistency in data capture and the feasibility of secondary clinical data use for research.

Clinical entities providing similar childhood obesity focused services (e.g., weight management clinics) reported similar approaches and similar challenges. These clinics use a patient-centered and team-based care approach. Providers do not use a formalized or protocol-driven care plan; instead all care is customized to the patient's needs, interests, and specific challenges. Clinics engage patients for as long as they remain interested in care such that no natural or structured intervention end point exists. Clinics struggle with a high rate of appointment no-shows and attrition. Clinics do a majority of documentation in provider notes but focus on strong coordination and communication with a patient's primary care provider.

Community organizations described using information systems, workflows, and user interfaces highly customized to their services and interventions. Unlike in clinical organizations, workflow within community programs is consistently delivered, systematic collected, and consistently documented. Strong alignment between use cases, information system, and workflow reflects a narrower scope of practice, lower variation and volume of services, and lesser degree of complexity compared to clinical practice.

In the interviews, CODI stakeholders were highly motivated to build strong partnerships between clinical and community organization and were focused on improving interoperability and data exchange between information systems. Clinical stakeholders saw community organizations as a valuable resource for their patients and aspire to use a patient's and provider's time in clinic to accomplish the tasks that can only occur in a clinical setting. Community organizations saw clinical providers as a rich source of referrals and have identified improving data exchange as a way to increase the reach and impact of their services. Still, major challenges in data exchange persist between these organizations. Fax referrals are very much in use, and no examples of a direct interface between an EHR and a community organization's information system were identified.

Childhood obesity care and treatment involve a number of patient activities occurring outside of the context of a traditional clinical encounter including texting, phone calls, and in-person exchanges with non-provider staff. Because a traditional clinical encounter provides structure for documentation in the EHR, extra-encounter activities are difficult to accurately record and track. Additionally, expectations for documentation of extra-encounter activities are unclear to those carrying out these tasks, especially navigation and care coordination.

While the CODI framework differentiates medical and behavioral interventions, key informant interviews did not uncover a distinct separation between medical and behavioral interventions. For the purposes of comparison and description, these business processes were described separately in this document. However, a number of non-medical interventions are delivered in clinical settings and are inextricably linked to medical interventions.

## Future work

The following recommendations for future work can advance childhood obesity research.

Health systems can continue to improve documentation and EHR data quality by training providers in EHR best practices, implementing audit tools to identify missing or erroneous information and implement suggested fixes, engaging in quality improvement processes to align workflow with the information system, incorporating data and information standards into EHR functionality, and developing analytic resources to extract structured data from unstructured notes. Transitioning existing telephone, fax, and paper referrals to electronic referrals from the EHR can improve tracking of patient services across health systems and community organizations.

Key informants described many examples of communication with patients not captured in an information system. Patient portals are a relatively new way for patients and providers to communicate and are a potential source of health data for research. Now that almost all EHR products offer a patient portal platform, health systems can prioritize driving patients to use patient portals in lieu of telephone calls and direct emails to the provider, when appropriate.

Sustained use of the CODI data model will be improved through alignment with leading efforts to reach a standard patient data or health information model as well as a standard approach to identity management and patient record linkage. Translation of the CODI data model to these models or methodologies may be necessary in the future.

## Conclusion

This examination of childhood obesity treatment showed dramatic variation and complexity within and between the clinical care and community programs that support children and families struggling with obesity and weight. For the most part, clinical care and community programs have adopted a patient-centered or family-centered approach where the services and data collection are highly customized to the patient or family needs. This approach has been determined to be the most efficient and effective for patients and highly preferred by providers.

From an informatics perspective, a patient-centered approach is a challenge and an opportunity. Nonstandard, unstructured documentation practices are obstacles to the CODI goal of creating a common data model and infrastructure to support research and surveillance for childhood obesity. Information systems like EHRs do not excel at capturing nonstandard customized processes and workflows, and the secondary use of EHR data to characterize and measure such processes is limited. This examination identified a high usage of unstructured notes to document the services provided and organization-specific EHR customization to support this work. Within some processes consistently

occurring across organizations, such as screening for physical activity and social determinants of health, variation in screening tools and data collection pose an added layer of difficulty.

The creation and dissemination of a common data model and functional requirements for childhood obesity research and surveillance will be a useful tool and can serve as a guidepost for community and clinical systems to grow toward. Stakeholder engagement revealed strong interest and enthusiasm for harmonizing clinical and community patient data for research and an awareness that standardization of data collection and process may be needed to close the gaps between research priorities and existing data stores. Many stakeholders had already begun to think through implementing greater structure in these data and are taking steps to align processes between organizations. While the feasibility of reaching one common systematic sequence of events and data capture for childhood obesity is uncertain, important progress to optimize existing information technology has been made.

## Appendix 1: Deliver medical intervention detailed task description

Detailed descriptions of each task are included below.

### Register patient

A patient is registered for a clinical visit by an administrative staff member, based on the visit type that the patient scheduled. Visit types in primary care settings may include a WCC, a follow-up visit, or a sick visit. WCC are typically scheduled for a longer duration compared to sick and follow-up visits (roughly 40 minutes vs. 20 minutes). This task includes creating a visit or retrieving a scheduled visit inside the EHR to enter and store information collected from the patient and observed by the provider. For a new patient, this process includes creating an MRN. The medical record for an existing patient is retrieved in the EHR by searching by name, date of birth, MRN, member identification number, or social security number; EHRs include functionality to identify and consolidate duplicate patient medical records.

### Collect patient information

A patient's demographic, insurance, and contact information is collected by administrative staff during visit scheduling and/or during registration. If the patient information is already populated in the patient record, staff reviews this information with the patient and asks them to confirm its accuracy. One or more values for demographic, insurance, and contact information may be provided by the patient and stored by the information system. Collected information may also include a chief complaint, which is the reason for the visit. For follow-up or sick visits, the chief complaint may be specific such as weight check, hypertension, or diabetes. The chief complaint may be collected by a scheduler over the phone or entered by the MA when the patient is being roomed.

### Collect vital signs

Collection of vitals may include height, weight, blood pressure, temperature, pulse, or respiration rate. Some vitals are collected during the rooming process, and others are collected in the patient room. A patient height/length, weight, temperature, and blood pressure are generally collected by an MA during the rooming process. Vital measures are often recorded on paper and then entered into the EHR. BMI and BMI percentile are calculated by the EHR and populated in the patient's record. The EHR may check for biologically implausible values (BIV) and suggest additional actions. The EHR may check that the height and weight have been entered and alert the MA or provider if one or both values are missing.

### Screen for lifestyle and risk factors

A patient is screened for lifestyle factors by the medical assistant or provider including dietary habits, fruit and vegetable consumption, screen time, physical activity, sugary drink consumptions, hours of sleep, breakfast and dinner habits, and family medical history. Risk factor screening may also include collecting data related to behavioral health issues or conditions such as depression, anxiety, or ADHD. The wording used for screening and which factors are screened for varies by organization, by visit type, and by care setting. A WCC generally includes more screening than sick visits or follow-up visits. For weight-related specialty care and weight management clinics, more detailed dietary and physical activity information may be gathered and documented. Responses may be collected on paper or asked verbally.

Responses may be recorded directly into the patient’s encounter record, captured in provider notes, or not recorded at all in the EHR.

### Screen for social determinants of health

A patient is screened for social determinants of health (SDOH) by a provider or other clinical staff. When, where, and how SDOH screening occurs and is recorded varies by care setting and visit type, within and between organizations. A patient may be screened on every visit, on every WCC, or at a time-driven or alternative frequency using various screening tools. Screening questions may be home grown or based on a validated instrument. Screening instruments may include a combination of home grown and validated questions and may be customized to meet clinic needs or address a selected patient population. Health systems may have implemented system-wide SDOH screening as well as pediatric focused SDOH screening tools. Depending on the patient’s age, the parent or the patient may be screened; 12 or 13 years is a common threshold where the patient begins completing the screening questionnaire. Screening efforts in a pilot stage are using paper screeners while other more mature SDOH screening efforts may be documented in the EHR in unstructured or structured fields.

### Elevated BMI?

This is both a decision point and the obesity screening task completed by a provider which includes reviewing BMI, BMI percentile, and growth trends as well as discussing the height, weight, and BMI values and growth chart with patient. This task includes an explanation of what BMI is, what it means, what percentiles are recommended, and why BMI is important. Each provider’s approach may vary. For sick or unrelated follow-up visits, an elevated BMI may not result in a focused conversation with the patient. Providers may begin an obesity screening conversation by asking about behaviors and healthy habits and then move into the discussion about BMI. Many providers use “too much weight for their health” language instead of the term “obesity.” Providers do not document obesity in a consistent way. No recommended codes exist such that providers may select a general or very specific diagnosis code. Weight-related documentation and coding is more likely to occur in specialty care settings where the visit is focused specifically on weight.

### Screen for and treat comorbidities

A provider screens patients with an elevated BMI for physical, mental, and behavioral comorbid conditions that contribute to and impact weight. Comorbidities include but are not limited to hypertension, diabetes, hyperlipidemia, non-alcoholic fatty liver disease (NAFLD), obstructive sleep apnea, polycystic ovarian syndrome, depression, anxiety, ADHD, and asthma. For patients with an elevated BMI, providers prioritize screening for hypertension, diabetes, hyperlipidemia, and non-alcoholic fatty liver disease. This task includes discussing the condition and rationale for screening with the patient, ordering a laboratory test or procedure to collect information needed to make a diagnosis, and documenting screening in the EHR. When lab tests or procedures have been completed, screening includes reviewing, discussing, and documenting results with the patient and making a diagnosis. Hypertension screening relies on blood pressure levels, which are collected as part of vital signs. In specialty care, some screening has occurred prior to the visit and the visit may result in additional or repeated screening, depending on the condition.



Comorbidities screening is also informed by the patient's symptoms and family history (when available). A provider asks questions about symptomatology as a part of the comorbidity screening conversation. Depending on the condition, patients may be screened for comorbidities one time or multiple times. Depending on a number of factors, primary care providers may elect to screen, diagnose, treat, and manage comorbid conditions as a part of routine pediatric care or refer a patient to a specialist for screening.

#### Provide data

A patient may collect and track data about their own behaviors, weight, BMI, or other weight-related information. Collection may occur on paper or through mobile applications like MyFitnessPal. That information may be shared with the provider to complement observations and data collected in the clinical setting. A provider may record all, some, or none of this data into the provider notes in the EHR. Key informants did not identify any direct interfaces between the EHR and external information systems for patient reported data. The use of patient data is more common in weight-focused specialty care compared to primary care.

#### Make recommendations

A provider shares recommendations for behavior change and other medical interventions with the patient. Recommendations are often based on clinical guidelines, best practices, or institutional policies. Recommendations may include initiating and continuing the use of pharmacotherapy to manage a comorbidity related to weight.

#### Discuss intervention options

A provider shares recommendations for medical interventions with the patient and discusses appropriateness, readiness, and feasibility. Medical interventions may include but are not limited to pharmacotherapy, bariatric surgery, specialty care for comorbidity screening or treatment, and specialty care for nutrition or exercise support. Non-medical interventions include (but are not limited to) behavioral interventions such as community-based weight management programs, assets such as community resources (e.g., recreation centers), and navigation or coordination services that connect or enroll patients with programs. Discussing intervention options may include providing the patient with a detailed description of each intervention including rationale, expectations regarding where the intervention occurs, frequency, duration, intensity, and expected outcome. Recommendations for interventions are based on the child's eligibility, available services, cost, patient preferences, clinical guidelines, best practices, and institutional policies. Discussing additional medical interventions is also a mechanism to help the patient understand the severity of their condition.

#### Assess readiness for options

A provider assesses a patient's readiness for each medical intervention with the goal of only making referrals for medical interventions that are appropriate and likely to be acted upon. A child's BMI or home situation may or may not make them a suitable candidate for a medical intervention. For example, LMP is not appropriate for children less than 2 or over 18 years of age and may not be appropriate for children living outside of Colorado. The interventions discussed and the outcome of a readiness conversation may be documented in provider visit notes and may inform what referrals are created and

sent. Providers may formalize this discussion by crafting and documenting a care plan for the patient. Details about what medical interventions are agreed upon may also be documented in the after-visit summary.

### Make referrals

Referrals refer to the exchange of structured data to refer a patient for additional interventions using an information system (provider recommendations are described in the “make recommendations” section). A provider creates electronic referral orders within the EHR system for additional medical interventions that need to occur outside of the primary care setting. If, what, and when a specialist referral is made can vary based on the provider’s capacity and experience to treat obesity without the support of a specialist. This task includes an informal or formal consent for referrals.

Referrals are created during the visit, immediately following the visit (as part of completing visit documentation), or outside of the visit. To initiate a referral, the provider searches for the referral by the specific provider, type of specialty, specific clinic, or a clinical program; creates the referral; and then signs the referral. Referrals that occur outside the visit are a result of additional information like lab test results that trigger the need for more medical intervention. While providers initiate a referral, completion of a referral may also involve a referral coordinator or patient navigator who may coordinate and schedule the patient at the conclusion of the provider visit or over the phone after the visit. Referral coordinators provide more information about the referral and may schedule the referral appointment.

### Complete visit

This task is completed by a provider and includes all other aspects of the visit such as the physical exam, additional screening, immunizations, and management of other conditions unrelated to weight. “Complete visit” includes providing any needed pharmacotherapy (e.g., prescriptions) to the patient. Completing the visit may also include providing printed educational materials to the patient, scheduling referrals with subspecialist or community programs, and scheduling follow-up appointments, lab tests, or additional outpatient procedures related to the encounter. All visits conclude with creating and printing an after-visit summary.

### Receive after-visit summary

Before leaving the clinic, a family receives an after-visit summary which may include details regarding what was discussed during the visit, what goals the provider and patient agreed to work on together, which lab tests were ordered, and when the patient should be seen again. The after-visit summary is printed and handed to the patient.

### Schedule follow-up visit

Based on provider recommendations, a patient will schedule a follow-up visit with a primary care or specialty care provider. This task may occur in person or over the phone. Patients may schedule follow-up visit(s) at the conclusion of the provider visit with an administrative staff member within the clinic where they are being seen. If not in person, the patient may schedule follow-up over the phone with a scheduler or appointment center. When follow-up needs change based on comorbidity screening results, a provider or medical assistant may notify the patient that more follow-up is needed.

### Conduct biomedical testing

A primary care and specialty provider may order and conduct biomedical testing to screen for or monitor obesity or comorbid conditions. Biomedical testing for weight-related comorbidities is primarily laboratory tests but also includes procedures such as an echocardiogram or indirect calorimetry test. All biomedical testing is triggered by an EHR order initiated by a provider. For laboratory testing, the provider will order the lab test during the visit and direct the patient to go directly to the lab following the conclusion of the medical visit for sample collection. Some lab tests may require the patient to return to the lab on a different day, in which case they would schedule the subsequent lab test during the visit. For procedures, the patient would schedule the procedure or follow-up visit at the conclusion of their visit. If not scheduled, the order would trigger a scheduler to reach out to the patient on the telephone and schedule biomedical testing.

### Receive biomedical test results

Test results are populated in the patient's health record and the patient is notified by a provider or medical assistant. Most test results are returned outside of a medical visit, so the patient is notified over the phone, through a patient portal, or with a letter. Patients are more likely to be notified more immediately when test results show that a disease is present.

### Record observations

A provider records an array of observations and information about a patient in the EHR before they complete and sign the encounter. A provider often does not complete visit documentation during the visit; instead, a provider may wait for lab results to come back before completing the documentation within the seven days following the visit. Documentation practices and standardization vary between and within health systems. Some use templated notes customized for a clinic or visit type to organize information while others use mostly unstructured notes. Documentation serves many purposes including describing what happened during the visit and why, but also as a reference to be used on a subsequent visit. A provider's documentation may include what was discussed during the visit, what questions the patient had, what topics were addressed, what issues or topics were not addressed or require follow-up, what tests were ordered, what interventions or programs were discussed, which referrals were made, and when the patient should be seen again. Visit notes may include care provided by multiple providers. For providers whose services cannot be billed (e.g., health coach, social worker, or patient navigator), those individuals document the care that they provided inside the billing provider's patient visit notes.

Recording observations may include documenting diagnosis of obesity, overweight, or weight-related comorbidities. How comorbidity diagnoses are documented in the EHR can vary within and between health systems. Lab results are delivered to the provider through an inbox message. The provider navigates to and reviews the results. Depending on lab results, the provider may make a diagnosis of a comorbidity by adding a diagnosis code to the patient's problem list and assigning that same diagnosis code to the preceding visit. For positive results, the provider may document the diagnosis in the problem list and may call the patient to notify them of the lab results. In the case that the diagnosis code is present already on the problem list, the provider may confirm the presence of the diagnosis code or amend the diagnosis code for accuracy. If the result is negative, the provider may document

that the comorbidity had been ruled out in the provider note. If the provider calls the patient to notify them of the results, this is documented in the provider visit notes.

#### Conduct follow-up

A provider may conduct additional follow-up activities outside of the in-person encounter including comorbidity screening, making recommendations and referrals, or discussing other programs. These actions may be driven by additional information received from lab test results. Follow-up includes telephone and text reminders about an upcoming visit.

#### Bill for services

A provider bills for services directly. Outpatient services provided by health coaches, dietitians, and social workers are typically not billable. Billing is considered part of completing the encounter documentation and includes selecting the diagnosis codes to apply to the encounter based on what occurred. This task includes reviewing EHR documentation and coding the encounter based on what procedures and services the patient received and what conditions were assessed or managed during the visit. WCC have a diagnosis code, and bills from WCC will include that code.

#### Receive bill

A patient receives a bill for medical intervention services in the 30-90 days following the care episode. For a patient with insurance that covered all medical intervention services, a patient will receive an explanation of benefits (EOB) that defines the services, charges, and what insurance paid. An EOB is not a bill, but may identify remaining out of pocket costs that the patient will be billed for.

## Appendix 2: Deliver behavioral intervention detailed task descriptions

Detailed descriptions of each task are included below.

### Self-refer

A patient may self-refer to a program or clinic for behavioral interventions, though the option to self-refer is not always available. A self-referral is a trigger for enrollment in a program or initiation of care with a behavioral interventionist such as a referral to a psychologist. Self-referrals occur for an initial clinic visit or program enrollment but not for attendance at subsequent program sessions or clinic visits. A self-referral may be based on a recommendation from a provider, teacher, school nurse, friend or family member, or other individual. Self-referral can occur via a telephone call, online web registration portal, or email.

### Process referral

Electronic referrals are received through an information system (often an EHR) in a generic program inbox. A behavioral interventionist reviews the referral for appropriateness. A referral is a trigger for enrollment in a program or initiation of care in a clinic or with a behavioral interventionist within a clinic such as a referral to the DH MEND program. Referrals occur for an initial clinic visit or program enrollment but not for attendance at subsequent program sessions or clinic visits. For example, once referred to HLC, patients do not need additional referrals to HLC to continue to be seen. Based on program structure and inclusion criteria, some referrals may not be appropriate for the program or the patient; referrals may be cancelled or redirected to another program or provider. Processing the referral may include orienting a patient to the program or intervention requirements, conducting any formal enrollment activities, and scheduling patient for an initial visit. Orientation may occur before enrollment or after enrollment, depending on the program structure.

### Register patient

A patient is registered to participate in a program, at a program session, or for clinical visit to receive one or more behavioral intervention(s). For programs, behavioral intervention(s) are dictated by the program curriculum, specific to the session number. Patient registration may include recording a patient's attendance at a specific session. For a clinical visit, which behavioral intervention the patient will receive depends on a number of factors and is not defined in the registration process. For clinical visits where only behavioral intervention(s) are provided (e.g., visit with psychologist or exercise physiologist), a patient may be registered using the clinical EHR.

### Collect patient information

A patient's information is collected and stored in an information system. Because clinics require more detailed patient information for billing and operational purposes, behavioral interventions taking place during clinic visits collect and store more detailed patient information.

### Screen for lifestyle and risk factors

A patient is screened for lifestyle and risk factors to inform the delivery of a behavioral intervention. The purpose of lifestyle and risk factor screening is to both identify issues that the behavioral intervention

could address and to build patient awareness about their own problematic lifestyle and risk factors. A large amount of individual (1:1) screening is done to inform medical interventions (see deliver medical intervention annotation document). Additional screening related to behavioral interventions may include screening for mental health conditions such as ADHD, depression, anxiety, or autism spectrum disorder. Screening may also include detailed nutrition or physical activity screening. For example, a patient may be screened for healthy or unhealthy eating habits with a focus on specific eating behaviors and mealtime traditions. Screening may use a validated instrument such as the PHQ-9 or 5-2-1-0, or use a homegrown screening instrument. Screening results may be entered into structured EHR fields, unstructured notes, or not recorded in the EHR at all.

#### Screen for social determinants of health

A patient is screened for SDOH to inform the delivery of a behavioral intervention including homelessness and housing, food insecurity, transportation, safety and violence, and citizenship issues. The purpose of SDOH screening is to both identify barriers to success and treatment, and to identify areas that contributed to weight gain. SDOH screen may occur in conjunction with screening for lifestyle and risk factors or as a separate task.

#### Provide counseling and recommendations

A patient receives counseling and recommendations on an individual basis or in a group setting. When counseling is provided with medical interventions during a clinical visit, providers counsel the patient based on risk factors, comorbidities, weight status, and life circumstances; one example of counseling is a discussion about sugary drink consumption and food and beverage habits, followed by a recommendation to reduce consumption of sugary beverages. Counseling is bidirectional and includes gathering information and feedback from the patient, using information collected from screening, revisiting goals set during previous visits, and discussing the patient's health and tactics to improve behaviors and outcomes with the patient. Counseling occurs in primary and specialty care settings; primary care counseling may be more general, while specialty care counseling is more focused on a specific behavior or comorbid condition. In primary and specialty care, counseling on weight-related topics may not take place due to other medical needs, patient readiness, provider discretion, etc. During the WCC, a patient receives counseling on many general health behaviors, risks, and protective factors. More screening occurs during WCC, which may identify more SDOH or risk factors that merit counseling. Multiple counseling episodes may occur throughout the visit in conjunction with education and goal setting. For adolescents, providers may do some counseling with parents and then ask parents to leave and resume counseling with the patient.

Counseling can cover many topics that may or may not be weight-related including bullying, school performance, stressors at home, diet and exercise habits, screen time, and many more. Counseling may reflect an evidence-based framework such as motivational interviewing or harm reduction. Counseling includes actions taken in response to social determinant screening to address issues including food insecurity, homelessness, transportation, violence, or citizenship issues. This counseling is often provided by a social worker or community health specialist in the clinic, but may be provided by a social worker accessed through an internal referral or hotline. This counseling may lead to a referral or navigation intervention.

### Provide education

A patient receives education about weight status (e.g., BMI), weight-related behaviors (e.g., nutrition and physical activity), and weight-related comorbidities from providers during clinical visits. The goal of education is to provide information to the patient to increase healthy behaviors and improve outcomes. Education may be provided verbally in a one-on-one or group setting or by providing educational materials like pamphlets to the patient. A patient receives education in conjunction with counseling throughout a clinical visit or weight management program session. Providers consistently educate all patients about BMI, BMI percentile, and weight status categories. Providers may educate patient on topics that they ask about or are relevant to the patient's health status or conditions. Education is often based on published studies or clinical guidelines. For example, many providers use the 5-2-1-0 framework to educate families about best practices (five+ fruit and vegetables, two hours or less of screen time, one hour or more daily physical activity, and 0 sugary beverages). Education may focus on general concepts like sugary beverages or be more detailed such as the appropriate serving size of juice. Which topics a patient receives education on may be recorded in provider notes or not at all.

### Deliver training

A provider delivers training to a patient with the goal of improving the patient's ability to carry out a new task or behavior or change an existing behavior. Training may be provided during a WCC visit, follow-up clinical visit, or non-clinical program session. Examples of training discussed by key informants include training a patient in food shopping, food preparation, exercise, and parenting skills. For a patient with comorbidities, a provider may deliver training in how to collect vitals such as blood pressure at home. Training may take one minute or one hour, depending on the topic, depth, venue, and patient needs. For example, training in how to do a single movement of exercise (e.g., a squat) takes less time than training on how to prepare a specific dish using healthy ingredients. Training may be ad-hoc or delivered as part of a structured curriculum (e.g., MEND, Cooking Matters, or GOTR).

### Facilitate physical activity

A patient engages in facilitated physical activity individually or in a group setting. The goal of facilitated physical activity is to improve a patient's physical fitness by increasing the duration and frequency of physical activity a patient engages in.

### Provide patient data

A patient may record and share data related to nutrition, physical activity, and other weight-related behaviors outside of the program session or clinical visit. An example might be a food journal or physical activity tracker. Behavioral data may be recorded using a mobile application, an EHR patient portal, or on paper.

### Set goals

A provider works with a patient to set goals aimed at improving behaviors, weight, or comorbidities. Goals may be focused on weight-related behaviors such as nutrition, exercise, or sleep. Goals may also be related to weight loss/maintenance, BMI change, or change in body composition. Goals may also be related to adherence to comorbidity treatment or improving comorbidity control (e.g., remember to



take medication every day or decrease blood pressure by 10 points). Goals may be quantified such as “exercise for at least two hours every day” or may be general such as “drink more water.” Goals may be structured around increasing positive behaviors or decreasing negative behaviors. Goal setting can occur during a clinical visit or program session. During a clinic visit, a provider encourages a patient to drive goal setting and prefers to set goals around behaviors or issues the patient aspires to address. A provider reviews goals from the previous visit to prepare for subsequent visits. A provider may document goals in a structured care plan or in unstructured notes. Goals are generally included in the after-visit summary that the patient receives at the conclusion of a clinical visit. Not all patients have weight-related goals. Within a program session, participants may set goals related to education or counseling curriculum to increase or improve healthy behaviors or decrease unhealthy behaviors.

### Complete visit

This task is completed by an interventionist and includes all other behavioral aspects of the visit such as discussion of behaviors unrelated to weight. Completing the visit may also include providing printed educational materials to the patient, scheduling referrals with community programs, and scheduling follow-up appointments. All clinical visits conclude with creating and printing an after-visit summary.

### Record observations

A behavioral interventionist will record observations about the care provided to a patient. For behavioral interventions delivered through a program, little or no patient-level observations are recorded. For clinical visits, documentation practices and standardization vary between and within health systems. Generally, documentation of behavioral interventions is less structured than medical interventions. There may be custom recording tools, such as flowsheets that are specific to a provider type or clinic, which capture data related to a behavioral intervention (i.e., what type of physical activity assessment was done and what is the recorded outcome). When the behavioral interventionist is a physician or dietitian, observations and delivered services are recorded in the EHR before they complete and sign the encounter, with an emphasis on recording billable services or billable time, depending on the service. Some use templated notes customized for a clinic or visit types while others use unstructured notes. Recording observations may include describing what counseling, educating, training, and physical activity occurred during the visit and why. Providers may document what issues or topics were not addressed or require follow-up.

### Intervention complete?

A provider assesses whether the patient has completed the behavioral intervention(s). This is both a task and a decision point, which could lead a provider to recommend more of the same intervention or additional complementary interventions. Structured programs like MEND, GOTR, or Cooking Matters have a defined end point such that the intervention is complete when the last curriculum session has been delivered. In primary care, the behavioral intervention may evolve over time and an end date can be tailored to individual patient needs. For some patients, behavioral interventions may conclude when a milestone is reached, or may not conclude at all. In primary care, a patient receives education and counseling at every clinical visit. However, the focus of education and counseling may shift or evolve to other topics based on the patient’s health status and primary health concerns. Often, a patient does not return beyond the initial visit or session, thus ending the intervention. In specialty care, the patient may



continue to be seen until an outcome has been reached or the issue to catalyzed specialty care resolves. For example, a patient may see an exercise physiologist for four sessions to learn how to exercise. A patient may see a nutritionist to receive nutrition education with the goal of diabetes control. Once diabetes control (HGA1C control) has been achieved, the patient may discontinue specialty care. The determination of completeness may be made by the patient or the provider.

#### Bill for services

Many behavioral health interventions are not billable. Counseling from a physician is billable. Counseling from an exercise physiologist, dietician, psychologist, health coach, or social worker may be billable (depending on the state and insurance). Case management/care coordination can include a behavioral intervention component, but is not generally billable. Case management/care coordination may also be a shared responsibility between many providers or one distinct individual role. When providers bill for counseling, they notate how long they spent counseling a patient and bill for that time.

#### Schedule follow-up

A patient schedules a follow-up visit(s) to receive additional behavioral interventions. Scheduling may occur at the conclusion of the previous visit or at a later date over the phone. The patient may schedule directly with the clinic or provider, or schedule through a central appointment line. Programs are structured and meet at the same day and time every week. A patient does not schedule program sessions.

#### Receive after-visit summary

Behavioral interventions delivered in a clinical setting always result in providing an after-visit summary to the patient. Behavioral interventions may or may not be detailed on this document. Programs do not provide after-visit summaries.

#### Receive bill

A patient receives a bill for medical intervention services in the 30-90 days following the care episode. For a patient with insurance that covered all medical intervention services, a patient will receive an explanation of benefits (EOB) that defines the services, charges, and what insurance paid. An EOB is not a bill but may identify remaining out of pocket costs that the patient will be billed for.

#### Complete intervention

This is a decision point when the provider and patient determine if the patient needs additional behavioral interventions or if the intervention is complete. For some behavioral interventions like counseling provided in primary care, there is no natural intervention end point. For behavioral interventions targeting a behavior, such as snacking in the middle of the night, a patient may receive interventions from a psychologist until that behavior has resolved and then terminate that intervention. For structured programs, each program defines a distinct endpoint after which the intervention has been completed.

## Appendix 3: Deliver navigation and coordination intervention detailed task descriptions

### Self-refer

A patient may self-refer to navigation and coordination by contacting a navigator directly via email or telephone. When a navigator has a physical location, a patient may self-refer through a drop-in or walk-in visit. Healthcare organizations can provide navigation and care coordination using two approaches: 1) navigators located within primary or specialty care clinics who can be pulled into visits by providers or receive direct referrals, or 2) a central navigator resource that receives referrals/calls from providers for help or that uses business rules to identify patients that could benefit from coordination and navigation.

### Review patient list for follow-up

Business rules are utilized to identify a patient that may benefit from care coordination or navigation such as a patient with a recent no-show appointment, a patient with one or more screening responses that require follow-up, or a patient with a high level of medical complexity. Patient information is compiled in a list and delivered to the navigator or navigation team on a regularly scheduled frequency or through ad hoc reporting requests.

### Process referral

Electronic referrals are received through an information system (often an EHR) or a fax from a healthcare provider or community organization. The fax referral form may be completed by a patient, provider, or an information system. Referrals include in-person requests for support from a provider or clinical staff amidst a clinical encounter.

### Outreach patient

Coordination and navigation will occur during clinical visits, during a navigation or coordination specific scheduled encounter, over the telephone, or over email. A navigator calls or emails the patient using the contact information provided in the referral or stored in the EHR or the information system. Emails to a patient may occur within a patient portal or directly to a patient's email address. The navigator who contacts the patient may have an established relationship with the patient or be a new resource for the patient.

### Register patient

A patient is registered in an information system so that navigation services can be tracked. A patient may be registered only on their initial contact with an organization and/or on each interaction with the navigator. Initial patient registration activities are generally more in depth compared to subsequent encounters. For navigation and coordination that is provided in conjunction with an existing clinical encounter, the patient's registration for the clinical encounter will have already occurred, and an additional encounter in the EHR may or may not be created.

### Collect patient information

Patient information is collected and stored in a record within an information system. Because clinical organizations require more detailed patient information for billing and operational purposes, interventions taking place within a clinical setting tend to collect and store more detailed patient information. For navigation and coordination, patient information may include household or income information that will be used to assess eligibility for programs and resources.

### Establish patient needs

A patient shares their needs and resource goals so that the navigator understands what type of navigation the patient is seeking and which resources to assist with. Patient needs can include housing, transportation, citizenship issues, health insurance, childcare, money for rent assistance, food assistance, heat or electricity, or assistance navigating the healthcare system. Patient needs may be identified from a SDOH screening tool or through counseling during a clinical visit. Patient needs may be specific to an asset or program, such as, “I’d like to get SNAP benefits,” or general, such as, “I’d like help with food”. Patient needs may be recorded in an information system as a structured field, in an unstructured note, or not recorded at all. Patient needs may be noted in a referral for navigation support or shared over the phone during an initial navigation encounter. Patient needs are not static and may evolve and change over time. In a clinical setting, patient needs may appear as a chief complaint or “reason for today’s visit.”

### Deliver care coordination

Care coordination is only provided in clinical settings and includes scheduling procedures or appointments for specialty or primary care. Some care coordination is proactive assistance for a patient engaged in care while other care coordination is responsive, meaning it is triggered in response to a no-show appointment with the goal of re-engaging a patient in care. Care coordination includes an educational component where the navigator discusses how the patient’s clinical care is organized, what care they should receive, and what they can expect. Training includes showing a patient how to access information, ask questions, or make changes to their care. For example, a navigator may demonstrate how a patient can email their provider or access a patient portal. Recommendations include tips for the patient to improve their care experience, such as suggestions about where to park or how early to arrive for a specific encounter or procedure.

### Discuss resource options

A navigator shares resource options with a patient based on their needs. One navigator may provide navigation services for all issues, or navigators may be trained in certain types of patient needs. For example, navigators may work exclusively on Medicaid or WIC enrollment. For a given need, navigators may have one resource, multiple resource options, or no resources. Resources may be accessible immediately or require a lengthy application process. Resources may be internal to the organization (e.g., a food pantry at a clinic) or external organizations (e.g., SNAP program). Resources may be programs or assets. A navigator’s ability to discuss resource options is dependent on their awareness of those resources; some organizations maintain information about community resources, while others may rely on navigators to seek out information about community resources. Navigators may rely on referral to a curated inventory of resources or seek out and maintain their own roster of resources.

### Select resource

A patient selects which resource(s) they would like to receive. For some issues where resources are needed, resources may not be available. Navigators may or may not record resource selection or related discussions.

### Screen for eligibility

A navigator screens a patient for eligibility by reviewing eligibility criteria and collecting additional information such as income and employment information. A navigator may begin this screening before sharing resources with the patient with the goal of only discussing resources for which the patient is likely to qualify. Navigators may use historical information stored in an information system to assess eligibility and confirm that information with the patient (e.g., “My record shows that four individuals live in your home with a total income of \$100 per week, is that correct?”).

### Complete application

A navigator works with the patient to complete one or multiple applications for a program or support service. This task can include completing a referral for a program or for additional targeted navigation. Not all resources require an application. For example, no application is needed to use a food pantry. Programs requiring an application include Medicaid, SNAP, housing assistance, and WIC.

### Provide education, training, and recommendations

Navigators provide training and education to patients with the goal of improving the patient's ability and likelihood of receiving the resource. Education includes informing the patient about the enrollment process for each resource such as interview process and enrollment steps. For example: a navigator will educate a patient about what to bring to a SNAP interview. Training includes showing a patient how to complete a program application or how to check their enrollment status on CBMS. Recommendations include providing tips for how to complete the enrollment process, such as how to reschedule and interview and when to expect a call to schedule an interview.

Navigators provide education, training, and recommendations to every patient they serve. Because resources, enrollment processes and entities may vary by the patient, navigators customize their education and training for each patient. The goal of education, training, and recommendations is to build the patient's capacity to seek services and resources independently (without a need for navigation) in the future.

### Receive asset

Navigation and coordination are often associated with the delivery of an asset to a patient. Assets may include food, money, vouchers for transportation, rental assistance, or payment of a utility bill. Delivery of assets is based upon patient interest and has no standard eligibility criteria. Availability of assets can vary widely within an organization. For example, one of eight clinics within the same organization may have a food pantry.

Assets are considered an interim or provisional response to a relatively emergent situation. For example, a food pantry within a clinic is not designed as a long-term sustained solution for food insecurity.

Through navigation, patients are likely to be connected to assets on the day of the encounter and oriented to sustained support through enrollment in community resources/programs.

### Conclude navigation

A navigator will conclude navigation with a patient by asking the patient if they require any additional navigation support or have any questions about the services provided. This task may include making referrals to other navigation or coordination resources. Concluding the navigation may include discussing when follow-up should occur or what additional resources may exist for the patient.

A navigator conducts follow-up based on patient needs. For many navigation engagements, navigation is completed in one visit and requires no follow-up. Follow-up is driven by the patient, who is encouraged to contact the navigator for other questions and needs.

### Record observations

A navigator records observations about the navigation and coordination intervention(s) delivered to a patient in the EHR or other information system when the service is provided. Recording observations may include describing what educating and training occurred during the navigation and why. A navigator may document what issues or topics were not addressed or require follow-up.

## Appendix 4: CODI functional requirements table

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver medical intervention	Register patient		Generate a medical record for a new patient (includes assigning a MRN)	Should	Y	Y	Y	DEMOGRAPHICS
Deliver medical intervention	Register patient		Generate a new encounter	Should	Y	Y	Y	ENCOUNTER
Deliver medical intervention	Register patient	Y	Prompt collection of a payment	Should				
Deliver medical intervention	Register patient		Store encounter type (e.g., well child, sick, or follow-up)	Could		Y	Y	ENCOUNTER
Deliver medical intervention	Register patient		Store patient information in one patient medical record (e.g., deduplication)	Should	Y	Y	Y	DEMOGRAPHICS, IDENTIFIER
Deliver medical intervention	Register patient		Store payment information	Should			Y	COST
Deliver medical intervention	Register patient		Store the department or clinic where the encounter occurred	Should	Y	Y	Y	ENCOUNTER
Deliver medical intervention	Register patient		Store encounter provider information	Should		Y	Y	ENCOUNTER, PROVIDER
Deliver medical intervention	Collect patient information		Calculate patient's age on date of visit (in years and months)	Should	Y	Y	Y	
Deliver medical intervention	Collect patient information	Y	Flag missing values and direct user to collect it	Should	Y	Y	Y	
Deliver medical intervention	Collect patient information		Store chief complaint (reason for today's visit)	Should		Y		
Deliver medical intervention	Collect patient information		Store historical values when contact or insurance information changes	Should	Y	Y	Y	IDENTIFIER
Deliver medical intervention	Collect patient information		Store homelessness in a structured field	Should	Y	Y	Y	CENSUS_LOCATION
Deliver medical intervention	Collect patient information		Store multiple values for patient race	Should	Y	Y	Y	DEMOGRAPHICS
Deliver medical intervention	Collect patient information		Store patient and family contact information (address, phone number)	Should	Y	Y	Y	IDENTIFIER, CENSUS_LOCATION

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Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver medical intervention	Collect patient information		Store patient date of birth	Should	Y	Y	Y	DEMOGRAPHICS
Deliver medical intervention	Collect patient information		Store patient ethnicity	Should	Y	Y	Y	DEMOGRAPHICS
Deliver medical intervention	Collect patient information		Store patient's sex and gender identity	Should	Y	Y	Y	DEMOGRAPHICS
Deliver medical intervention	Collect patient information		Store patient's insurance number	Should	Y	Y	Y	IDENTIFIER
Deliver medical intervention	Collect patient information		Store patient's insurance provider	Should	Y	Y	Y	ENCOUNTER
Deliver medical intervention	Collect patient information		Store patient's sexual orientation	Should	Y	Y	Y	
Deliver medical intervention	Collect vital signs		Calculate patient's BMI and BMI percentile	Should	Y	Y		VITAL
Deliver medical intervention	Collect vital signs		Display patient's BMI on a pediatric growth chart	Should	Y	Y		VITAL
Deliver medical intervention	Collect vital signs	Y	Flag implausible height and weight values and direct user to review entries, provide corrections, or retake measurements	Should	Y	Y		SESSION_ALERT, ALERT
Deliver medical intervention	Collect vital signs	Y	Flag missing height or weight values and direct user to collect and enter height and weight	Should	Y	Y		SESSION_ALERT, ALERT
Deliver medical intervention	Collect vital signs		Store collection method	Should	Y	Y		
Deliver medical intervention	Collect vital signs		Store height, length, and weight	Should	Y	Y		VITAL
Deliver medical intervention	Collect vital signs		Store patient's diastolic blood pressure	Should		Y		VITAL
Deliver medical intervention	Collect vital signs		Store patient's systolic blood pressure	Should		Y		VITAL

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver medical intervention	Collect vital signs		Store time and date of height and weight collection	Should	Y	Y		VITAL
Deliver medical intervention	Screen for lifestyle and risk factors	Y	Calculate screening responses that require follow-up and highlight for follow-up (e.g., response or change in response since last screening)	Should				SESSION_ALERT, ALERT
Deliver medical intervention	Screen for lifestyle and risk factors	Y	Display custom questions based on demographic or lifestyle factors	Could				SESSION_ALERT, ALERT
Deliver medical intervention	Screen for lifestyle and risk factors		Display lifestyle and risk factor screening questions	Should				
Deliver medical intervention	Screen for lifestyle and risk factors		Store family history of disease	Should				FAMILY_HISTORY
Deliver medical intervention	Screen for lifestyle and risk factors		Store other screening response	Should				
Deliver medical intervention	Screen for lifestyle and risk factors		Store patient's detailed diet and exercise history	Should	Y	Y		
Deliver medical intervention	Screen for lifestyle and risk factors		Store patient's exercise	Should	Y	Y		
Deliver medical intervention	Screen for lifestyle and risk factors		Store patient's fruit and vegetable consumption	Should	Y	Y		
Deliver medical intervention	Screen for lifestyle and risk factors		Store patient's meal traditions	Should	Y	Y		



Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver medical intervention	Screen for lifestyle and risk factors		Store patient's mental health measures	Should	Y	Y		
Deliver medical intervention	Screen for lifestyle and risk factors		Store patient's sugary drink consumption	Should	Y	Y		
Deliver medical intervention	Screen for lifestyle and risk factors		Store patient's daily screen time	Should	Y	Y		
Deliver medical intervention	Screen for lifestyle and risk factors		Store patient's sleep habits and patterns	Should	Y	Y		
Deliver medical intervention	Screen for lifestyle and risk factors		Store screening for activity based on 5210 occurred	Should	Y	Y		SESSION
Deliver medical intervention	Screen for lifestyle and risk factors		Store screening for activity occurred	Should	Y	Y		SESSION
Deliver medical intervention	Screen for lifestyle and risk factors		Store screening for nutrition based on 5210 occurred	Should	Y	Y		SESSION
Deliver medical intervention	Screen for lifestyle and risk factors		Store screening for nutrition occurred	Should	Y	Y		SESSION
Deliver medical intervention	Screen for lifestyle and risk factors		Store screening instrument information	Should	Y	Y		
Deliver medical intervention	Screen for social determinants of health	Y	Calculate screening responses that require follow up and highlight for follow up (e.g., response or change in response since last screening)	Could				

# Childhood Obesity Data Initiative Business Process Analysis Report

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver medical intervention	Screen for social determinants of health		Display screening questions to assess SDOH	Should				
Deliver medical intervention	Screen for social determinants of health		Generate social worker referral for follow up	Could		Y		REFERRAL
Deliver medical intervention	Screen for social determinants of health		Store responses to SDOH screening questions	Should	Y	Y		
Deliver medical intervention	Elevated BMI?		Generate referral to dietitian	Should	Y	Y		REFERRAL
Deliver medical intervention	Elevated BMI?	Y	Highlight an elevated BMI value	Should	Y	Y		SESSION_ALERT, ALERT
Deliver medical intervention	Elevated BMI?	Y	Prompt provider to document obesity-related diagnoses	Could	Y	Y		SESSION_ALERT, ALERT
Deliver medical intervention	Elevated BMI?	Y	Prompt provider to mark elevated BMI as reviewed	Could	Y	Y		SESSION_ALERT, ALERT
Deliver medical intervention	Elevated BMI?	Y	Prompt provider to mark elevated BMI as reviewed with patient	Could	Y	Y		SESSION_ALERT, ALERT
Deliver medical intervention	Screen for and treat comorbidities	Y	Calculate changes to screening responses and highlight changes for follow-up	Should	Y	Y		
Deliver medical intervention	Screen for and treat comorbidities		Display a list of comorbidities to consider screening for (this should consider the conditions that the patient has already been tested for)	Should	Y	Y		
Deliver medical intervention	Screen for and treat comorbidities		Display comorbidity symptom screening questions	Should	Y	Y		
Deliver medical intervention	Screen for and treat comorbidities	Y	Display configurable list of lab and procedure orders based on patient's BMI value	Should	Y	Y		SESSION_ALERT, ALERT

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Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver medical intervention	Screen for and treat comorbidities	Y	Prompt for documentation of comorbidity diagnoses (e.g., prediabetes)	Should	Y	Y		SESSION_ALERT, ALERT
Deliver medical intervention	Screen for and treat comorbidities	Y	Prompt for documentation of comorbidity discussion with patient	Could	Y	Y		SESSION_ALERT, ALERT
Deliver medical intervention	Screen for and treat comorbidities	Y	Prompt for documentation of status of comorbidity screening (e.g., initiated/completed/declined/delayed [including note for rationale])	Could	Y	Y		SESSION_ALERT, ALERT
Deliver medical intervention	Provide data		Ingest a patient's nutrition or physical activity data directly from mobile application (e.g., MyFitnessPal)	Could		Y		
Deliver medical intervention	Provide data		Store a patient's weight related behaviors	Could		Y		
Deliver medical intervention	Provide data		Store patient's weight or BMI measurement	Could		Y		VITAL
Deliver medical intervention	Provide data		Store self-reported measure type	Could		Y		
Deliver medical intervention	Make recommendations	Y	Display behavior change or medical intervention recommendations based on a patient's BMI and comorbidities	Could	Y			SESSION_ALERT, ALERT
Deliver medical intervention	Make recommendations	Y	Prompt for documentation of healthy weight plan	Could	Y	Y		SESSION_ALERT, ALERT
Deliver medical intervention	Make recommendations	Y	Prompt for documentation of which recommendations were shared with patient	Could	Y	Y		SESSION_ALERT, ALERT
Deliver medical intervention	Discuss intervention options	Y	Display medical intervention based on a patient's BMI and comorbidities	Should	Y			SESSION_ALERT, ALERT

# Childhood Obesity Data Initiative Business Process Analysis Report

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver medical intervention	Discuss intervention options		Display summary description of each medical intervention	Could	Y			
Deliver medical intervention	Discuss intervention options	Y	Prompt for documentation of which medical interventions were discussed with patient	Could	Y	Y		SESSION_ALERT, ALERT
Deliver medical intervention	Discuss intervention options	Y	Prompt for documentation that medical intervention has been initiated/completed/declined/delayed (including note for rationale)	Could	Y	Y		SESSION_ALERT, ALERT
Deliver medical intervention	Assess readiness for options		Store barriers and concerns for medical interventions	Could	Y	Y		
Deliver medical intervention	Assess readiness for options		Store discrete patient readiness score for medical interventions	Could	Y	Y		
Deliver medical intervention	Make referral		Display a searchable referral list indexed by provider, specialty, and organization	Should	Y			
Deliver medical intervention	Make referral		Generate referrals from orders	Should	Y	Y		REFERRAL
Deliver medical intervention	Complete visit		Display a searchable list of pharmacotherapy options	Should				
Deliver medical intervention	Complete visit		Display pediatric dosing recommendation	Should				
Deliver medical intervention	Complete visit	Y	Flag unsafe prescribing values and direct user to review entries, acknowledge warning, or provide corrections.	Should				
Deliver medical intervention	Complete visit		Generate electronic prescription	Should		Y		PRESCRIBING
Deliver medical intervention	Complete visit		Store consent to receive text messages	Should		Y		

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver medical intervention	Complete visit		Store date and time that visit was completed	Should		Y		ENCOUNTER
Deliver medical intervention	Complete visit		Store procedure orders	Should		Y		PROCEDURES
Deliver medical intervention	Receive after-visit summary		Generate after-visit summary	Should				
Deliver medical intervention	Schedule follow-up		Display available follow-up visit date/times	Should				
Deliver medical intervention	Schedule follow-up		Schedule follow-up visits	Should	Y	Y		
Deliver medical intervention	Conduct additional biomedical testing		Display lab-related screening questions	Should				
Deliver medical intervention	Conduct additional biomedical testing		Notify referring provider that lab test has been initiated	Could				
Deliver medical intervention	Conduct additional biomedical testing		Store date and time that patient arrived at lab	Should	Y			LAB_RESULTS_CM
Deliver medical intervention	Conduct additional biomedical testing		Store discrete responses to lab-related screening questions (e.g., "did you eat today?")	Should				
Deliver medical intervention	Conduct additional biomedical testing		Store specimen collection-related adverse events (e.g., SNOMED codes)	Should				

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver medical intervention	Conduct additional biomedical testing		Store specimen type, source and location (e.g., blood, left hand finger prick)	Should				LAB_RESULTS_CM
Deliver medical intervention	Conduct additional biomedical testing		Store venue where lab test was performed (e.g., POC, lab)	Should		Y		LAB_RESULTS_CM
Deliver medical intervention	Receive biomedical test results		Notify patient of lab result value and follow-up (e.g., patient portal message)	Should				
Deliver medical intervention	Receive biomedical test results	Y	Notify provider that lab results or clinical observations are available	Should				
Deliver medical intervention	Receive biomedical test results	Y	Prompt provider to add diagnosis from lab results.	Should				
Deliver medical intervention	Receive biomedical test results		Store clinical observations (e.g., echocardiogram or calorimetry) related to medical procedures	Should				
Deliver medical intervention	Receive biomedical test results		Store date lab result became available	Should	Y	Y		LAB_RESULTS_CM
Deliver medical intervention	Receive biomedical test results		Store date lab results were reviewed by provider	Should	Y	Y		
Deliver medical intervention	Receive biomedical test results		Store lab result values and units	Should	Y	Y		LAB_RESULTS_CM
Deliver medical intervention	Record observations		Store clinical decision support alerts and actions	Should	Y	Y		SESSION_ALERT, ALERT

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver medical intervention	Record observations		Store date/time documentation was completed	Should	Y	Y		
Deliver medical intervention	Record observations		Store diagnosis codes and procedure codes for all medical services provided during clinical visit (for billing)	Should	Y	Y		DIAGNOSIS, PROCEDURES
Deliver medical intervention	Record observations		Store documentation status (e.g., complete)	Should	Y	Y		
Deliver medical intervention	Record observations		Store patient diagnosis in problem list including dates added and resolved	Should				DIAGNOSIS
Deliver medical intervention	Record observations		Store provider actions resulting from clinical decision support	Should	Y	Y		
Deliver medical intervention	Record observations		Store provider notes	Should	Y	Y		
Deliver medical intervention	Conduct follow-up		Generate and transmit note to referring provider about patient status	Should				
Deliver medical intervention	Conduct follow-up		Generate and transmit text reminders to patients for upcoming appointments	Should				
Deliver medical intervention	Conduct follow-up		Generate new encounter for telephone or email exchange with patient	Should				
Deliver medical intervention	Conduct follow-up		Notify patient about pre-encounter lab tests	Should		Y		
Deliver medical intervention	Conduct follow-up		Store date lab results were discussed with patient	Should		Y		
Deliver medical intervention	Bill for services		Generate bill reflecting diagnoses and procedures	Should			Y	COST

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Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver medical intervention	Bill for services		Ingest and store denial information from patient insurance	Should			Y	
Deliver medical intervention	Bill for services		Ingest payment information (e.g., paid date and amount)	Should			Y	COST
Deliver medical intervention	Bill for services		Transmit bill to patient insurance	Should			Y	
Deliver medical intervention	Receive bill		Generate patient bill(s) for remaining costs	Should			Y	COST
Deliver medical intervention	Receive bill		Ingest payment information from patient	Should			Y	COST
Deliver behavioral intervention	Process referral		Generate acknowledgement message to referring provider	Should				
Deliver behavioral intervention	Process referral		Store referral metadata	Should				REFERRAL
Deliver behavioral intervention	Process referral		Ingest referral and store with patient health record and referral recipient provider/coordinator	Should	Y			REFERRAL
Deliver behavioral intervention	Process referral		Store patient attendance at orientation	Could	Y	Y		
Deliver behavioral intervention	Process referral		Store patient enrollment	Could	Y	Y		
Deliver behavioral intervention	Process referral		Store reason for non-enrollment	Could	Y	Y		
Deliver behavioral intervention	Process referral		Store referral category (e.g., urgent)	Should	Y	Y		
Deliver behavioral intervention	Process referral		Store referral status (e.g., accepted or declined) and rationale	Could	Y	Y		
Deliver behavioral intervention	Register patient		Generate a record for a new patient (includes assigning a unique ID)	Should	Y	Y	Y	DEMOGRAPHICS
Deliver behavioral intervention	Register patient	Y	Prompt collection of a payment for the intervention/program (e.g., GOTR)	Should				
Deliver behavioral intervention	Register patient	Y	Prompt collection of a payment for the session	Should				



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Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver behavioral intervention	Register patient		Store date/time of patient's registration	Should		Y		ENCOUNTER
Deliver behavioral intervention	Register patient		Store encounter method (e.g., 1:1 or group)	Should		Y	Y	ENCOUNTER, SESSION
Deliver behavioral intervention	Register patient		Store encounter type (e.g., well child, sick, or follow-up)	Should		Y	Y	ENCOUNTER
Deliver behavioral intervention	Register patient		Store information identifying the care provider, coach, or interventionist to the encounter/session	Should		Y	Y	ENCOUNTER, SESSION, PROGRAM
Deliver behavioral intervention	Register patient		Store patient information in one patient medical record (e.g., deduplication)	Should	Y	Y	Y	DEMOGRAPHICS, IDENTIFIER
Deliver behavioral intervention	Register patient		Store payment level for the intervention/program (e.g., GOTR)	Should			Y	COST
Deliver behavioral intervention	Register patient		Store receipt of payment of the session	Should			Y	COST
Deliver behavioral intervention	Collect patient information		Calculate patient's age on date of visit (in years and months)	Should	Y	Y	Y	
Deliver behavioral intervention	Collect patient information	Y	Flag missing contact or demographic information values and direct user to collect it	Should	Y	Y	Y	
Deliver behavioral intervention	Collect patient information		Store chief complaint (reason for today's visit)	Should		Y		
Deliver behavioral intervention	Collect patient information		Store historical values when contact or insurance information changes	Should	Y	Y	Y	IDENTIFIER
Deliver behavioral intervention	Collect patient information		Store homelessness in a structured field	Should	Y	Y	Y	CENSUS_LOCATION
Deliver behavioral intervention	Collect patient information		Store multiple values for patient race	Should	Y	Y	Y	DEMOGRAPHICS

# Childhood Obesity Data Initiative Business Process Analysis Report

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver behavioral intervention	Collect patient information		Store patient and family contact information (address, phone number).	Should	Y	Y	Y	IDENTIFIER
Deliver behavioral intervention	Collect patient information		Store patient date of birth	Should	Y	Y	Y	DEMOGRAPHICS
Deliver behavioral intervention	Collect patient information		Store patient ethnicity	Should	Y	Y	Y	DEMOGRAPHICS
Deliver behavioral intervention	Collect patient information		Store patient's sex and gender identity	Should	Y	Y	Y	DEMOGRAPHICS
Deliver behavioral intervention	Collect patient information		Store patient's insurance number	Should	Y	Y	Y	IDENTIFIER
Deliver behavioral intervention	Collect patient information		Store patient's insurance provider	Should	Y	Y	Y	ENCOUNTER
Deliver behavioral intervention	Collect patient information		Store patient's sexual orientation	Should	Y	Y	Y	
Deliver behavioral intervention	Screen for lifestyle and risk factors	Y	Calculate screening responses that require follow-up and highlight for follow-up (e.g., changes since last screening or response)	Could				SESSION_ALERT, ALERT
Deliver behavioral intervention	Screen for lifestyle and risk factors	Y	Display custom questions based on demographic or lifestyle factors (e.g., age)	Could				SESSION_ALERT, ALERT
Deliver behavioral intervention	Screen for lifestyle and risk factors		Display lifestyle and risk factor screening questions	Should				
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store additional screening responses	Should	Y	Y		

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store family history of disease	Should				FAMILY_HISTORY
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store patient's anxiety symptoms	Should	Y	Y		
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store patient's depression symptoms	Should	Y	Y		
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store patient's detailed diet and exercise history	Should	Y	Y		
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store patient's exercise	Should	Y	Y		
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store patient's fruit and vegetable consumption	Should	Y	Y		
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store patient's meal traditions	Should	Y	Y		
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store patient's mental health measures	Should	Y	Y		
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store patient's sugary drink consumption	Should	Y	Y		
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store patient's daily screen time	Should	Y	Y		

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Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store patient's sleep habits and patterns	Should	Y	Y		
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store screening for activity based on 5210 occurred	Should	Y	Y		SESSION
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store screening for activity occurred	Should	Y	Y		SESSION
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store screening for nutrition based on 5210 occurred	Should	Y	Y		SESSION
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store screening for nutrition occurred	Should	Y	Y		SESSION
Deliver behavioral intervention	Screen for lifestyle and risk factors		Store screening instrument information	Should	Y	Y		
Deliver behavioral intervention	Screen for social determinants of health	Y	Calculate screening responses that require follow up and highlight for follow up (e.g., changes since last screening or response)	Could				
Deliver behavioral intervention	Screen for social determinants of health		Display screening questions to assess SDOH	Should				
Deliver behavioral intervention	Screen for social determinants of health	Y	Refer patient to social worker for navigation	Could		Y		REFERRAL
Deliver behavioral intervention	Screen for social determinants of health		Store responses to SDOH screening	Should	Y	Y		

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Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver behavioral intervention	Provide counseling and recommendations		Display a searchable list of counseling topics	Could				
Deliver behavioral intervention	Provide counseling and recommendations	Y	Display a summary of previously discussed behavioral counseling topics	Could				
Deliver behavioral intervention	Provide counseling and recommendations	Y	Display behavior recommendations based on a patient's BMI, behaviors, symptoms, and comorbidities.	Should				SESSION_ALERT, ALERT
Deliver behavioral intervention	Provide counseling and recommendations	Y	Highlight counseling topic that is tied to patient goal	Could				SESSION_ALERT, ALERT
Deliver behavioral intervention	Provide counseling and recommendations		Store determination that counseling was delivered	Should		Y		SESSION
Deliver behavioral intervention	Provide counseling and recommendations		Store behavioral recommendations shared with patient	Should	Y	Y		
Deliver behavioral intervention	Provide counseling and recommendations		Store behavioral topics discussed in counseling	Should	Y	Y		
Deliver behavioral intervention	Provide counseling and recommendations		Store behavioral topics that require counseling but were not addressed	Should				
Deliver behavioral intervention	Provide counseling and recommendations		Store estimation of time spent counseling on behaviors	Could		Y		
Deliver behavioral intervention	Provide education		Display a searchable list of behavioral education topics	Could				
Deliver behavioral intervention	Provide education	Y	Display a summary of previously discussed behavioral education topics	Could				SESSION_ALERT, ALERT

# Childhood Obesity Data Initiative Business Process Analysis Report

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver behavioral intervention	Provide education	Y	Highlight education topic that is tied to patient goal	Could		Y		SESSION_ALERT, ALERT
Deliver behavioral intervention	Provide education		Store determination that education was delivered	Should		Y		SESSION
Deliver behavioral intervention	Provide education		Store behavioral education topics addressed	Could	Y	Y		
Deliver behavioral intervention	Provide education		Store framework related to behavioral education messages (e.g., 5210)	Could				
Deliver behavioral intervention	Provide education		Store provided education materials	Should		Y		
Deliver behavioral intervention	Deliver training		Display a searchable list of behavioral training topics	Could				
Deliver behavioral intervention	Deliver training		Store determination that training was delivered	Should		Y		SESSION
Deliver behavioral intervention	Deliver training		Store description of training provided	Should		Y		
Deliver behavioral intervention	Facilitate physical activity		Store determination that facilitated physical activity occurred	Should		Y		SESSION
Deliver behavioral intervention	Facilitate physical activity		Store duration of physical activity completed by patient	Should		Y		
Deliver behavioral intervention	Facilitate physical activity		Store intensity of physical activity completed by patient	Should		Y		
Deliver behavioral intervention	Facilitate physical activity		Store location of physical activity completed by patient	Should		Y		
Deliver behavioral intervention	Facilitate physical activity		Store type of physical activity	Should		Y		
Deliver behavioral intervention	Provide data		Ingest a patient's nutrition or physical activity data directly from mobile application (e.g., MyFitnessPal)	Could		Y		

# Childhood Obesity Data Initiative Business Process Analysis Report

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver behavioral intervention	Provide data		Store a patient's health behaviors (e.g., meal history)	Could		Y		
Deliver behavioral intervention	Provide data		Store measure collection type (e.g., self-reported)	Could		Y		
Deliver behavioral intervention	Set goals		Store date of patient goals	Should	Y	Y		
Deliver behavioral intervention	Set goals		Store goal status (e.g., complete)	Could	Y	Y		
Deliver behavioral intervention	Set goals		Store patient goals	Should	Y	Y		
Deliver behavioral intervention	Complete visit		Generate referrals	Should	Y	Y		REFERRAL
Deliver behavioral intervention	Complete visit		Schedule visits with other providers (related to referrals)	Should				
Deliver behavioral intervention	Complete visit		Store consent to receive text messages	Should				
Deliver behavioral intervention	Complete visit		Store date and time that visit was completed	Should		Y		
Deliver behavioral intervention	Complete visit		Store follow-up visit plan (e.g., frequency)	Should	Y	Y		
Deliver behavioral intervention	Conduct follow-up		Generate and send text reminders to patients for upcoming appointments	Should		Y		
Deliver behavioral intervention	Conduct follow-up		Generate new encounter for telephone or email exchange with patient	Should		Y		
Deliver behavioral intervention	Record observations		Store all patient diagnosis in problem list including dates added and resolved	Should	Y	Y		DIAGNOSIS
Deliver behavioral intervention	Record observations		Store clinical decision support alerts and actions	Should	Y	Y		SESSION_ALERT, ALERT
Deliver behavioral intervention	Record observations		Store date/time documentation was completed	Should	Y	Y		DIAGNOSIS

# Childhood Obesity Data Initiative Business Process Analysis Report

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver behavioral intervention	Record observations		Store diagnosis codes and procedure codes for all behavioral services provided (for billing)	Should	Y	Y		DIAGNOSIS, PROCEDURES
Deliver behavioral intervention	Record observations		Store documentation status (e.g., complete)	Should	Y	Y		
Deliver behavioral intervention	Record observations		Store provider actions resulting from clinical decision support	Should	Y	Y		
Deliver behavioral intervention	Record observations		Store provider notes	Should		Y		
Deliver behavioral intervention	Bill for services		Generate bill reflecting diagnoses and procedures entered by provider	Should			Y	COST
Deliver behavioral intervention	Bill for services		Ingest and store denial information from patient insurance	Should			Y	COST
Deliver behavioral intervention	Bill for services		Ingest payment from patient insurance	Should			Y	COST
Deliver behavioral intervention	Bill for services		Transmit bill to patient insurance	Should			Y	
Deliver behavioral intervention	Receive after-visit summary		Generate patient education material	Should			Y	
Deliver behavioral intervention	Receive after-visit summary		Summarize visit data and provider actions in after-visit summary	Should				
Deliver behavioral intervention	Receive bill		Generate patient bill(s) for remaining costs	Should			Y	COST
Deliver behavioral intervention	Receive bill		Ingest payment from patient	Should			Y	COST
Deliver behavioral intervention	Complete intervention		Store intervention/program completion data	Should		Y		
Deliver behavioral intervention	Complete intervention		Store program/intervention completion	Should		Y		
Deliver navigation and coordination intervention	Self-refer		Store referral source					



Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver navigation and coordination intervention	Review patient work list	Y	Identify patients needing navigation or care coordination in work list	Should				
Deliver navigation and coordination intervention	Review patient work list	Y	Transmit work list to navigator	Should				
Deliver navigation and coordination intervention	Process referral		Generate acknowledgement message to referring provider	Should				
Deliver navigation and coordination intervention	Process referral		Store referral metadata	Should				REFERRAL
Deliver navigation and coordination intervention	Process referral		Ingest referral and store with patient health record and referral recipient provider/coordinator	Should	Y			REFERRAL
Deliver navigation and coordination intervention	Process referral	Y	Triage referrals to navigation or coordination resource	Should				
Deliver navigation and coordination intervention	Process referral		Store navigation/coordination issues noted in referral	Could	Y	Y		
Deliver navigation and coordination intervention	Process referral		Store referral category (e.g., urgent)	Should	Y	Y		
Deliver navigation and coordination intervention	Process referral		Store referral status (e.g., accepted or declined) and rationale	Could	Y	Y		REFERRAL
Deliver navigation and coordination intervention	Outreach patient		Store date and time of outreach	Should				
Deliver navigation and coordination intervention	Outreach patient		Store mode of outreach (e.g., in person, telephone, etc.)	Should				
Deliver navigation and coordination intervention	Outreach patient		Store status of outreach (e.g., patient reached, unreachable, voicemail left)	Should				
Deliver navigation and coordination intervention	Register patient		Generate a record for a new patient (includes assigning a unique ID)	Should	Y	Y	Y	DEMOGRAPHICS
Deliver navigation and coordination intervention	Register patient		Store date/time of patient's registration	Should		Y		ENCOUNTER

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver navigation and coordination intervention	Register patient		Store encounter method (e.g., 1:1 or group)	Should		Y	Y	ENCOUNTER/SESSION
Deliver navigation and coordination intervention	Register patient		Store encounter type (e.g., in-person, telephone, text, email)	Should		Y	Y	ENCOUNTER
Deliver navigation and coordination intervention	Register patient		Store information identifying the care provider, coach, or interventionist to the encounter/session	Should		Y	Y	ENCOUNTER/SESSION/PROGRAM
Deliver navigation and coordination intervention	Register patient		Store patient information in one patient medical record (e.g., deduplication)	Should	Y	Y	Y	DEMOGRAPHICS, IDENTIFIER
Deliver navigation and coordination intervention	Register patient		Store payment level for the intervention/program (e.g., GOTR)	Should			Y	COST
Deliver navigation and coordination intervention	Register patient		Store receipt of payment of the session	Should			Y	COST
Deliver navigation and coordination intervention	Collect patient information		Calculate patient's age on date of visit (in years and months)	Should	Y	Y	Y	
Deliver navigation and coordination intervention	Collect patient information	Y	Flag missing contact or demographic information values and direct user to collect it	Should	Y	Y	Y	ENCOUNTER_ALERT, ALERT
Deliver navigation and coordination intervention	Collect patient information		Store historical values when contact or insurance information changes	Should	Y	Y	Y	IDENTIFIER
Deliver navigation and coordination intervention	Collect patient information		Store homelessness in a structured field	Should	Y	Y	Y	CENSUS_LOCATION
Deliver navigation and coordination intervention	Collect patient information		Store multiple values for patient race	Should	Y	Y	Y	DEMOGRAPHICS
Deliver navigation and coordination intervention	Collect patient information		Store patient and family contact information (address, phone number).	Should	Y	Y	Y	IDENTIFIER
Deliver navigation and coordination intervention	Collect patient information		Store patient date of birth	Should	Y	Y	Y	DEMOGRAPHICS

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver navigation and coordination intervention	Collect patient information		Store patient ethnicity	Should	Y	Y	Y	DEMOGRAPHICS
Deliver navigation and coordination intervention	Collect patient information		Store patient's gender identity	Should	Y	Y	Y	DEMOGRAPHICS
Deliver navigation and coordination intervention	Collect patient information		Store patient's insurance number	Should	Y	Y	Y	
Deliver navigation and coordination intervention	Collect patient information		Store patient's insurance provider	Should	Y	Y	Y	ENCOUNTER
Deliver navigation and coordination intervention	Collect patient information		Store patient's sexual orientation	Should	Y	Y	Y	DEMOGRAPHICS
Deliver navigation and coordination intervention	Collect patient information		Store patient's income information	Should	Y	Y	Y	
Deliver navigation and coordination intervention	Collect patient information		Store patient's household information	Should	Y	Y	Y	
Deliver navigation and coordination intervention	Assess patient needs		Store patient screening responses	Should				
Deliver navigation and coordination intervention	Assess patient needs		Store patient need for food assistance	Should				ASSET_DELIVERY
Deliver navigation and coordination intervention	Assess patient needs		Store patient need for housing assistance	Should				ASSET_DELIVERY
Deliver navigation and coordination intervention	Assess patient needs		Store screening instrument information	Should				
Deliver navigation and coordination intervention	Assess patient needs	Y	Calculate screening responses that require follow up and highlight for follow up (e.g., changes since last screening or response)	Could				
Deliver navigation and coordination intervention	Assess patient needs	Y	Display custom questions based on demographic or lifestyle factors (e.g., age)	Could				

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver navigation and coordination intervention	Assess patient needs	Y	Generate automated referrals or orders based on screening responses	Should	Y	Y		REFERRAL
Deliver navigation and coordination intervention	Assess patient needs		Store need assessment method (e.g., screening, patient-identified)	Could				
Deliver navigation and coordination intervention	Deliver care coordination		Store patient care coordination rationale (e.g., medical complexity)	Could				
Deliver navigation and coordination intervention	Deliver care coordination		Generate and store new or rescheduled encounters	Should				ENCOUNTER
Deliver navigation and coordination intervention	Deliver care coordination		Generate and store new or rescheduled procedures or laboratory tests	Should				PROCEDURE, LAB_RESULTS_CM
Deliver navigation and coordination intervention	Deliver care coordination		Generate referrals	Should		Y		REFERRAL
Deliver navigation and coordination intervention	Deliver care coordination	Y	Flag unresolved patient care coordination needs that require additional follow up	Could				
Deliver navigation and coordination intervention	Deliver care coordination		Store patient care barriers/issues	Could				
Deliver navigation and coordination intervention	Discuss resource options	Y	Display a searchable list of resources (customized based on screening responses, patient location, and eligibility criteria)	Could				
Deliver navigation and coordination intervention	Discuss resource options	Y	Display a summary of previously discussed resources	Could				
Deliver navigation and coordination intervention	Discuss resource options		Store which resources were discussed with patient	Could	Y	Y		
Deliver navigation and coordination intervention	Discuss resource options		Store which resources patient desires follow-up or enrollment	Could	Y	Y		
Deliver navigation and coordination intervention	Discuss resource options		Store estimation of time spent counseling on resources	Could		Y		

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Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver navigation and coordination intervention	Deliver asset	Y	Display a list of assets based on patient needs	Could				
Deliver navigation and coordination intervention	Deliver asset		Store asset delivered	Could	Y			ASSET_DELIVERY
Deliver navigation and coordination intervention	Deliver asset		Store date and time of asset delivery	Could	Y			ASSET_DELIVERY
Deliver navigation and coordination intervention	Deliver asset		Flag patient needs/screening response that asset addresses	Could				ASSET_DELIVERY
Deliver navigation and coordination intervention	Assess patient eligibility		Display eligibility criteria	Could				
Deliver navigation and coordination intervention	Assess patient eligibility		Store patient eligibility information	Could				
Deliver navigation and coordination intervention	Assess patient eligibility		Store patient eligibility	Could		Y		
Deliver navigation and coordination intervention	Complete application		Transmit application	Could				
Deliver navigation and coordination intervention	Complete application		Store applications completed with patient	Should				
Deliver navigation and coordination intervention	Provide education		Store educational topics discussed with patient	Could				
Deliver navigation and coordination intervention	Provide education		Store provided education materials	Should		Y		
Deliver navigation and coordination intervention	Complete navigation		Generate referrals	Should	Y	Y		
Deliver navigation and coordination intervention	Complete navigation		Store consent to receive text messages	Should				
Deliver navigation and coordination intervention	Complete navigation		Store date and time that visit was completed	Should		Y		

Business process	Task	CDS	Functional requirement: the system [should/could]...	Should/could	RQ1	RQ2	RQ3	Data model table(s)
Deliver navigation and coordination intervention	Complete navigation		Store follow-up visit plan (e.g., frequency)	Should	Y	Y		
Deliver navigation and coordination intervention	Record observations		Store clinical decision support alerts and actions	Should	Y	Y		
Deliver navigation and coordination intervention	Record observations		Store date/time documentation was completed	Should	Y	Y		
Deliver navigation and coordination intervention	Record observations		Store documentation status (e.g., complete)	Should	Y	Y		
Deliver navigation and coordination intervention	Record observations		Store provider notes	Should		Y		