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## **Care Plan Domain Analysis Model, Release 1**

May 2014

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## **HL7 Informative Ballot**

**Sponsored by:**  
**Patient Care Workgroup**

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**Structured Document Workgroup**

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## EXECUTIVE SUMMARY

### Project Overview

The scope of this project is to create a Domain Analyses Model (DAM) for the Care Plan (CP DAM). The Care Plan is a tool used by clinicians to coordinate care for an individual patient. The Care Plan is known by several similar and often interchangeable names such as the plan of care and treatment plan. It is acknowledged that the use of these similar names and their associated meanings are context, organization and realm specific. The Care Plan DAM uses the concept care plan in generic sense. This project encompasses several years of discussion and work within the HL7 Patient Care Work Group in collaboration with several other teams to produce artifacts defining requirements, information models, contextual storyboards and definitions of terms that collectively articulate the Care Plan process domain, Care Plan. One of the key objectives is to produce a care plan model and associated infrastructure robust enough to support the design and implementation of the variety of care plans known to this project

The Care Plan is a highly discussed topic in many healthcare venues throughout the world. Identification of what is needed within the Care Plan for coordination of care and healthcare in general is needed. There is strong support from multiple venues throughout the healthcare arena to define a domain analysis model (including the information model) for the Care Plan within HL7 as quickly as possible.

The Care Plan Topic is one of the rollouts of the Care Provision Domain Message Information Model (D-MIM). The Care Plan is a specification of the Care Statement with a focus on defined Acts in a guideline, and their transformation of those acts within an individualized care plan in which the selected Acts are added.

The purpose of the Care Plan as defined upon acceptance of the DSTU materials in 2007 is:

- Define the management action plans for the various conditions (for example problems, diagnosis, health concerns) identified for the target of care
- Organize a care plan and check for completion by all individual professions and/or responsible parties (including the patient, caregiver or family) for decision making, communication, and continuity and coordination
- Communicate explicitly by documenting and planning actions and goals
- Permit the monitoring, flagging, evaluating and feedback of the status of goals, actions, and outcomes such as completed, or unperformed activities and unmet goals and/or unmet outcomes for later follow up.
- Manage risk related to effectuating the care plan,

Generally a care plan greatly aids the team (responsible parties –) in understanding and coordinating the actions that need to be performed for the target of care.

The Care Plan structure is used to define the management of activities and goals for the various conditions identified for the target of care. It is the structure in which the care planning for all individual professions or for groups of professionals can be organized, planned and checked for completion. Communicating explicitly documented and planned actions and goals greatly aids the patient, their caregivers and the interdisciplinary team (including patients, providers, nurses, therapists, dietitians, case managers and disease managers) in understanding and coordinating the actions that need to be performed for the person. Care plans also permit the monitoring and flagging of unperformed activities and unmet goals for later follow up.

The artifacts contained within this Care Plan DAM articulate best practice of the Care Plan as discussed in the HL7 Patient Care Workgroup, Care Plan Initiative. These discussions have been in close concert with discussions occurring within the HL7 SOA Workgroup Care Coordination Service project, The HL7 Structured Documents Workgroup Care Plan Implementation Guide project, the ONC S&I Framework Longitudinal Coordination of Care (LCC) Community led initiative and the IHE Patient Care Technical

Committee Patient Centered Care Plan (PtCP) Profile project. The intention is to be collaborative, synergistic and supportive with each of these named efforts and projects.

## DAM Overview

215 This project provides guidance for the HL7 community on definitions of terms related to the “care plan”,  
contextual applications of the Care Plan through storyboards, and an overview that outlines the  
information needs of Care Plan. This Care Plan Domain Analysis Model (CP DAM) contains a broad  
spectrum of storyboards intended to describe the multiple settings and/or venues of care where care  
planning occurs and a Care Plan artifact exists. The CP DAM contains an information model created in  
220 tandem with the HL7 Service Oriented Architecture Workgroup. The CP DAM also includes a short list of  
functional requirements supporting the creation, use, storage and exchange of the Care Plan as well as a  
glossary clarifying use of the terms within this CP DAM.

## Ballot Scope

225 This ballot is limited to the documents contained within. There may be some overlap with other balloted  
documents within HL7 (such as the Care Coordination Service Functional Model and Profiles) Efforts  
have been made to minimize extent of overlap and to reference those relevant resources where  
appropriate. This CP DAM contains artifacts meant to be supportive and not antagonistic to these other  
efforts.

## 230 Out of Scope for this Ballot

The domain surrounding the Care Plan is quite large and complex. The areas below are recognized to be  
an important part of the Care Plan Domain but are not included in this ballot document. It is anticipated  
these areas will be addressed in subsequent versions and ballot documents of this CP DAM.

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## Reconciliation

240 A key component of clinical workflow is the ability to reconcile clinical data. Reconciliation of electronic  
clinical information from multiple data sources is a difficult task. It involves managing large amounts of  
clinical information that are often larger than most people can keep in working memory. When static Care  
Plans are exchanged reconciliation of two or more Care Plans must be considered. Content areas such  
as active problems, medications, allergies, goals and interventions might need reconciling. The CP DAM  
does not currently address reconciliation of the Care Plan. Synchronization and reconciliation of multiple  
care plans is addressed in the HL7 Care Coordination Services (CCS) functional model and capabilities  
co-authored by the HL7 Services Oriented Architecture and HL7 Patient Care Working Group. The  
245 storyboards that depict the reconciliation and synchronization process are in the CCS document.

## Quality Measures

250 Measuring and monitoring the impact Care Plans have on patient care outcomes is very important. The  
application and relationship of the CP DAM artifacts to the Quality Data Model (QDM), Quality Reporting  
Document Architecture (QRDA), Health Quality Measure Format (HQMF) has not yet been addressed.  
An initial activity needing attention is the harmonization of terms and definitions used within the CP DAM  
with the QDM definitions of similar terms. An example of the QDM term definitions is in Appendix 1.

Exploratory discussions between PCWG and CQI workgroup on how quality measures metrics can be  
reflected in care plan instantiation and implementation began at the September 2103 Workgroup meeting.



255 Initial analysis of the care plan structure appears to indicate that structural components of the care plan model is capable of supporting implementation of quality metrics. CQI plans to supply use cases, storyboards and sample quality metrics for further validation of the care plan model. Collaborations with CQI are continuing.

## 260 ***Application of Care Plan to Populations and Public Health***

The application of Care Plan to a population for public health purposes has not yet been discussed. It is conceivable the artifacts described in the CP DAM could apply to the overall care of populations and public health concerns. The appropriateness of this application and the adaptations needed to the model have not yet been addressed. An initial evaluation to determine the interest and need for this application also needs to be completed.

## **Target Audience of the CP DAM**

270 The CP DAM informs all stakeholders interested in the care planning information space. This includes the stakeholders listed in Table 2 of this document, but the HL7 domain analysis tool is specifically focused towards those interested in the HL7 Standards space including but not limited to:

- Developers of specifications that incorporate the Care Plan in other specifications to understand the context, uses and information needs of the Care Plan.
- Standard developers with an interest in care planning and related domains
- Software developers
- 275 • Software implementers
- Policy makers
- Subject matter experts
- Secondary users of Care Plan data
- Health Information Exchange

280 The CP DAM is intended to apply to the international audience of HL7.

## **Introduction**

285 The provision of healthcare today often encompasses multiple disciplines that may be spread across several sites of care. Coordinating the care provided and received from all settings/venues of care and team members can be challenging. It is not uncommon for miscommunication and/or errors or omissions in care to occur. Care Plan has been accepted as one of the effective tool to foster cross care team communications and care coordination. Care Plans can enhance understanding of other clinicians and patients for acute, short-term and chronic, long term conditions by enabling greater patient engagement and shared decision-making.

290 The term “care plan” is often used interchangeably with “plan of care”, “treatment plan” or other similar terms. The content and use of the “care plan” is not consistent and may often mean different things to different people. The Care Plan DAM recognizes the current practice to label artifacts serving as care planning tools with adjectives describing the scope of the plan. As such, the concept “care plan” is used 295 in a generic sense without any attempt to exert differentiation between the different types of plan that are

used and understood in varying ways by stakeholders based on the contexts and scope of use. Examples of these are Cardiovascular Plan of Care, Home Health Care Plan, Diabetes Management Plan, and Interdisciplinary Care Plan. The care plan model defined in this Care Plan DAM accommodates these descriptive titles to allow the greatest utility in all care situations.

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Chronic diseases are diseases that are persistent and can have long-term effects. "Chronic" is usually applied to diseases lasting over 3 months. Individuals of all ages are living longer with chronic illness and disability. The World Health Organization<sup>1</sup> estimates 63% of all annual deaths (~36 million people) are attributable to non-communicable or chronic diseases. As the number and complexity of health

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conditions increase over time and episodes of acute illness are superimposed, the number of care providers contributing to individual care increases as well. With this complexity, it becomes significantly more difficult to align and coordinate care among diverse providers who frequently span multiple sites.

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The numbers of health care service delivery encounters required by individuals, as well as the failure to deliver and coordinate needed services are significant sources of frustration and errors and are drivers of health care expenditures. According to claims data reported for US Medicare beneficiaries in 2003-2004, 19.6% of re-hospitalizations occurred 30 days after discharge. This translated into \$17.4 billion dollars in hospital payments from Medicare in 2004<sup>2</sup>. Providing person-centered care is particularly important for medically-complex and/or functionally impaired individuals given the complexity, range, and on-going and evolving nature of their health status and the services needed. Effective, collaborative partnerships between service providers and individuals are necessary to ensure that individuals have the ability to participate in planning their care and that their wants, needs, and preferences are respected in health care decision making.

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The ability to target appropriate services and to coordinate care over time, across multiple clinicians and sites of service, with the engagement of the individual (i.e. longitudinal coordination of care) is essential to alleviating fragmented, duplicative and costly care for these medically complex and/or functionally impaired persons.

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Efficient health information exchange to support coordination of care across multiple clinicians and care sites requires more than medication reconciliation and care summary exchanges. The availability and adoption of standards to support and inform care delivery independent of care setting is essential to alleviating fragmented, duplicative and costly care.

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Without a process to reconcile potentially conflicting plans created by multiple providers, it is difficult, if not impossible to avoid unnecessary and potentially harmful interventions. Without such a process, it is also difficult to shift the perspective of providers from the management of currently active issues to consideration of future goals and expectations. Similarly, the challenge of establishing a consensus driven process across multiple disciplines and settings is confounded by a fragmented system of policies, technologies and services.

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As information moves across settings in the longitudinal care space, Care Team Members need more information than standard chart summaries typically provide. Care Team Members, including patients, benefit from sharing comprehensive patient data and information, including the Care Plan.

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There is growing recognition of the need for and benefits of fully interoperable Health Information Technology (HIT) capabilities across care provider groups. Of importance are the information or data

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<sup>1</sup> World Health Organization, [http://www.who.int/features/factfiles/noncommunicable\\_diseases/en/index.html](http://www.who.int/features/factfiles/noncommunicable_diseases/en/index.html)

<sup>2</sup> Coleman, MD, MPH, Eric A. "Preparing Patients and Caregivers to Participate in Care Delivered Across Settings: The Care Transitions Intervention." *Journal of the American Geriatric Society* 52, (2004): 1817-1825.

<sup>3</sup> Institute of Medicine. "Crossing the Quality Chasm: A New Health System for the 21<sup>st</sup> Century." <http://www.edu/-/media/Files/Report%20Files/2001/Crossing-theQuality-Chasm/Quality%20Chasm%202001%20%20report%20brief.pdf>

needs of the medically complex and/or functionally impaired individuals. Effective, collaborative partnerships among service providers and individuals are necessary to ensure that individuals have the ability to participate in planning their care and that their wants, needs, and preferences are respected in health care decision making<sup>3</sup>. The identification and harmonization of standards for the longitudinal coordination of care will improve efficiencies and promote collaboration by:

- Improving provider's workflow by enabling secure, single-point data entry for data related to care coordination
- Eliminating the large amount of time wasted in phone communication and the frustrations on the side of the receiving provider in not always obtaining care transition and care planning information in a timely manner
- Reducing paper and fax, and corresponding manual processes during care coordination
- Supporting the timely transition of relevant clinical information at each point of care transition and as the patient's condition changes
- Enabling sending and receiving provider groups to initiate and/or recommend changes to patient interventions more promptly

This care plan DAM is intended to support an evolving model based on interdisciplinary patient centric care and delivery. It is recognized the use of care plans is currently highly varied with some organizations and clinical settings (e.g. Cancer Treatment Centers, Emergency Departments, trauma centers, Labor and Delivery) are providing clinical care with interdisciplinary patient-centric care plans (even if informally/ad hoc such as with the initial resuscitation of trauma patients where care planning is highly dynamic involving emergency physicians, trauma surgeons, emergency nurses, respiratory therapy, radiology technicians, interventional radiologists, and various surgical sub specialties like orthopedics, ENT/OFMS, and/or neurosurgery), and other settings use care plan tools in a highly specialized manner specific to unique care areas.

## Background

The care plan concept traditionally is known as a piece of paper that is updated either when a patient's condition changes, or according to rules or regulations. The application of the term "care plan", "plan of care" or "treatment plan" to these paper based tools has been somewhat arbitrary. There is a basic idea of what may be found under these headings, but there is no consistency from site to site or care giver to care giver.

Different disciplines apply the terms Care Plan, plan of care and treatment plan differently. Some include "Care Plan sections" within other notes, such as a discharge summary, while others have complete documents, sometimes many pages with the title of the document being "Care Plan". Each of these methods has a specific purpose that is necessary. It is not the position of this CP DAM to endorse one method over another. The CP DAM is to look at care planning information needs in a broad way and articulate requirements and an information model that supports the many methods of care planning and the variety of stakeholders.

Recently the topic of care plan and care coordination has become a focus of several national and international discussions. In the US the ONC Standards & Interoperability Framework has addressed the use of care plan and care plan components in both the Transfer of Care and Longitudinal Care Coordination Initiatives, the National Quality Forum has sponsored Technical Expert Panels and the development of quality measures related to care plan. The Patient Care Coordination Committees at IHE (Integrating the Healthcare Enterprise) and multiple workgroups at HL7 have all had projects related to defining care plan elements and promoting interoperability of the artifacts. This CP DAM committee has worked diligently to share, collaborate and coordinate this effort with the efforts these other organizations to remain closely aligned. Although impossible to maintain complete agreement it is a shared goal of all interested parties to share and cross pollinate between the efforts towards a more cohesive and aligned vision and direction.

The Care Plan DAM approaches the definition of care plan from a functionally driven perspective. The CP DAM defines a care plan as a planning and coordination tool to assist in delivery of integrated/collaborative care by a health care team within which the patient is the center of the team. A care plan supports the inclusion of health concerns and risks, health goals, care preferences and barriers, interventions, and iterative reviews during the planning and implementation phases of collaborative care. The care plan also supports communication of the whole, or parts of the plan, acceptance (or not) of the plan, and synchronization or reconciliation of multiple plans.

## **Significant Terms**

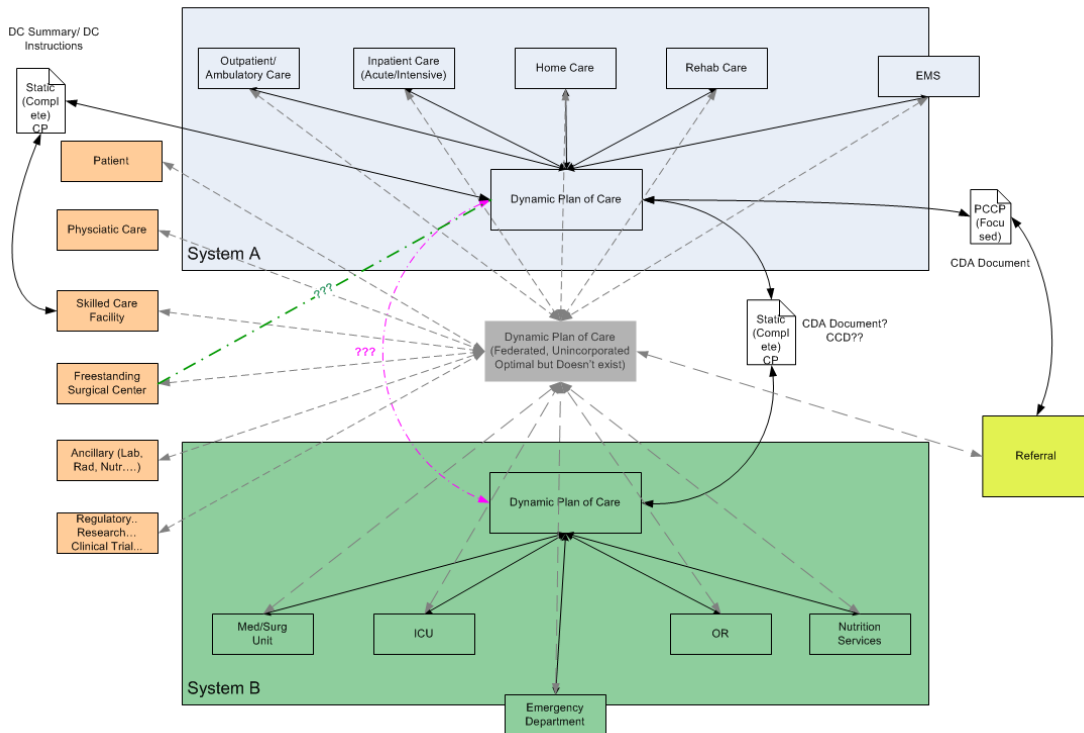
The United States Office of the National Coordinator (ONC) S&I Framework Longitudinal Care Coordination (LCC) Community Initiative has defined Care Plan, Plan of Care and Treatment Plan as distinctly unique but related entities. In the course of developing the CP DAM the HL7 Patient Care Workgroup spent significant time internally and reaching out to other interested parties, intensely researching, discussing and debating the definition of these three terms. Over time, the PCWG team acknowledged the concepts have been, and will continue to be used interchangeably or somewhat differently. The legacy of these terms is deeply entrenched in clinical and/or business uses by multiple stakeholders. They are likely to continue to be understood and used in different ways depending on the preference, culture, experiences, context of use, and funding models under which they operate. It is recognized that changing this deeply rooted cultural interchangeability of the terms is beyond the scope of this Domain Analysis Model. The Care Plan DAM will use the concept “care plan” in the generic sense. The key objective of the project is to ensure that the care plan model and its accompanying infrastructures are fully capable of supporting the different uses and can be labeled accordingly in care planning, care coordination and care plan sharing activities.

As these definitions continue to be included in the artifacts of the ONC S&I Framework the HL7 Care Plan DAM will monitor the evolution of the term usage and if appropriate revisit the inclusion of the definitions at another time.

## **Dynamic vs. Static Care Plan**

While the CP DAM is limited in scope and does not address processes associated with care planning, it does recognize the difference between static care planning and dynamic care planning. While all care planning could be considered dynamic and constantly changing, the CP DAM recognizes the power of computers allows the Care Plan to be managed in ways not possible with paper.

Figure 1 illustrates a collaborative care model where the Care Plan is dynamically updated and maintained by multiple organizations and providers. The central gray box indicates a future state of a federated Care Plan existing in a cloud-like architecture. While not currently supported through available Clinical Information Systems and security structures, thought leaders in care coordination envision this as an ultimate tool in flexibility, accuracy and accessibility of all information needed by patients and care team members to obtain the highest quality of care at the lowest cost. The diagram is included here to give insight to a potential path the Care Plan may have. This line of thinking was considered when developing the Care Plan information model.



**Figure 1. Collaborative Care Model**

Dynamic Care Plans are plans related to the care of a patient that are developed, shared, actioned and revised in real-time by participating care providers via a collaborative Care Plan management environment supported by complex workflow management tools. Dynamic Care Plans are organic, may be coordinated by a care coordinator if needed, or self governed by all team members. Ultimately the dynamic Care Plan contains links to relevant patient information (where appropriate and feasible, i.e. privacy and security permit), and other supportive tools such as evidence-based resources, and real time quality dashboards with outcome data.

Limitations in information system architecture, and healthcare cultural issues such as who “owns” the Care Plan, how items are added, deleted updated etc. makes the near term implementation and use of dynamic Care Plans unlikely. As dynamic Care Plans are currently not entirely supported for all care settings, it is realized a more supportable and realistic model for Care Plans is data and information that can be exchanged across care settings. Static exchanged Care Plans are essentially a snap shot of the patient’s master Care Plan at a point in time. They are usually communicated after an episode of care often together with referral/request for services to target care providers. A static exchanged Care Plan is helpful in communicating relevant care plan information to other care team members, but it is recognized in complex cases with multiple care team members it is “out-dated” as soon as it is created. Updating static exchanged Care Plans is dependent on human intervention, typically the next care team member assuming coordination of care for the patient. This method may overlook minor updates or changes by other team members participating in the care of the patient.

## Stakeholders

465 The ONC S&I Framework Community Initiative has identified Communities of Interest who are public and private stakeholders directly involved in the business process, in the development and use, and/or in actual implementation of Care Plans. Communities of Interest may directly participate in the exchange of Care Plans; that is, they are business actors or are affected indirectly through the results of the improved business process.

470 Table 1 is the list of Communities of Interest and their definitions as defined by the ONC S&I Framework LCC Community.

Member of Communities of Interest	Definition
Patient	Member of the public who requires healthcare services from acute care and ambulatory facilities, emergency department, Physician's office, and/or the public health agency/department and LTPAC sites of care.
Consumer	Member of the public that includes a patient as well a caregiver, patient advocate, surrogate, family member, and other party who may be acting for, or in support of, a patient receiving or potentially receiving healthcare services.
Care Coordinator / Care Manager	Individual who supports a patient and/or other consumer by coordinating with clinicians in the management of health and disease conditions, physical, cognitive functioning, psychosocial aspects of care, and issues related to health and human services. This includes case manager and others.
Caregiver	A caregiver typically focuses on helping the patient carry out Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs). The caregiver can also assist the patient in carrying out medication self-administration and/or treatments intended to help heal or palliate health condition(s) and convey information about the patient's response to the care plan to the providers and relevant parties. This individual may be authorized by the patient to receive Personal Health Information (PHI) that is used to inform the type, methods, and frequency of care activities provided in the home in keeping with the patient's wishes and/or directions.
Surrogate	Individual designated as a legal default decision-maker or health care proxy or agent for the patient when the patient is unable to make decisions or speak for himself or herself about personal health care. This individual may be selected by the patient and/or patient's caregiver or family members.
Clinician	Healthcare provider with patient care responsibilities, including physician, advanced practice nurse, physician assistant, nurse, psychologist, pharmacist, therapists (including physical and occupational therapists, and speech language pathologists), medical social workers and other licensed and/or credentialed personnel involved in treating patients.
Laboratory	Setting where specimens are sent for testing and analysis are resulted, and then results are communicated back to the requestor. Patients may be sent to laboratories to have samples drawn. The types of laboratories may include clinical/medical, and environmental, and may be both private and/or public.
Pharmacy	Entity that exists as an expert on medication therapy and is the primary health professional that optimizes medication use to provide patients with positive health outcomes.

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Care Team Member	Party who manages and/or provides care or service as specified and agreed to in the Care Plan, including clinicians, other paid and informal caregivers, communication sponsor and the patient. Note: In some settings the Care Team is a separate group of people whose responsibility it is to formalize a Care Plan and possibly even to implement or coordinate its implementation. This group of people may or may not include any or all members of the patient's rendering team of healthcare professionals. Members of the Care Team are typically selected because of their comprehensive knowledge of the patient's condition(s) and/or due to their knowledge of the healthcare business rules governing aspects of patient care or its financing. For this reason the term Care Team is capitalized to indicate the specific group of individuals who create the content of the structured document referred to as Care Plan.
Provider	Provider of medical or health services and any other person or organization who furnishes, bills, or is paid for health care in the normal course of business. This includes a licensed/certified and/or credentialed person who provides health and/or human services, who is authorized to implement a portion of the Care Plan and who has patient care responsibilities (e.g., physicians, advanced practice nurses, physician assistants, nurses, nurse care managers, psychologists, therapists, pharmacists, dietitians, Accountable Care Organizations, Patient Centered Medical Home etc.). This also includes organizations including, but not limited to hospitals including short-term acute care hospitals and specialty hospitals (e.g., long-term care hospitals, rehabilitation facilities, and psychiatric hospitals, etc.), ambulatory centers, provider practices, nursing facilities, home health providers, home and community-based service providers (e.g., home-based care, hospice, adult daycare centers, etc.), and human and social service providers (e.g., behavioral health, transportation, etc.).
Healthcare Payer	Any private or public entity that finances health care delivery or organizes health financing. This includes commercial for-profit health insurers, non-profit health insurers, ERISA self-insured, state and federal department agencies that oversee Medicaid and Medicare health services delivery. The payer can be actively involved with the member to influence cost effective evidenced based outcomes.
Healthcare Administrator and Manager	Individual with patient information and medical records management responsibilities including Health Information Management (HIM) personnel, Registered Health Information Administrator (RHIA), Registered Health Information Technicians (RHIT), Inpatient/Outpatient Clinical Coding Specialists, Medical Transcription Specialists, Medical Records Safety and Security staff, Quality Assurance and Improvement personnel, Physician Practice Managers, Pharmacy Benefit Managers, Nurse Discharge Planner, Nurse Care Manager, and other management personnel or entities involved in managing

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	patient information.
Agent (Clearing Houses and other entities as defined by Health Insurance Portability and Accountability Act (HIPAA) including Health Information Handlers)	Any organization that handles health information on behalf of a provider as a covered entity or under a Business Associate Agreement (BAA). Many providers already use Agents to submit claims, provide electronic health record systems, etc. Organizations that are Agents include but are not limited to Claim Clearinghouses, Release of Information vendors, Health Information Exchanges, Electronic Health Record vendors, etc.
EHR/PHR and HISP Vendor	Entity that provides specific EHR/PHR solutions to clinicians such as software applications and software services. These suppliers may include developers, service providers, resellers, operators, and others who may provide these or similar capabilities.
Other Healthcare Vendor	Vendor that provides health care solutions other than EHR/Electronic Medical Record (EMR)/Personal Health Record (PHR) solutions such as software applications and services. Examples include integration vendors, data providers, medical device vendors, Remote Monitoring Management System (RMMS) vendors, diagnostic imaging service providers, clinical order system supply vendors, transcription service vendors, clearinghouses, drug knowledge suppliers, network infrastructure providers, Clinical Decision Support (CDS) resource systems, practice-based registry system suppliers, public health registry systems, immunization information system providers, clinical genetic database/repository system vendors, practice management systems, care management/disease management system vendors, and patient accounting systems, etc.
Health Information Exchange/Health Information Organization (HIE/HIO)	Organization dedicated to the mobilization of healthcare information electronically across organizations within a region, community or hospital system.
Regional Extension Center (REC)	Entity that supports and serves health care providers to help them quickly become adept and meaningful users of EHRs. RECs provide training and support services to assist doctors and other providers in adopting EHRs, offer information and guidance to help with EHR implementation, and give technical assistance as needed. Originally sponsored through ONC REC Grant Program.
Health Information Service Provider (HISP)	Entity that serves as a node on the National Health & Information Network to enable a private, secure and safe alternative method to send and receive sensitive health information.
Standards Organization	Organization whose purpose is to define, harmonize and integrate standards that will meet clinical and business needs for sharing information among organizations and systems.



Federal Agency	Organization within the federal government that delivers, regulates or provides funding for health care, long-term care, and/or human services.
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Table 1. List of Stakeholders

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## Project Goals

480 The goal of this CP DAM is to create a platform for discussion of terms and artifacts related to care coordination. There is a desire for a common understanding of terminology and artifacts created by, stored, used, and updated during care coordination, however the long history of various applications of similar terms and artifacts is recognized. Effort has been made to discover, discuss and articulate an information model that is flexible to meet needs of today as well as a vision for the future. Effort has been made to collaborate with other interested parties from many international venues and to incorporate the latest thinking towards meeting the needs of care coordination. This CP DAM is a first attempt at articulating the domain of the care plan. It is expected to generate more discussion and evolve over time.

485 An additional goal for the CP DAM was to create a model for a generic care plan concept applicable for use in all care plan needs of various detail and scope. Using this model for all care plan needs such as Physical Therapy Treatment Plan for Fall Prevention, Nutrition Treatment Plan for Pressure Ulcer Management, Invasive Line Treatment Plan for Catheter Related Infection Prevention, Cardiovascular Plan of Care, Diabetes Care Management Plan, and Comprehensive Patient Care Plan allows for

490 interoperability, reconciliation/synchronization and greater care collaboration.

## Assumptions

495 The CP DAM assumes the care team actively involved in creating, updating and using the Care Plan includes the patient of focus for the Care Plan, any family or community care givers, and all disciplines of professional and semi-professional caregivers such as physicians, nurses, therapists, nutritionists, nursing and medical assistants etc.

## Out of Scope

500 The CP DAM is limited to articulating the data and information used to create, store, access, update and use a Care Plan. The process surrounding care planning is not fully addressed or articulated in this CP DAM. They storyboards are provided as examples of the context in which the Care Plan is used. These are not intended to promote a specific care planning process.

505

## CARE PLAN DOMAIN ANALYSIS MODEL ARTIFACTS

### Storyboards

510 The storyboards are narrative descriptions of clinical scenarios where the Care Plan is created, accessed, updated or used during the provision of healthcare. The storyboards provide context to the information collected, retrieved, presented and reported in Care Plans.

The topics of storyboards contained in this CPDAM are intended to describe the wide variety of care setting and criticality of care where Care Plans are applied.

### Storyboard Elements

**Short Description** - typically a brief statement that conveys the role and purpose of the specific use case.

**Actors and Roles**—individuals who initiate an action that requires the system to respond

520 **Pre-Conditions**—document the business or system states that are necessary prior to the storyboard encounter

**Description of Encounter**—the primary path and tasks performed between the actors or the system

**Post-Conditions**—describe the potential states after the encounter

525

### Participant Information for Storyboards

The Care Plan DAM uses the HL7 defined participant roles and patient types.

### Storyboard 1: Acute Care

#### **Short Description of the health issue thread covered by this storyboard**

535 The purpose of this storyboard is to illustrate the dynamic nature of care plans, which are informed by additional information and changes in status of associated health concerns, actions, goals and relevant clinical information including observations and results. It also helps to illustrate that Care Plans may not just be valuable in long-term care or management of chronic conditions, but also are important in acute care, even if a care plan is only in place for a matter of minutes.

540 The key point is that care plans may be episodic or longitudinal, depending on the context of use, and can capture care, which is intended, scheduled, requested, and delivered. This approach takes a forward-looking expression of what *should* happen, while also capturing what *actually* happened.

This storyboard consists of these patient encounters:

- A. Primary Care Provider Encounter
- B. Second Outpatient Encounter
- C. Emergency Medical Services and Pre-hospital Care
- D. Emergency Department Encounter

### **Storyboard Actors and Roles**

- Emergency Physician: Dr. Erik E. Mergency, MD
- Emergency Physician (medical control): Dr. Archie Emergency, DO
- Primary Care Provider: Dr. Paul Primary, MD
- Patient: Robert Anyman
- Triage Nurse: Pat Sorter, RN/BSN, CEN
- Emergency Nurse: Jean Careful, RN/BSN, CEN
- Respiratory Therapist: Brie Theepley, RRT
- Paramedic (EMT-P): Sam Scooper

### **Encounter A: Primary Care Provider Encounter**

#### **Pre-condition**

Mr. Anyman is a 26 year-old married man with a history of migraine headaches, who presents to his regular physician (Dr. Primary) with a month of symptoms of depressed mood, irritability, early morning awakening (terminal insomnia), and loss of enjoyment of social activities. He has some problems with work, particularly getting to work on time in the morning. His only chronic medications are atenolol 25 mg daily for migraine headache prophylaxis, ibuprofen and sumatriptan for abortive therapy of migraines.

#### **Description of Evaluation and Management**

Dr. Primary performs a history and physical examination, as well as administers two standardized assessment scales for depression severity (PHQ-9 and HADS). Dr. Primary discusses the nature of depression, and asks Mr. Anyman to consider which symptoms are most bothersome and use these to set goals. Mr. Anyman indicates that sleep related issues and difficulty waking up in the morning were the biggest problem, and his wife had expressed some concern that he was shaving, showering and dressing more professionally less often than desired. These are agreed upon goals. He prescribes a SSRI class antidepressant as part of order sets and a care plan for major depressive disorder in adults. The plan includes a referral to a non-physician mental health provider for evaluation for cognitive behavior therapy, assessment of response to the SSRI antidepressant, screening for suicide risk, screening for substance abuse, and a follow up visit in four weeks.

#### **Post-condition**

Both the PHQ-9 and HADS indicate moderately severe depression, the screen for suicide indicates low risk, and the substance abuse screen indicates occasional binge drinking. The patient is given information regarding community resources, a copy of *The Feeling Good Handbook*, and a referral to a therapist, which is included in his insurance coverage, as well as suicide precautions, and the link to the practice's patient portal, where he is asked to do on-line PHQ-9 and HADS. An electronic prescription for a month's worth of citalopram 20 mg daily #30, and temazepam 15 mg as needed at bedtime #6. After

he schedules a follow up visit, and an initial evaluation with the therapist he is discharged to home.

## Encounter B: Second Outpatient Encounter

### Pre-condition

Soon after starting on the SSRI. Mr. Anyman noted increasing frequency and severity of headaches. These were similar to his usual migraine headaches, and on three occasions had to leave work or call in sick due to severity.

### Description of Clinic Visit #2 Evaluation and Management

Dr. Primary determines that the citalopram is a likely cause, and discontinues the medication, noting a possible adverse reaction to the medication. Nortriptyline 25 mg by mouth at bedtime, with increasing doses every few days to a target dose of 150 mg is prescribed for both depression and migraine headache prophylaxis.

### Post-condition

Self-care instructions updated to indicate need to track orthostatic symptoms, arise slowly from bed to avoid syncope, and methods for mitigation of anticholinergic symptoms. Updated prescriptions sent electronically, and patient's care plan tracking method (part of patient record) updated with new goal (to return to full function without headaches). Notice sent to mental health provider, updating the referral letter.

## Encounter C: Emergency Medical Services and Pre-hospital Care

### Precondition

The patient's wife has called for an ambulance after he took an overdose of tricyclic antidepressants (TCA) he had been prescribed for migraine prophylaxis and depression. The EMS unit consists of a basic emergency medical technician (EMT-B) and Mr. Sam Scooper, the paramedic (EMT-P). Dr. Mergency is working in the community hospital where the EMS agency routinely transports critically ill patients. Dr. Archie Emergency provides on-line medical control for the EMS unit after their initial evaluation of the patient.

Several standing orders are in place in both the emergency department and the EMS unit, which define specific actions to take, given a particular set of preconditions.

### Description of EMS Evaluation and Transportation

The patient has a mild tachycardia, is somewhat agitated, and is confused as to date/time and circumstances why they took the overdose. The paramedic contacts the regional poison control center, and is advised to administer activated charcoal. The paramedic contacts medical control (Dr. Emergency) who orders physical restraints as needed, and starts an intravenous line with normal saline if it will not delay transport. Cardiac and vital sign monitoring is established en route to the hospital with an ETA of 5 minutes.

### Post-condition

The patient's depression care plan is currently in limbo, as more pressing items supplant the requirements. The paramedic documents the new care plan, consisting of 4-point soft restraints, oral administration of activated charcoal, monitoring, establishing intravenous access, and transportation to the nearest emergency department.

## Encounter D: Emergency Department Encounter

### *Pre-condition*

635 The patient arrives to the emergency department and is triaged into a high acuity bed. The initial set of vital signs obtained by the paramedic en route to the ED shows HR 106, BP 134/88, RR 18, SaO<sub>2</sub> 99% on room air. The patient has not complied with requests to consume the activated charcoal by mouth.

### *Description of ED Course*

640 The initial care plan is dictated by standardized procedures for a potentially suicidal patient and for potential drug ingestion. Upon entry of the potential ingestion, specific orders are added to the plan. This includes a 12 lead ECG, comprehensive metabolic profile, serum acetaminophen level, serum aspirin level, activated charcoal, urinalysis, serum TCA level, blood alcohol level, urine toxicology screen, intravenous line with normal saline.

645 The 12 lead ECG and activated charcoal administration are automatically triaged as the highest priority activities. These occur in conjunction with establishing vascular access, drawing blood, re-attaching restraints.

650 The patient continues to balk at swallowing the activated charcoal, so a nasogastric tube is added to the care plan to administer it. However, the plan components enable the detection of a potential risk of aspiration with placement of the plan as potentially detrimental.

655 The ECG is reviewed by Dr. Mergency while Jean Careful coaxes Mr. Anyman to drink the charcoal. The ECG reveals a sinus tachycardia with a HR of 134, QRS of 110 ms, and QTc of 420 ms. The plan is updated and a bicarbonate drip is ordered from the pharmacy and a bolus of sodium bicarbonate ordered.

660 As that is being prepared, Mr. Anyman has a seizure. Execution of the care plan continues with a bolus of sodium bicarbonate ordered in response to the wide complex tachycardia that appeared shortly after the onset of the seizure. Dr. Mergency requests that the patient be prepared for intubation as he orders intravenous lorazepam to combat the seizure.

665 The intubation plan includes multiple drugs that are weight adjusted automatically by the emergency department information system. Current medications and health concerns (including allergies) are queried from the health information exchange to facilitate the decision support system. The wide complex tachycardia converts into a sinus tachycardia after the first dose of sodium bicarbonate.

670 The patient is given intravenous fentanyl, lidocaine, and a low dose of vecuronium. The care plan includes an automatic request for respiratory therapy to set up a ventilator, arterial blood gases, and a portable chest radiography. After succinylcholine and 10 mg of midazolam (given because the lorazepam could not be located quicker than the vial of midazolam in the intubation drug box) the placement of the tube confirmed by EtCO<sub>2</sub>.

675 Once the last of the intubation plan items were completed, the ventilator management plan was finalized with ventilator settings and continued sedation. To monitor for recurrent seizures the plan was adapted to exclude ongoing neuromuscular blockade.

Vital signs showed a continued sinus tachycardia with a HR of 136, BP of 102/62, SaO<sub>2</sub> of 100% on FiO<sub>2</sub> of 0.5 and MMV of 10L/min.

680 The bicarbonate infusion is begun at a rate of 150 cc/hr, and a medical toxicology consultation instantiated to discuss need of continual lidocaine infusion. An orogastric tube is placed, and activated charcoal administered.

685 Repeat blood pressure measurement shows a HR of 132, BP 90/42. The care plan is adapted, as the decision support system advises rechecking a 12 lead ECG, and giving another bolus of bicarbonate if the QRS is widened. Otherwise a norepinephrine infusion is prepared and the care plan adapted to titrate to a MAP > 70. Blood gasses show a mixed respiratory and metabolic alkalosis with a pH of 7.5.

### **Post-condition**

690 The patient has a care plan in place accommodating multiple plans for the various treatments occurring: titration of norepinephrine and bicarbonate infusion to manage hemodynamics; bicarbonate infusion, hyperventilation and bicarbonate infusion to manage the TCA toxicity (by reducing the free TCA, as binding to albumin occurs at alkaline pHs), as well as multiple dose activated charcoal. Sedation for ventilation is ongoing with fentanyl and midazolam. The patient is transferred to the ICU. The care plan is used to coordinate care.

695

## **Storyboard 2: Chronic Conditions**

### **Short Description of the health issue thread covered in the storyboard**

700 The purpose of the chronic conditions care plan storyboard is to illustrate the communication flow and documentation of a care plan between a patient, his or her primary care provider and the home health specialists involved in the discovery and treatment of a case of Type II Diabetes Mellitus. This health issue thread (simplified) consists of four encounters, although in reality there could be many more encounters:

- 705
- A. Primary Care Physician Initial Visit
  - B. Allied Health Care Provider Visits
  - C. Hospital Admission
  - D. Primary Care Follow-up Visits

710 Care coordination should occur throughout the health issue thread, across several care settings and several care providers/givers. It is briefly discussed later in this document, after the series of encounters.

### **Storyboard Actors and Roles**

- 715
- Primary Care Physician: Dr. Patricia Primary
  - Patient: Mr. Bob Anyman
  - Diabetic Educator: Ms. Edith Teaching
  - Dietitian/Nutritionist: Ms. Debbie Nutrition
  - Exercise Physiologist: Mr. Ed Active
  - Optometrist: Mr. Victor Vision
  - Pharmacist: Ms. Susan Script
  - 720 • Podiatrist: Mr. Barry Bunion
  - Psychologist: Mr. Larry Listener
  - Hospital Attending Physician: Dr. Allen Attend

## Encounter A: Primary Care Physician Initial Visit

### 725 *Pre-conditions*

Patient Mr. Bob Anyman attends his primary care physician (PCP) clinic because he has been feeling generally unwell in the past 7-8 months. His recent blood test results reveal abnormal glucose challenge test profile.

### *Description of Encounter*

730 Dr. Patricia Primary reviews Mr. Anyman's medical history, presenting complaints and the oral glucose tolerance test results and concludes the patient suffers from Type II Diabetes Mellitus (Type II DM). Dr. Primary accesses Mr. Anyman's medical record, and records the clinical assessment findings and the diagnosis.

735 Dr. Primary discusses with Mr. Anyman the identified problems, potential risks, goals, management strategies and intended outcomes. After ensuring that these are understood by the patient, Dr. Primary begins to draw up a customized chronic condition (Type II DM) care plan based on a standardized multi-disciplinary Type II DM care plan adopted for use by her practice. Agreed goals and scheduled activities specific for the care of Mr. Individual are entered into the new care plan.

740 Dr. Primary also discusses with the patient the importance of good nutrition and medication management and exercises in achieving good control of the disease, as well as the criticality of good skin/foot care and eye care to prevent complications. Scheduling of consultations with diabetic educator, dietitian, exercise physiologist, community pharmacist, optometrist, and podiatrist (allied health care providers) is discussed and agreed to by the patient. The frequency of visit to allied health care providers is scheduled according to the national professional recommendation for collaborative diabetes care.

745 Dr. Primary also notices signs and symptoms of mood changes in the patient after the diagnosis is made. She recommends that the patient may benefit from seeing a clinical psychologist to which the patient also agrees.

750 Dr. Primary generates a set of referrals to these allied health care providers. The referrals contain information about the patient's medical history including the recent diagnosis of Type II diabetes, reasons for referral, requested services and supporting clinical information such as any relevant clinical assessment findings including test results. A copy of the care plan agreed to by the patient is attached to the referral.

### *Post Condition*

Once the care plan is completed, it is committed to the patient's medical record. The patient is offered a copy of the plan.

760 A number of referrals in the form of notification/request for services together with a copy of the care plan are sent to the relevant health care providers

765 The patient is advised to follow the referral practice/protocol specific to the local health care system or insurance plan. For the first appointment, the patient may wait for scheduled appointments from the relevant health care providers to whom referral/request for services have been sent, or may be able to schedule his own appointment using booking systems of the specialist or allied health providers.

## Encounter B: Allied Health Care Provider Visits

### *Pre-Condition*

770 Individual allied health care provider has received a referral with copy of care plan from Dr. Patricia Primary.



The allied health care provider has accepted the referral and scheduled a first visit with the patient – Mr. Bob Anyman.

The case has been assigned to the following individual allied health care providers:

- 775 A. Ms. Edith Teaching (Diabetic Educator) for development and implementation of comprehensive diabetic education program and plan to ensure that the patient understands the nature of the disease, the problem, potential complications and how best to manage the condition and prevention of potential complications
- 780 B. Ms. Debbie Nutrition (Dietitian/Nutritionist) for development and implementation of a nutrition care plan for diabetes to ensure effective stabilization of the blood glucose level with the help of effective diet control
- C. Mr. Ed Active (Exercise Physiologist) for development and implementation of an exercise regime
- 785 D. In certain country (e.g. Australia), the community pharmacist (Ms. Susan Script) provides patient with education on diabetic medications prescribed for the patient by Dr. Primary, and development and implementation of an effective and safe medication management program. The objectives are to gain and maintain effective control of the condition and to prevent hypo- and hyper- glycemic episodes.
- 790 E. Mr. Larry Listener (clinical psychologist) for counseling and to develop and implement an emotional support program; this includes a plan to reduce the impact of emotional stress brought about by the newly diagnosed condition and to improve the patient's psychological well being. The plan may include enrolling patient in diabetic support group.
- F. Mr Victor Vision (Optometrist) for regular (e.g. 6 monthly) visual and retinal screening and to educate patient on the eye care and how best to prevent/minimize the risks of ocular complications
- 795 G. Mr Barry Bunion (Podiatrist) for education on the risks of foot complications and to develop and implement an effective foot care program including regular self-assessment, care of the feet and follow-up visits.

### **Description of Allied Health Care Provider Encounter**

800 The patient is registered at the allied health care provider's reception. Any additional or new information provided by the patient is recorded in the health care record system operated by the allied health provider clinic.

During the first consultation, the allied health care provider reviews the referral and care plan sent by Dr. Primary.

805 During subsequent consultation, the allied health care provider reviews the patient's health care record and most recent care plan of the patient kept in the allied health care provider care record system.

810 At each consultation, the allied health care provider reviews the patient's health record, assesses the patient, checks the progress and any risks of non-adherence (compliance) and complications, and discusses the outcomes of the management strategies and/or risks. Any difficulties in following the management strategies or activities by the patient are discussed. Any new/revised goals and timing, new intervention and self-care activities are discussed and agreed to by the patient. The new/changed activities are scheduled and target dates agreed upon.

815 The allied health care provider updates the clinical notes and the care plan with the assessment details, and any changes to the management plan including new advices to the patient. The date of next visit is also determined.



HL7 PCWG Care Plan DAM

<b>Provider / Allied Health Provider</b>	<b>Encounter Activities</b>	<b>Outcomes</b>	<b>Communications</b>
Diabetic Educator	<p>Review referral/patient progress</p> <p>assess learning needs and strategy</p> <p>discuss and finalize education plan</p>	<p>Develop/update education plan</p> <p>Update clinical notes</p> <p>Generate progress notes</p>	<p>New/updated education plan to patient</p> <p>Summary care plan and progress note to primary care provider and to others, e.g. dietitian, pharmacist, etc..</p>
Dietitian/Nutritionist	<p>Review referral/patient progress</p> <p>Assess diet management needs and strategies</p> <p>Discuss and finalize diet management plan</p>	<p>Develop/update diet plan</p> <p>Weight assessment; Exercise plan</p> <p>Diet management plan;</p> <p>Referral to educator and exercise therapy if necessary</p> <p>Update clinical notes</p> <p>Generate progress notes</p>	<p>New/updated care plan to patient</p> <p>Summary diet plan and progress note to primary care provider and to others, e.g. diabetic educator, exercise physiologist, etc.</p>
Exercise Physiologist	<p>Review referral/patient progress</p> <p>Assess exercise/activity needs and strategies</p> <p>Discuss and finalize exercise plan</p>	<p>Develop/update exercise plan:</p> <p>Weight assessment; exercise plan</p> <p>Update clinical notes</p> <p>Generate progress notes</p>	<p>New/updated exercise plan to patient</p> <p>Summary care plan and progress note to primary care provider and to others, e.g. diabetic educator, dietitian, etc.</p>
Community Pharmacist	<p>Review patient medication profile</p> <p>Assess medication management (education, conformance, etc.) needs and strategies</p> <p>Discuss and finalize medication management plan</p>	<p>Develop/update medication management plan:</p> <p>patient current medication list assessment result;</p> <p>recommendation on meds management; referral to other provider(s) if necessary</p> <p>dispense record on dispensed meds</p> <p>Update clinical notes</p> <p>Generate progress notes</p>	<p>New/updated medication management plan to patient</p> <p>Summary care plan and progress note to primary care provider and to others, e.g. diabetic educator, dietitian, etc.</p>

## HL7 PCWG Care Plan DAM

Clinical Psychologist	<p>Review referral/patient progress</p> <p>Assess emotional status, coping mechanisms and strategies</p> <p>Discuss and finalize psychological management plan</p>	<p>Develop/update psychological management plan:</p> <p>Emotion assessment;</p> <p>Psychotherapy session plan</p> <p>Update clinical notes</p> <p>Generate progress notes</p>	<p>New/updated psychological management plan to patient</p> <p>Summary care plan and progress note to primary care provider and to others, e.g. diabetic educator, pharmacist, etc.</p>
Optometrist	<p>Review referral/patient progress</p> <p>Assess eye care needs and strategies</p> <p>Discuss and finalize eye care plan</p>	<p>Develop/update eye care plan:</p> <p>Regular eye checks for early detection of Diabetic retinopathy (1 yearly to 2 yearly depending on national protocol and how advanced is DM)</p> <p>Stop smoking (prevent smoking related damage to eye cells)</p> <p>Wear sun glasses when in sun (prevent VU accelerating eye damage) – dispense prescription sun glasses if necessary;</p> <p>Referral to Dietitian/Nutritionist for counseling on diet rich in fruits and green leafy veg and Omega 3 fats along with effective weight control</p> <p>Update clinical notes</p> <p>Generate progress notes</p>	<p>New/updated eye care plan to patient</p> <p>Summary care plan and progress note to primary care provider and to others, e.g. diabetic educator, pharmacist, etc.</p>
Podiatrist	<p>Review referral/patient progress</p> <p>Assess foot care needs and strategies</p> <p>Discuss and finalize foot care plan</p>	<p>Develop/update foot care plan</p> <p>Foot assessment</p> <p>Foot care plan</p> <p>Update clinical notes</p>	<p>New/updated foot care plan to patient</p> <p>Summary care plan and progress note to primary care provider and to others, e.g. diabetic educator, dietitian, pharmacist, etc.</p>

		Generate progress notes	
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Table 2. Allied Health Encounter – Activities and Outcomes

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### Post Condition

An updated allied health domain specific care plan complete with action items and target dates is completed with patient agreement.

825 The patient is given a copy of the new/updated care plan at the end of each allied health consultation.

At the end of each consultation a progress note is written by the allied health provider which documents the outcomes of the assessment, any new risks identified and changes to or new management strategies that have been included in the updated care plan. This allied health domain specific progress note is sent to the patient's primary care provider, Dr. Primary. Any care coordination responsibilities required of Dr. Primary is also communicated. The progress note is also sent to any other allied health care provider(s) who may need to be informed about changes in risks, goals, and management plan that are relevant to the ongoing management of the patient. For example, progress note from a dietitian/nutritionist may contain clinical information that may need to be considered by the diabetic educator.

### Encounter C: Hospital Admission

#### Pre-Condition

840 Mr. Bob Anyman took a 3-month holiday in Australia during the southern hemisphere spring season, missed the influenza immunization window in his northern hemisphere home country, and forgot about the immunization after he returned home. He develops a severe episode of influenza with broncho-pneumonia and very high blood glucose level (spot BSL = 23 mM) as complications. He suffers from increasing shortness of breath on a Saturday afternoon.

845 Mr. Individual presents himself at the Emergency Department of his local hospital as Dr. Primary's clinic is closed over the weekend.

#### Description of Encounter

Mr. Individual is admitted to the hospital and placed under the care of physicians from the general medicine clinical unit.

850 During the hospitalization, the patient is given a course of IV antibiotics, insulin injections to stabilize the blood glucose level. The patient was assessed by the hospital attending physician, Dr. Allen Attend, as medically fit for discharge after four days of inpatient care. Dr. Attend reconciles the medication treatment during inpatient care, creates a discharge medication list, outlines follow up information and discusses post discharge care with the patient. He recommends the patient to consider receiving influenza immunization before the next influenza session and updates this as recommendation to Dr. Primary in the patient's discharge plan.

860 Planning for discharge is initiated by the physician and the nurse assigned to care for the patient soon after admission as per hospital discharge planning protocol. The discharge plan is finalized on the day of discharge and a discharge summary is generated.

#### Post Condition

The patient's discharge care plan is completed. This plan may include information on changes to medications, management recommendations to the patient's primary care provider and the patient, and any health care services that are requested or scheduled.

- 865 The patient is given a copy of the discharge summary that includes the discharge care plan.
- A discharge summary with summary of the discharge plan is sent to the patient's primary care provider, Dr. Primary with recommendation for pre-influenza season immunization.

## Encounter D: Primary Care Follow-up Visits

### *Pre-Condition*

- 870 Patient Mr. Bob Anyman is scheduled for a post-hospital discharge consultation with his primary care provider, Dr. Primary
- Mr. Anyman is seen by Dr. Primary at her clinic on the day of appointment.
- 875 The discharge summary information from the hospital is incorporated into the patient's medical record and is ready for Dr. Primary to review at the consultation.

### *Description of Encounter*

- 880 Primary Care Physician Dr. Patricia Primary reviews patient Mr. Anyman's hospital discharge summary and discusses the pre-influenza season immunization recommendation with the patient. The patient agrees with the recommendation. The care plan is updated.
- 885 Dr. Primary notices that the patient has gained extra weight and the blood sugar level has not quite stabilised after discharge from hospital. Dr. Primary reviews the care plan and discusses with patient the plan to change the diet and medication. Patient agrees. The care plan is updated.
- Dr. Primary issues a new prescription to the patient, and asks the patient to make an early appointment to see the dietitian to discuss new nutrition management strategy and plan.
- 890 Dr. Primary generates progress notes with nutrition management and exercise change recommendations are generated by Dr. Primary and sent to the patient's dietitian. The care plan is updated and sent to relevant allied health providers
- 895 Dr. Primary changes patient's follow-up visits from four monthly to two monthly for the next two appointments with the aim to review the follow-up frequency after that.

### *Post Condition*

- A new prescription is sent to the patient's community pharmacy. Ms. Script will discuss the new medication management plan with the patient when he goes to pick up his medications.
- 900 The patient also makes an early appointment to see the dietitian and exercise physiologist. A copy of progress notes from Dr. Primary will be received by the dietitian and exercise physiologist before the scheduled appointment.
- Patient gets a copy of the updated care plan, and a copy of the plan is also sent to relevant allied health providers.

### *General Observations about Coordination of Care*

- 905 While patient is in hospital coordination of care would be under the responsibility of the hospital attending physician. This coordination role would then be transferred formally to the primary care physician who may work with a community care coordinator.

910 Coordinated care is required when a patient's care needs are complicated such that there are multiple ongoing assessments, planning and intervention from a variety of clinical specialists. The provision of care from multiple providers must be coordinated to ensure delivery of effective and efficient quality care.

915 Coordinated care is a systemic approach to providing effective care and support to patients with chronic conditions. When coordinated care is implemented, patients (and their families where necessary and appropriate) are managed/cared for and supported across the health/wellness continuum. The resulting care and management are effective, efficient, high quality, accessible, and produce optimal health outcomes.

### Storyboard 3: Home Care

#### 920 *Short Description of the health issue thread covered in the storyboard*

The purpose of this care plan storyboard on home-care is to illustrate the communication flow and documentation of a care plan between a patient, his or her primary care provider and the home health specialists involved in the rehabilitation efforts for a patient recovering from a stroke. This health issue thread (simplified) consists of five encounters, although in reality there could be many more encounters:

- 925 A. Hospital Discharge
- B. Ambulatory Rehabilitation Clinic Visit
- C. Home Health Visit
- D. Primary Care Visit
- 930 E. Dietitian Visit

#### *Storyboard Actors and Roles*

- 935 • Hospital Attending Physician: Dr. Aaron Attend
- Primary Care Physician: Dr. Patricia Primary
- Patient: Eve Everywoman
- Occupational Therapist: Pamela Player
- Physical Therapist: Seth Stretcher
- Speech Therapist: George Speaker (not in HL7 list)
- 940 • Home Health Nurse (Not in HL7 list): Nancy Nightingale
- Dietitian: Connie Chow

### Encounter A: Hospital Discharge

#### *Pre-Condition*

945 Patient Eve Everywoman, a sixty-seven year old female is ready to be discharged from the hospital after having been diagnosed and treated for a stroke.

#### *Description of Encounter*

950 Hospital Attending Physician Dr. Aaron Attend performs a discharge assessment to verify that patient Eve  
Everywoman is stable enough to be sent home. During the assessment Dr. Aaron Attend reconciles the  
medications to be continued or added (Note: sometimes meds are changed at discharge to something  
more appropriate to take at home – e.g. an oral alternative to a parental drug, outlines follow up  
information and discusses activities to continue at home. He has observed some relatively minor  
955 difficulties in walking and in speaking, and therefore recommends some rehabilitation activities with the  
Ambulatory Rehabilitation Clinic. As Dr. Aaron Attend and Eve Everywoman talk about the goals relating  
to the care plan at the rehabilitation clinic and at home, they determine that a home health skilled nurse  
would be crucial as a complement to the rehabilitation activities they have agreed upon. After the care  
plan has been discussed and agreed to, Dr. Aaron Attend documents the care plan, asks that a referral  
960 request be sent to the Ambulatory Rehabilitation Clinic, and schedules a list of rehabilitation activities that  
are to be performed by a home health skilled nurse in parallel to the Ambulatory Rehabilitation Clinic  
activities (Note: Usually the nurses, physical and occupational therapists develop a plan and do not  
consult with the physician).

### **Post Condition**

965 Once the care plan was updated, administrative personnel sent a request for services to the Ambulatory  
Rehabilitation Clinic with the patient hospital discharge summary and the care plan. A referral in the form  
of a notification was also sent to the home health agency notifying the agency of the need to have a home  
health nurse visit Eve Everywoman and help in her rehabilitation efforts. This was accompanied by a  
hospital discharge summary and the care plan. This same information was sent to the primary care  
970 provider. A copy of the care plan was also given to the patient and the patient was discharged to home.

## **Encounter B: Ambulatory Rehabilitation Clinic Visit (in parallel to Home Health Visit)**

### **Pre-Condition**

975 The Ambulatory Rehabilitation Clinic has scheduled a first visit with patient Eve Everywoman to conduct a  
full assessment of Eve's condition and to develop a detailed care plan. The case has been assigned to  
physical therapist Seth Stretcher as the interdisciplinary team lead. Seth has reviewed the information  
sent by Hospital Attending Physician Dr. Aaron Attend and has determined that 2 other professionals are  
needed in the assessment: Occupational Therapist Pamela Player and Speech Therapist George  
980 Speaker. He informs them of the case. He is aware from the care plan that a Home Health Nurse will be  
providing home care in parallel and that there will be a need for coordination of rehabilitation efforts with  
the home care nurse.

### **Description of Encounter**

985 Patient Eve Everywoman arrives at the Ambulatory Rehabilitation Clinic and is shown to an assessment  
room. Physical therapist Seth Stretcher introduces himself and starts a conversation to put Eve at ease.  
He reviews with her what she has gone through and the care plan prepared by Hospital Attending  
Physician Dr. Aaron Attend. He performs a preliminary assessment and records his observations and  
findings. He then informs Eve that he would like her to see 2 other professionals, Occupational Therapist  
Pamela Player and Speech therapist George Speaker. In turn, Pamela and George meet with Eve, record  
990 their observations and findings. The 3 professionals meet together, share their findings and agree on  
specific goals and treatments for the 3 areas of rehabilitation. Seth meets with Eve, discusses with her  
what they have found and what they feel the detailed rehabilitation care plan should be, explains the  
collaboration between the clinic and the home care nurse, answers her questions, addresses her  
concerns, and obtains agreement from her on the Ambulatory Rehabilitation Clinic care plan and  
995 schedule of activities. (Note: the OT could do a 'home assessment' to see what changes should be done  
to the home – carpets, grab bars and so on.)

### **Post Condition**

1000 A copy of the new care plan and schedule was given to the patient and the patient was sent home. An update to the original care plan was made. A copy of findings and the care plan and schedule (were sent to the home health agency, and a request was made for close coordination of activities at the clinic and in the home. A summary of the information was sent as feedback to Primary Care Physician Dr. Patricia Primary and to Hospital Attending Physician Dr. Aaron Attend.

### **1005 Encounter C: Home Health Visit (in parallel to Ambulatory Rehabilitation Clinic Visit)**

#### **Pre-Condition**

1010 Home Health Nurse Nancy Nightingale, upon receiving the request from Dr. Attending, acknowledges receipt of the request, familiarizes herself with the discharge summary, and reviews the notes and activities that Dr. Attending desires to be completed in patient Eve Everywoman's rehabilitation efforts. A home health visit appointment is scheduled.

#### **Description of Encounter**

1015 During the first home visit, Home Health Nurse Nancy Nightingale takes a few minutes to introduce herself and gets to know patient Eve Everywoman. Nancy Nightingale uses the care plan as a reference as she visits with Eve Everywoman and discusses the rehabilitation efforts Dr. Attend desires. Included in the care plan is the platelet inhibitor and cholesterol reducing medications that Eve Everywoman was discharged on. Nancy Nightingale discusses any questions regarding the medications and or any discharge orders that Eve Everywoman was sent home with. Nancy Nightingale takes a few minutes to

1020 perform a quick assessment including a basic set of vital signs and documents this in the appropriate area on the care plan. As Nancy Nightingale and Eve Everywoman talk about rehabilitation efforts, one of the goals that Eve Everywoman would like to work on emerges: it is about managing her weight. Nancy Nightingale documents this along with a set of realistic interventions and steps on weight management, including reducing the salt intake and taking the blood pressure regularly. Nancy shows

1025 Eve how to take her own blood pressure readings and how to record them. As Nancy Nightingale leaves this home health visit, she reminds Eve Everywoman of the goals they have discussed and the time of the next visit.

#### **Post Condition**

1030 Home Health Nurse Nancy Nightingale sends an update to the care plan to record the weight management activities and the blood pressure reading instructions and training. During the next few weeks, Home Health Nurse Nancy Nightingale continues to make home visits to patient Eve Everywoman and assist in rehabilitation efforts. During each visit Nancy is able to reference the care plan and updates assessments and progress. The time has come for Eve to follow up with her primary care

1035 provider.

### **Encounter D: Primary Care Visit**

#### **Pre-Condition**

1040 Patient Eve Everywoman is scheduled to meet with her primary care provider on a regular basis to assess her health and prevent future complications. Today is Eve Everywoman's first visit to Primary Care Physician Dr. Patricia Primary since her stroke occurrence and her discharge from hospital. Her primary care provider has been copied on the hospital discharge summary and the care plan.

### Description of Encounter

1045 Primary Care Physician Dr. Patricia Primary reviews patient Eve Everywoman's hospital discharge summary and most recent care plan, and reviews the assessments and progress notes made over the last four weeks as well as the blood pressure recordings made by Eve. Dr. Patricia Primary notices that one of Eve Everywoman's goals is weight management. Dr. Patricia Primary congratulates Eve Everywoman on her weight loss over the last four weeks and also discusses the advantages of diet along with her exercise. She gains the approval of Eve Everywoman's to meet with a registered dietitian to consult on diet along with her exercise.

1050

### Post Condition

1055 After patient Eve Everywoman leaves the office, Primary Care Physician Dr. Patricia Primary takes a few minutes to update the care plan and record progress notes, and copies the home care nurse on these. A week after Eve Everywoman's appointment with Dr. Patricia Primary, Home Health Nurse Nancy Nightingale visits Eve Everywoman. Nancy Nightingale again accesses the care plan and reviews the updates and progress notes from the appointment with Primary Care Physician Dr. Patricia Primary. Nancy Nightingale notices that Dr. Patricia Primary advised Eve Everywoman to consult with a Dietitian and asks Eve Everywoman if she needs any help scheduling that appointment. She adds notes to the care plan. (Note: usually a physician would send some kind of referral letter in association with the referral or notify the nurse to do that if the nurse and physician are in a interdisciplinary team.)

1060

## Encounter E: Dietitian Visit

### Pre-Condition

1065 Due to the recommendation of patient Eve Everywoman's primary care provider to visit a dietitian, patient Eve Everywoman, with the help of her home health nurse scheduled an appointment. Home Health Nurse Nancy Nightingale sends an up to date care plan (or a link to a centrally hosted one in the EHR) to the dietitian. Eve Everywoman has arrived at the dietitian office for the scheduled appointment.

1070

### Description of Encounter

The receptionist at the dietitian's office takes a few moments to register patient Eve Everywoman and verify the identification information that was sent over with the care plan. The receptionist also updates the care plan with the additional nutrition information that Eve Everywoman was instructed to complete.

1075 Dietitian Connie Chow visits with patient Eve Everywoman and reviews the care plan including the additional nutrition information that was just updated. After reviewing this information and through the discussion with Eve, Connie Chow is able to assess Eve's current state of nutrition habits and health. Connie Chow makes specific recommendations for Eve and notes them in the care plan.

### Post Condition

1080 Dietitian Connie Chow gives to patient Eve Everywoman a copy of the care plan with diet recommendations and recommends her to return for a follow up appointment in a couple of weeks. Connie Chow re-emphasizes the importance of maintaining a good diet to prevent other strokes from occurring. A progress note is also sent to the home health nurse and to Dr. Patricia Primary updating the events of the appointment.

1085

### About Coordination of Care



In this storyboard, the initial coordination of care provided by all providers would be under the responsibility of the hospital attending physician; however, in most places, the responsibility ends when the patient is discharged. This coordination role would then be transferred formally to the primary care physician who may work with a community care coordinator. However, there could exist a shared coordination role between the primary care physician and the lead at the Ambulatory Rehabilitation Clinic.

## Storyboard 4: Pediatric Allergy

### *Short Description of the health issue thread covered in the storyboard*

The purpose of the Pediatric Allergy storyboard is to illustrate the communication flow and documentation of a pediatric care plan to ensure good communication among team members (consisting of diverse health care professionals, caregiving parent, and child) along with development of the care plan and education to promote adherence to the care plan. This health issue thread consists of four encounters:

- A. Primary Care Physician Initial Visit for Seasonal Allergy and Cough
- B. Allied Health Care Provider Visit
- C. Visit to Allergist (Specialist Physician) by referral from PCP
- D. Primary Care Follow-up Visit

### *Storyboard Actors and Roles*

- Patient: Kari Kidd
- Caregiver (Mother): Nelda Nuclear
- Primary Care Provider (Pediatric Nurse Practitioner): Amanda Assigned, NP
- Medical Specialist (Allergist): Richard Reaction, MD
- Pharmacist: Susan Script
- Primary Care Provider (Pediatrician): Patricia Primary, MD
- Office Manager: unnamed actor

## Encounter A: Primary Care Physician Initial Visit for Seasonal Allergy and Contact Dermatitis

### *Pre-Condition*

Patient Kari Kidd has been sneezing and sniffing for a week as she did at this same time last year. She also has a cough that awakens her most nights and started soon after her sneezing. She complains of being tired and refuses to participate in her after school sports activities, which also seem to bring out her cough. In the mornings she has a sore throat and headache. Mother decides Kari needs to be seen and calls their primary care office for a same day appointment.

### *Description of Encounter*

As is customary for the practice, Kari is examined by the Nurse Practitioner, Amanda Assigned. NP Assigned takes a history and learns that the symptoms are worse this spring and that the cough is a new development. NP Assigned is aware the pollen count has been exceptionally high for the past week. She asks if Kari usually gets "cold symptoms" in the spring. Mother and daughter nod in agreement.

Headache, sore throat, and morning mucus are described as occurring every spring. NP Assigned diagnoses seasonal allergies to pollen. She prescribes a nasal corticosteroid spray, two squirts once a day in each nostril and recommends loratadine 10 mg daily. She tells Kari it is ok to use an over-the-counter analgesic such as acetaminophen or ibuprofen for the headache. She refers Kari to an allergist because her symptoms were much worse this year than in previous seasons and the cough, which may be an asthma variant, has developed this year. NP Assigned sends the pharmacy an e-prescription for the nasal corticosteroid spray. She also suggests they stay a few more minutes to learn proper use of the nasal spray.

### **Post Condition**

The chief complaint of the visit diagnosis written into Kari's medical record is: Seasonal rhinitis stemming from allergy to pollen and possible cough variant asthma.

A referral is processed to Richard Reaction, MD for assessment of allergies and the appointment scheduled. A clinical summary is sent along with the referral request.

A care plan is started in the EHR: patient referred to home-based self-care supervised by care-giving parent (Mother).

The prescription medication orders are conveyed to the pharmacy designated by the patient's mother electronically after doing an insurance coverage check to verify coverage for the prescribed medication.

The care plan is updated by NP Assigned: Patient and care-giver medication self-administration education delivered. Patient and Caregiver evidenced comprehension by return demonstration and verbal summary of plan by patient and caregiver.

Medication List is updated with OTC prescribed and prescription medications. The date of next visit is also determined. The Mother and Patient thank NP Assigned and head to the pharmacy.

## **Encounter B: Allied Health Care Provider Visits**

### **Pre-Condition**

Pharmacist Susan Script meets the Patient and her Mother to ensure they know how to use the medication safely, and answer any questions.

### **Description of Allied Health Care Provider Encounter - Pharmacy**

Susan asks Kari if she has ever taken either medication. She tells Kari the medication she will receive is called fluticasone propionate nasal spray as well as the non-prescription loratadine pill.

### **Post Condition**

An updated care plan complete with action items and target dates is completed with patient agreement. It focuses on symptomatic management of seasonal allergy emphasizing the prevention strategy developed this visit.

The patient is given a copy of the new care plan.

A progress note is written which documents the outcomes of the management, any risks identified and

changes/new management strategies required. The patient summary is updated and this progress note is routed to the patient's primary care provider, Dr. Primary. Any care coordination responsibilities required of Dr. Primary are also communicated to her.

1180

Provider/ Allied Health Provider	Encounter Activities	Outcomes	Communications
Nurse Practitioner	Review referral/patient progress Diagnose and treat. Assess learning needs and strategy Discuss and finalize education plan Discuss and update care plan and patient summary	Articulate a mutually agreed upon care plan. Verify comprehension of education plan Update clinical notes and patient summary Generate progress notes	Summary care plan and progress note medical record to primary care provider and to others, e.g. patient's PHR, specialist, etc.
Pharmacist	Review prescription Assess medication and other pharmaceutical therapy needs and strategies Check for and answer questions about use of medications, contraindications or side effects.	Update care plan if anything unusual or concerning is noted if pharmacy is part of the same organizational entity.	New/updated care plan to patient and PHR if there are any changes to prescription or care plan.
Allergy Specialist Physician	Review referral/patient progress Assess symptoms and medication needs and strategies. Decide if skin testing should be done Discuss and finalize allergy care plan	Review results of skin tests. Develop/update allergy care plan Update clinical notes Generate progress notes	New/updated allergy care plan to patient and PHR. Summary care plan and progress note to primary care provider and to others, e.g. NP, pharmacist, etc.
Primary Care Physician	Review referral/patient progress Assess overall care needs and strategies Discuss and finalize care plan with NP as needed and with the patient and Mother at next encounter.	Develop/update care plan with targeted prevention elements for seasonal symptom reduction Update clinical notes Generate progress notes	New/updated care plan to patient Summary care plan and Progress note to medical record and to others, e.g. Specialist, NP, patient and Mother (PHR), etc.

Table 3. Provider and Allied Health Provider Encounters – Activities and Outcomes

## Encounter C: Visit to Allergist (Specialist Physician) three months later

1185

### Pre-Condition

Dr. Richard Reaction receives a referral for evaluation of allergy from the patient's Nurse Practitioner.

### Description of Encounter

1190

Dr. Reaction reviews the referral request, obtains a history from Kari and her mother, and performs a physical exam. He also orders a pulmonary function test by his staff and skin testing to relevant inhalant allergens. When the testing is over, Dr. Reaction meets Kari and Nelda in his office where he explains the

results. They confirm NP Assigned's diagnosis of seasonal allergy and explains the results of the skin tests. Dr. Reaction also advises that the normal pulmonary function test results are consistent with a diagnosis of cough variant asthma, a mild form of asthma. He makes a recommendation to treat the symptoms with daily use of a controller medication, an inhaled corticosteroid, to control symptoms and to reduce the potential to progress to more significant asthma. He also explains that Kari is allergic to grass and oak pollen. He provides handouts about what to do if you have allergies explaining that if you keep the doors and windows shut, there is essentially no pollen indoors.

He provides Nelda with a copy of the results of the pulmonary function tests and the allergy testing that she has requested.

### **Post Condition**

Dr. Reaction completes a consult note, including Kari's allergy care plan. He transmits a copy of this to NP Assigned as the referring provider and to Dr Primary as Kari's primary care provider.

A copy of the consult note and allergy care plan is sent to Kari's mother also.

Prescriptions for the nasal corticosteroid and the inhaled corticosteroid are sent to the pharmacy specified by Nelda with refills sufficient to last until a follow up visit in 2 months. The allergy care plan calls for these medications to be suspended at that time if symptoms are absent and a follow-up visit with Dr Reaction just prior to the allergy season next year. If symptoms reappear before that time, Nelda is to contact Dr. Reaction.

Upon receipt of her copy Amanda updates Kari's care plan, including her list of active medications. She adds Kari to the list of patients who are to be scheduled for an annual influenza vaccination as recommended in Dr. Reaction's allergy care plan.

## **Encounter D: Primary Care Follow-up Visits**

### **Pre-Condition**

Office Manager:

- Schedules an annual influenza immunization reminder. The practice will send out their letters to all patients who need them the same week advising of which days and times are available for an office nurse visit to get the vaccination.

### **Description of Encounter**

Nelda receives a reminder to book Kari's next annual visit. She books the visit and brings Kari to the practice to meet with Dr. Primary.

Primary Care Physician Dr. Patricia Primary reviews Kari's progress, and makes changes after conferring with Kari and her mother and getting agreement on her new recommendations. This time Kari expresses continuing health and only minor problems adhering to and benefitting from the seasonal allergy control strategy. The care plan is updated to reflect well-controlled seasonal allergy.

### **Post Condition**

The practice reminder system is updated with the request to book the annual visit three months prior and to send the patient a reminder of the visit date two weeks before the next office visit.

## Storyboard 5: Pediatric Immunization

### Short Description of the health issue thread covered in the storyboard

The pediatric immunization storyboard illustrates the documentation of a care plan and communication in a well child visit involving patient, parent and doctor. This health issue thread consists of three encounters:

- A. Annual well child visit with initial vaccination (injection 1 of 3)
- B. Return visit for first booster injection (injection 2 of 3)
- C. Return visit for second booster injection (injection 3 of 3)

Coordination of care is triggered by the physician's recommendation for a three dose vaccine series. Other actions include use of the medical office reminder system, the three interventions (injections), as well as documentation.

### Storyboard Actors and Roles

- Patient: Ned Nuclear
- Caregiver (Mother): Nelda Nuclear
- Primary Care Provider Patricia Primary, MD (PCP)
- Registered Nurse: Nancy Nightingale, RN
- Office Manager: unnamed actor

## Encounter A: Annual well child visit with initial vaccination (injection 1 of 3)

### Pre-Condition

Ned Nuclear, a child enrolled in Dr. Patricia Primary's pediatric practice arrives to register for his annual well child visit. At the appropriate point in the encounter, she reviews immunizations he is eligible for.

The Pediatrician notes that his age makes him eligible for immunization against human papilloma virus (HPV).\*

### Description of Encounter

After the immunization plan is discussed and agreed to and after allergies are verified, Dr. Primary documents in the care plan. She also documents vaccine lot number of the dose in the narrative health record. She hands the parent the VIS for HPV vaccine. Dr. Primary records the version date for this VIS and records the date presented. She records the target disease (HPV) for the VIS as the document type. (This may be done by a clinical staff person.) The mother is asked if the child fits into one of the categories that would make him eligible for special funding programs, such as vaccines programs for children. Her answers are recorded. Then, Dr. Primary or a clinical staff member gives the injection and documents in the patients record "HPV 1 of 3 given, follow-up in two months for number 2 of 3." The information is entered in the Immunization section of the care plan. Then Dr. Primary or the clinical staff person transfers the information to the patient's pocket immunization document Ned's mother brought to the visit. Dr. Primary asks patient and mother to schedule a follow up visit in 1-2 months for the next dose in the immunization series.

### Post Condition

An appointment is scheduled for the second immunization and a notification is set to remind Nelda by email of the coming appointment 48 to 72 hours before it starts.

## Encounter B: Return visit for first booster injection (injection 2 of 3)

### Pre-Condition

Scheduled visit for number 2 of 3, i.e., the second dose of three dose immunization series two months after the initial dose. Today is Ned's appointment at the primary care practice for his HPV booster.

### Description of Encounter

Ned and his mother arrive in the primary care office for his first HPV booster immunization. Nancy Nightingale, RN greets them and shows them in to the exam room. She asks if Ned experienced any side effects from the vaccine when he last received it. Ned's mother reports Ned experienced a sore arm only, lasting a day. Nancy documents this in the narrative record as interdisciplinary notes. Dr. Primary sees Ned and his mother and it is agreed Ned will continue on the immunization schedule. Nancy comes back into the room to administer the booster vaccine. She documents the vaccine lot number of the dose in the narrative health record. She hands the parent the VIS for HPV vaccine. Nancy records the version date for this VIS and records the date presented. She records the target disease (HPV) for the VIS as the document type. Nancy gives the injection and documents in Ned's record "HPV 1 of 3 given, follow-up in two months for number 2 of 3." The information is entered in the Immunization section of the care plan. Then Nancy transfers the information to the patient's pocket immunization document Ned's mother brought to the visit. Dr. Primary asks patient and mother to schedule a follow up visit in 1-2 months for the next dose in the immunization series.

### Post Condition

Nancy updates the care plan. Ned and Nelda make the final appointment on their way out.

## Encounter C: Return visit for second booster injection (injection 3 of 3).

### Pre-Condition

Ned and Nelda receive their reminder notices of appointment for Ned's third HPV vaccine injection.

### Description of Encounter

Ned and Nelda arrive as scheduled. Nancy Nightingale, RN checks for reaction to the previous booster. Hearing there was none, she gives the third injection; sending Ned and Mom on their way in five minutes after asking if they have any other needs or concerns.

Office management protocols for next scheduled visit are invoked.

### Post Condition

Updating the Immunization Section of the care plan:

A visit reminder will be e-mailed to Nelda and mailed to Ned (their chosen communication methods) two days before the next annual visit date.

The immunization is submitted to the clinical / immunization registries in the jurisdiction.

### **About Coordination of Care**

1320 In this storyboard, the coordination of care provided is under the responsibility of the pediatrician who may work with an office nurse or a medical assistant trained to this task of vaccine booster visits. Coordination also depends on the scheduling and reminder systems.

The following sections present general observations about the coordination of care in similar situations, and present various models of care coordination.

1325

## **Storyboard 6 – Perinatology**

### **Short Description of the Health Issue Thread covered in the Storyboard**

1330 The purpose of the Perinatology story board is to illustrate the communication flow and documentation between a patient and various collaborating care team members (i.e. diverse health care professionals) involved for a patient experiencing pregnancy, labor and). This storyboard describes four (4) major encounters in this health issue thread, each encounter being presented with its pre and post conditions and specific activities:

- 1335
- A. First pregnancy visit
  - B. Post ultrasound visit
  - C. First Perinatologist visit
  - D. Giving Birth

1340 Patient Eve Everywoman experiences her first pregnancy. She initiates prenatal care with Obstetrician/ Gynaecologist (OB/Gyn) specialist who follows Eve's pregnancy until a complication develops. At that time Eve's prenatal care is transferred to a perinatologist who provides Eve's prenatal care until her delivery. The perinatologist maintains close communication with the OB/Gyn throughout the prenatal period and attends the delivery of the baby. The OB/GYN specialist delivers the baby. Care is coordinated throughout the health issue thread across several care settings and several care

1345 providers/givers.

Information gathered and included in the Health Record and in documents transferred between caregivers includes demographics, physical findings (e.g. VS including weight) and test results (e.g. laboratory, radiology and other diagnostic testing results).

### **Storyboard Actors and Roles**

- 1350
- OB/Gyn Physician: Dr. Flora Fem
  - Perinatologist: Dr. Patricia Perinatologist
  - Patient: Eve Everywoman
  - Receptionist: Ruth Receptionist
  - OB/Gyn Office Medical Assistant: Melissa MedAssist, MA
- 1355
- Perinatologist Office Medical Assistant: Mandy MedHelp, MA
  - Next of kin – patient's husband: Neville Nuclear



- Labor and Delivery Registered Nurse 1: Nancy Nightingale
- Labor and Delivery Registered Nurse 2: Lilly Labornurse

1360

## Encounter A: First Pregnancy Visit

### Pre-Condition

1365 Patient Eve Everywoman is a 28-year-old high school teacher. She and her husband of two years have recently suspected she is pregnant with their first child. Eve has confirmed her suspicions with the use of an over the counter pregnancy test and has scheduled an appointment with the OB/Gyn Physician Dr. Flora Fem.

### Description of Encounter

1370 Patient Eve Everywoman is excited for the first Dr's visit after finding out she is expecting her first child. Eve Everywoman has checked into the OB/Gyn office for her first visit and is waiting to be called back to the exam room. Eve has completed the new patient history form at home (after having downloaded and printed the form from the OB/Gyn Office website as directed when making her appointment).. When Eve made her appointment, a patient record for Eve was initiated. The OB/Gyn office Medical Assistant, Melissa MedAssist comes to the waiting room and asks Eve to follow her back to the exam room.

1375 Melissa MedAssist measures Patient Eve Everywoman's weight and blood pressure. These measurements are entered into the patient record. Melissa MedAssist also enters the information provided by Eve on the new patient history form into the patient record. OB/Gyn Physician Dr. Flora Fem enters the room and greets Patient Eve Everywoman. Dr. Flora Fem reviews the information is Eve's patient record and performs both a subjective and objective assessment. During the assessment Dr.

1380 Fem evaluates Eve's diet, activity and symptoms of pregnancy. OB/Gyn Dr. Flora determines Eve's diet to be adequately nutritional for a pregnancy and encourages her to continue moderate exercise during the pregnancy. Dr. Fem determines Eve's symptoms of pregnancy are mild and currently manageable by the Eve at home. Dr. Fem recommends prenatal vitamins and provides Eve with a list of resources for early pregnancy education. Fem updates any new or additional information brought up during the visit in

1385 the patient record and updates Eve's Perinatal care plan with items relevant to her current pregnancy.

### Post-Condition

1390 Dr. Flora Fem provides Patient Eve with a copy of the updated Perinatology care plan and reviews it with her. The next visit is scheduled and Patient Eve Everywoman is feeling confident about the care plan discussed during the appointment.

## Encounter B: Post ultrasound visit

### Pre-Condition

1395 Patient Eve Everywoman's 1<sup>st</sup> pregnancy has been uneventful. Eve has continued to feel well has not experienced negative symptoms of pregnancy such as nausea. She and her husband are thrilled to be starting a family and have been busy preparing a nursery. After the sixteenth week, Eve Everywoman went to get a routine ultrasound and has returned to OB/Gyn Physician, Dr. Flora Fem's office for a follow up visit.

### Description of Encounter



Medical Assistant, Melissa MedAssist escorts Patient Eve Everywoman to the exam room stopping to check Eve's weight along the way. Once in the room Melissa MedAssist also checks Eve's blood pressure, respiratory rate, pulse, temperature and pulse ox. Dr. Flora Fem enters the room and reviews the updates to the patient record and the results of the ultrasound performed last week. Dr. Flora Fem asks Eve how she has been feeling does a quick assessment, including a Doppler assessment of the fetal heart tones. Dr. Flora Fem enters her findings into the patient record. Dr. Flora Fem has some concerns about a few of the findings associated with the ultrasound. Dr. Flora Fem has a referral relationship with Dr. Patricia Perinatologist and discusses the benefits of the additional care a Perinatologist can provide with Eve Everywoman. Dr. Flora Fem schedules a referral appointment, and updates the Perinatology care plan with the new problem indicated by the ultrasound report and the steps agreed upon with the patient Eve Everywoman to see the perinatologist. Dr. Flora Fem also reviews the data contained in the patient Perinatology care plan to ensure all data is up to date and includes the relevant/pertinent VS and physical exam findings of today's visit. When the Perinatology care plan is updated a message is sent in the form of a notification to Dr. Patricia Perinatologist with the intent of Patient Eve Everywoman to schedule an appointment. As part of the notification, the message includes a copy of the Perinatology care plan.

#### **Post-Condition**

Dr. Flora Fem provides Patient Eve with a copy of the updated Perinatology care plan and reviews it with her. Patient Eve Everywoman schedules an appointment with Dr. Patricia Perinatologist. Dr. Patricia Perinatologist is able to access the Perinatology care plan and can see the documents relating to Patient Eve Everywoman's care plan up to this point. The Patient record and Perinatology care plan is up to date with the recent data.

### **Encounter C: First Perinatologist visit**

#### **Pre-Condition**

Patient Eve Everywoman continues to feel well and not experience negative symptoms of pregnancy. She and her husband are concerned about their baby and the results of the ultrasound requiring a referral to the Perinatologist. Patient has arrived with her husband at the perinatologist office for the scheduled appointment. OB/Gyn Physician Flora Fem's office has provided Perinatologist Dr. Patricia Perinatologist with pertinent information from Eve Everywoman's patient record.

#### **Description of Encounter**

The Perinatologist Office Medical Assistant, Mandy MedHelp, escorts patient Eve Everywoman and her husband Neville Nuclear to the exam room. Mandy MedHelp measures Eve's weight, blood pressure, pulse, and fetal heart rate and records them in the Patient Record. Mandy MedHelp finds the results from Eve's 16-week ultrasound and makes them readily accessible to Perinatologist Dr. Patricia Perinatologist. Dr. Patricia Perinatologist enters the room and greets Eve and her husband Neville. Dr. Perinatologist reviews Eve's patient record and performs a subjective and objective assessment. Dr. Perinatologist updates the patient record with her findings. Dr. Patricia Perinatologist explains to Eve and her husband the sixteen-week ultrasound indicated the fetus is small for its gestational age and that the umbilical cord is only a 2-vessel cord instead of three. Dr. Patricia Perinatologist explains these findings are something to watch carefully, but that Eve and Neville could still have a healthy baby. Dr. Patricia Perinatologist explains to Eve and Neville the importance for Eve to maintain a good diet, exercise routine and other healthy habits during the pregnancy. She makes specific recommendations for Eve and notes them in the care plan.

#### **Post-Condition**

Dr Patricia Perinatologist gives a copy of the care plan with diet and activity recommendations noted as well as a couple of patient handouts with instructions that are more specific and suggestions listed to Eve Everywoman. Dr. Patricia Perinatologist recommends Eve to return for a check up in two weeks. The findings and recommendations of Dr. Patricia Perinatologist are made available to Dr. Flora Fem.

1450 OB/Gyn Dr. Flora Fem also has access to the up dated CP and is alerted the plan has been updated appropriately.

## Encounter D: Giving Birth

### Pre-Condition

1455 Eve Everywoman's pregnancy commences without further events. She continued to see Dr. Patricia Perinatologist every two weeks for the remainder of her pregnancy. It is determined that both she and the baby are healthy enough to attempt a vaginal delivery at the hospital where C-section facilities are available if the baby would begin to show distress. The patient record and CP are maintained at each visit, and a progress note is also sent every time to the referring OBGYN. Arrangements are made, and Eve Everywoman completes her hospital pre-registration for delivery. This allows the up to date patient  
1460 record and Perinatology care plan to be accessible to the labor and delivery suite. At her last visit, the baby was estimated to be 5.5 lbs.

### Description of Encounter

1465 Eve Everywoman begins to go into labor on the 5<sup>th</sup> day of her 39<sup>th</sup> week of gestation. Eve Everywoman calls the L&D unit where she has pre-registered for her delivery and tells them she believes she is in labor and on her way as she was directed at the pre-registration period.

Nancy Nightingale, the L&D nurse assigned to care for Eve Everywoman upon notice of her impending arrival accesses Eve's patient record and Perinatology care plan. Nancy Nightingale prepares a room for Eve Everywoman according to the anticipated needs for Eve's labor and delivery. Eve arrives and settles into the room prepared for her with assistance from Nurse Nancy. During the admission process, Nurse  
1470 Nancy obtains Eve's current weight and vital signs including temperature, pulse, respiratory rate, blood pressure, and oxygen saturation. Nancy also starts an intravenous line and attaches a fetal monitor to evaluate the frequency and strength of Eve's contractions and the baby's response to them. Nancy orients Eve and her husband Neville to the room and reinforces their prenatal education regarding what to expect during the labor and delivery process. Nancy does an objective and subjective physical  
1475 assessment. During the admission process and after the flurry of hands on activities caring for Eve, Nancy updates the patient record with her findings and notes the interventions done. Nancy also updates Eve's Labor and Delivery care plan to include items specific to the Labor and Delivery Process. Nurse Nancy notifies Perinatologist Dr. Patricia Perinatologist of Eve's arrival in the Labor and Delivery Department. Nurse Nancy continues to monitor and support Eve throughout Eve's laboring until her shift  
1480 ends. Dr. Perinatologist arrives to do an objective and subjective assessment including a pelvic exam for Patient Eve and reviews the updated patient record and Labor and Delivery care plan. Dr. Perinatologist also makes updates to the patient record and Labor and Delivery care plan noting her findings. When Nurse Nancy's shift ends, she reviews Eve's progress and care provided unto that time with the oncoming nurse Lilly Labornurse. Lilly Labornurse reviews Eve's updated patient record and Labor and Delivery  
1485 care plan. Lilly Labornurse continues the monitoring and supportive care to Eve during her labor and through delivery. Lilly Labornurse updates the patient record and Labor and Delivery care plan as needed.

### Post Condition

1490 After 10 hours of progressive labor, Eve delivers a healthy 5 lb. 2 ounce baby girl. The patient record contains all records related to Eve's pregnancy, labor, delivery and hospital post-partum care. A new patient record is also now available for the baby and contains all relevant delivery and newborn care information. Eve's Postnatal care plan is up to date with goals towards healthy post partum recovery. A Healthy Baby care plan is created for the baby with focus towards healthy newborn care, required  
1495 screenings, scheduled immunizations and growth and development monitoring. The up to date summary reports and care plan (Postnatal and Healthy Baby) are provided to Eve. The updated coordination of care documents (summaries and care plan) are available to all of Eve's and the baby's caregivers as appropriate for care assignments. Each caregiver is appropriately alerted and the documents have been

1500 updated. Follow up appointments for Eve are made with the OB/Gyn specialist. Follow up appointments are made for the baby with a Pediatrician.

## Storyboard 7 – Stay Healthy/Health Promotion

### *Short Description of the Health Issue Thread covered in the Storyboard*

1505 The purpose of the Stay Healthy – Health Promotion care plan storyboard is to illustrate the communication flow and documentation of a care plan between a patient, his or her primary care provider and the other specialists involved in health prevention. This health issue thread (simplified) consists of 7 encounters, although in reality there could be many more encounters:

- 1510
- A. Visit to Primary Care Physician
  - B. Dietitian Visit
  - C. Follow Up Dietitian Visit
  - D. Primary Care Follow Up

### *Storyboard Actors and Roles*

- 1515
- Primary Care Physician: Dr. Patricia Primary
  - Patient: Adam Everyman
  - Dietitian: Connie Chow

## Encounter A: Visit to Primary Care Physician

### *Pre-Condition*

1520 Adam Everyman, a sixty year old male has been feeling tired, with frequent headaches and general discomfort. It has been over a 2 years since his last check up. Due to weight gain over the past few years, he has been reluctant to return. He makes an appointment with his primary care physician Dr. Patricia Primary. The office requested that he be fasting for the appointment for lab work.

1525

### *Description of Encounter*

1530 Adam Everyman arrives at his physician's office where he is weighed, has his blood pressure taken and is asked to fill out a health history. Dr. Patricia Primary enters the exam room and reviews Adam's chart as well as today's measurements. She notes a weight gain of 20 lbs. (9.1 kg) over the past two years. Blood pressure reading was 130/80, increased since the last visit as well. She does congratulate Adam for quitting and not smoking for the last 10 years. Dr. Primary orders screening blood work as well as a total cholesterol panel and HbA1c. Dr. Primary also discusses the risk of heart disease, stroke, and diabetes with his current weight and blood pressure. She writes an exercise prescription that includes gradually more exercises, starting with 30 minutes of walking daily outside of his normal activities. She

1535 recommends that Adam visit a registered dietitian to discuss improving his eating habits. She requests a follow up visit in three months to check progress. Lab work was drawn and Adam left with a referral to the dietitian.

### *Post Encounter Visit*

1540 Dr. Primary Care summarized the visit for the patient's record, including updates to Adam's health history, lab tests ordered, as well as the referral to the registered dietitian. She asks the office to send a copy of

the care plan that includes the above information as well as lab results and plans for follow up to Connie Chow, RD.

- 1545 Adam's lab values return the same week. Dr. Primary Care calls Adams with the results that indicate Total Cholesterol level 260, LDL 240, HDL 50, and triglycerides 190. His HbA1c level was 7. Dr. Primary explained that the current lab values put him at an increased risk of heart disease and stroke. She reinforces the need to follow up with the dietitian and exercise program.

## **Encounter B: Dietitian Visit**

### **1550 *Pre-Condition***

Adam Everyman calls Connie Chow RD's office to schedule an appointment after hearing the results of his lab tests. The office asks him to keep a food diary for three days and offer to email him a sample form. Adam does have an active email account and provides his email address.

### **1555 *Description of Encounter***

- Adam Everyman arrives at his first visit with Connie Chow, RD. She quickly scans the food diary as well as the information provided by Dr. Primary Care's office. She also questions Adam further regarding his food preferences, cooking methods, and interest in changing his eating habits. Connie Chow notes that his weekday breakfast and lunch meals are appropriate, but that he needs to rethink the portion sizes at dinner and his snacks. A meal plan is developed to promote weight loss of 0.5 lbs. (0.23 kg) per week.
- 1560 She is pleased to learn that Adam also has an exercise plan from his physician. Adam leaves with a copy of Connie Chow's nutrition recommendations and an appointment for next month.

### ***Post Condition***

- 1565 Connie Chow completes her assessment and nutrition care plan on Adam Everyman and sends a copy to Primary Care Physician Dr. Patricia Primary. She recommends monthly follow up for the first three months, then cutting back to every three month until Adam achieves his goals of weight loss and lower blood pressure.

## **1570 Encounter C: Follow Up Dietitian Visit**

### ***Pre-Condition***

Adam has continued to follow the diet guidelines outlines by Connie Chow most of the time. He arrives for his one-month follow up visit.

### **1575 *Description of Encounter***

- Adam's weighs 2.2 lbs. (1 kg) less than his first visit. Connie Chow congratulates him on the weight loss. Adam admits that he has not followed the meal plan perfectly, but has been exercising 3-4 times weekly. Connie reviews what parts of the diet work and which parts need some adjustment. They discuss appropriate choices when dining out, one of Adam's downfalls. Connie asks to see him in one month.
- 1580 She invites his wife along to discuss cooking techniques as well. Updates to the diet plan are given to Adams. Another visit is scheduled in two months.

### ***Post Condition***

Connie Chow updates her care plan with weight loss progress as well as new goals for healthy eating

1585 when out and including wife in cooking discussion next month. This care plan is shared with Dr. Primary Care.

## Encounter D: Primary Care Follow Up

### Pre-Condition

1590 Adam Everyman continues his exercise program and is following his meal plan. After 3 months, he has lab work redone prior to his doctor visit and he returns to his Primary Care MD.

### Description of Encounter

1595 Dr. Primary reviewed the lab values and again explained that they have improved compared to the initial values. She asked about the dietitian visits and was pleased that he was trying to follow the recommended meal plan. She was also pleased to learn that he was working out three times a week at a gym close to his work and on Saturdays at a gym close to his home. Adam admitted that he was sore the first few weeks, but now was afraid to stop, as he did not want to start over. Dr. Pricilla Primary Care applauded his progress and suggested another follow up visit in six months with another blood draw.

1600

### Post Condition

Patient Adam Everyman makes appointment with Dr. Primary for a follow up visit in three months. Dr. Primary updates Adam's care plan with a summary of the visit, recent lab work and measurements, noting Adam's positive attitude. A copy is sent to his dietitian, Connie Chow.

1605

## Storyboard 8 – Case Management/Disease Management Care Coordination

Source:

1610 *This Storyboard is submitted by Lenel James of Blue Cross and Blue Shield Association and Susan E. Campbell, Principal, PhD, RN-BC (NI), CPHQ, CCM, CIC, Care Management Professionals*

### Short Description of the Health Issue Thread covered in the Storyboard

1615 Clinical data exchange in transitions of care will need to include sharing care plans, reviewing care plans, recognizing and removing barriers to care, updating care plans, consolidating care plans and reconciling care plans. The purpose of this storyboard is to illustrate the communication flow, documentation and content evolution of multiple care plans for a moderately complex patient's care, between a Patient Centered Medical Home (PCMH) primary care provider, an orthopedic specialist and health plan care manager involved in the treatment of a patient who has several health concerns.

1620 Providing support and guidance to a patient as s/he navigates "across the continuum" has long been a hallmark of Care Management. The PCMH movement seeks to make consumer engagement a standard practice in provider offices as well as in the care management activities of health plans. Accordingly, Care Management, a broader term that encompasses all health professionals engaged in caring for a particular individual, should be a central feature of interoperability to support tracking health concerns across care settings and involved care providers and caregivers. The practice of Care Management which includes case management and disease management is briefly discussed later in this document, following

1625

descriptions of a series of encounters of a hypothetical patient with multiple health concerns that needs coordination of care.

1630 The use of care plans from and for both providers and payers, from and for both case management and  
disease management as well as for the benefit of the patient is key to demonstrate the importance of the  
effective use of health information exchange. The exchange of care plans between providers and payers  
can inform care decisions, improve effective communication and provide a basis for the aggregation of  
multiple care plans - and the subsequent interdisciplinary reconciliation of these plans into a consolidated  
1635 care plan that reflects a coordinated resource-enabled care strategy to improve care quality.

Specifically, this storyboard demonstrates the value of effective, timely information sharing to improve  
medication adherence, avoid adverse medication interactions, support the patient in making informed  
care decisions (that minimize financial impacts), and increase the patient's understanding of and ability to  
1640 self-manage a chronic condition. The effective sharing of care plans and clinical information in this  
storyboard are demonstrated as an effective approach to improved communication by all stakeholders  
involved in the care and monitoring of the patient, including the importance of the patient being a well-  
informed part of the care team

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**NOTE 1:** this storyboard was developed from the health insurer and provider perspectives. It should be noted that the concept of  
care plan in general should be patient-centric and should include the patient, and family where appropriate, as part of the health  
care team.

1650 Readers are recommended to access the following source for example of US specific definitions of these concepts:  
[http://www.state.nj.us/humanservices/dmahs/news/Care\\_Management\\_Workbook.pdf](http://www.state.nj.us/humanservices/dmahs/news/Care_Management_Workbook.pdf)

**NOTE 2:** It is acknowledged that a number of concepts included in this document, in particularly terms such as care manager,  
disease manager, care coordinator, and their definitions are based on US realm specific context. It is also acknowledged that there  
1655 is no consensus on how these concepts are defined and used in other international realms. These concepts and their uses in this  
document are for illustration only and for meeting US specific scenarios.

**NOTE 3:** There is an atypical use of technology in this storyboard to illustrate the value of information exchange with Consolidated  
CDA, DIRECT protocol and Health Information Exchanges. This is not meant to exclude the use of FHIR, web services, and portals  
1660 as viable approaches to support exchange.

This storyboard consists of these patient encounters:

- A. PCMH Primary Care Provider Encounter
- B. Health Plan Case Management/Disease Management (CM/DM) Care-Manager Encounter
- C. Hospital Admission
- D. PCMH Primary Care Provider Follow-up Visit
- E. Specialist Visit
- F. Health Plan CM & DM Care-Manager Encounters
- G. Primary Care Provider Follow-up Visit

### ***Storyboard Actors and Roles***

- PCMH Primary Care Provider: Dr. Patricia Primary
- PCMH Care Management Nurse Betty, RN, Certified Nurse Case Manager (CCM) referred to in this storyboard as Betty Provider Case-Manager .)
- Hospital Physician: Dr. Aaron Attend
- Patient: Adam Everyman
- Health Plan CM/DM Nurse: Pamela CM/DM Payer Care-Manager, RN, CCM
- Health Plan DM Nurse: Deborah Payer Diabetes Disease-Manager, RN
- Specialist Physician: Dr. Charles Bone

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[Note 1: The umbrella term “care manager” is a URAC-preferred generic descriptor for the Nurse Case Manager and Nurse Disease Manager roles combined. All care managers coordinate care as well as provide nursing functions according to patient needs and business rules. Case Managers are focused on the individual patient as generalists, whereas disease managers are population-based disease specialists who work with, advise, coach and monitor patients in self-management of their disease. Pamela CM/DM Payer Care-Manager, RN is trained as an asthma disease manager and as a case management generalist and fills both roles in this storyboard.]

[Note 2: The Health Information Exchange (HIE) in this storyboard is a federated model. The HIE does not retain copies of the information exchange. It points to which facilities and providers have information on patients, and it receives routine updates when new information is available or has been updated.]

[Note 3: See the appendix for details on the medications associated with this storyboard.]



## Encounter A: PCMH Primary Care Provider Encounter

### Pre-condition

1705 Mr. Adam Everyman is a 52 year-old single man with asthma and is pre-diabetic. He is overweight, at risk of cardiovascular disease, suffers from depression and is a heavy smoker and occasional drinker. Adam Everyman resides in Southern state and is employed at Work Is Fun, Inc. His insurance carrier is HC Payor, Inc. in a Midwest state. He is enrolled in a Patient Center Medical Home Program(PCMH) in his Southern state and he selects Dr. Patricia Primary as his primary physician. As part of the PCMH routine practice for an annual physical, a panel of basic lab tests is ordered, for completion prior to Patient

1710 Adam's annual check-up the office visit.

Adam Everyman arrives for his annual check-up with his physician (Dr. Patricia Primary).

### Description of Evaluation and Management

1715 Dr. Patricia Primary performs a history and physical examination. As part of her intervention, she performs depression screening and an assessment for depression severity. Both the screening and the assessment indicate moderately severe depression and the substance abuse screen indicates occasional binge drinking periods. Dr. Patricia Primary discusses the nature of depression, and asks Mr. Everyman to consider which symptoms are most bothersome and use these to set goals. Mr. Everyman was told

1720 recently that his position will be eliminated and is uncertain of his future employment. As a result, his depression has worsened due to anxiety and stress. Because Adam Everyman also smokes and previously planned to quit, Dr. Patricia Primary suggests bupropion "Wellbutrin" for his depression and a care plan for major depressive disorder in adults as well as participation in a local, evening smoking cessation program. He is prescribed albuterol for his asthma which flares up seasonally. Dr. Patricia

1725 Primary suggests physical exercise and balanced diet for weight management. Given the depression, Dr. Patricia Primary recommends that Adam Everyman visit the office health coach before leaving to set some individualized goals for calorie reduction and increased activity. Mr. Everyman is asked to make a follow-up visit in three months.

### Post-condition

1730 A Consolidated Clinical Document Architecture (C-CDA) file is created with a summary of the visit, the lab results, and the care plan. A notification of the updated clinical information is sent to the local HIE - a routine practice in this setting.

1735 Adam Everyman dutifully fills his prescription for bupropion, "Wellbutrin," for his depression and attends the smoking cessation program, which triggers claim activities from the pharmacy to the health plan. But, Mr. Everyman has not filled the albuterol for his seasonal asthma in over a year (nor does he have a PCP-provided sample). He signs up with the health coach to discuss physical exercise and balanced diet for weight control. Mr. Everyman schedules a follow-up visit in three months.

## Encounter B: Health Plan Disease Management Care-Manager Encounter

1740

### Pre-condition

Work Is Fun Inc.'s voluntary disease screening program is augmented by data mining to identify candidates for disease management outreach at HC Payor, Inc. As the patient's asthma flares up



1745 seasonally, he is identified as a candidate for disease screening outreach within the disease management  
programs. Managed under the relevant programs, the patient establishes reasonable asthma control, but  
then stops filling his asthma medication. When the non-compliance pattern is identified, a yellow alert  
flag is triggered. Pamela CM/DM Care Manager reenrolls and reengages Mr. Everyman in the Asthma  
1750 meter to establish baseline as a method for monitoring and documenting the severity of the patient's  
asthma attacks (see NOTE 4 for NIH guideline on patient self/home asthma monitoring). The DM care  
plan also recommends using a spacer to ensure the same dose every time when using an inhaler.

As part of the HC Payor, Inc. process, Nurse Pamela in Midwest state also checks the Southern state's  
1755 HIE for any activity on Adam Everyman and determines a C-CDA of his last PCMH visit is available,  
which is requested, and received. It can be viewed and added to future outbound "aggregated" C-CDA  
export files.

1760 ***Description of Health Plan Disease Management Nurse Care Manager Encounter***

**Evaluation and Management**

Given Mr. Everyman's medication and claims history, a few months before, HC Payor, Inc. had initiated  
1765 action to enroll Mr. Everyman in their asthma program. Nurse Pamela, a CM/DM Care-Manager who  
works with asthma patients, especially those with other chronic conditions like diabetes, called Mr.  
Everyman one evening after work. Given his recent PCMH visit and work with a health coach, Mr.  
Everyman has a positive response to the outreach email and subsequent scheduled phone call. Mr.  
Everyman resolves to really take advantage of the support this time. During the call Pamela CM/DM  
1770 Payer Care-Manager has view-access to his recent PCMH visit's C-CDA and also has the plan's standard  
DM care plan up on her computer screens at the same time. They choose a frequency of every two  
weeks for a follow-up call. She asks if he understands how to use a peak flow meter. Mr. Everyman says  
he had used one in the past, has received updated education on its use, but will require a new device.  
Because he is pre-diabetic, she also mentions his latest Hemoglobin A1C result showed an elevation  
1775 beyond the pre-diabetic reference range of 6.0 to 6.5; it had shown a further elevated reading at 7. Mr.  
Everyman acknowledges that "worry eating" has been a feature of his evenings as he thought  
obsessively about where he could turn for help if his job is eliminated. She asks if he would like to  
participate in the health plan's diabetes disease management program. Feeling a bit overwhelmed, Mr.  
Everyman welcomed the added help, and accepted enrollment. Pamela CM/DM Payer Care-Manager  
1780 explained he will receive an enrollment call from the health plan's Diabetes- Care-Manager, Deborah  
Payer Disease-Manager if he can't take the time off of work to go to the PCP office. She encourages him  
to follow-up with his doctor and informs him that a hardcopy and email note will be sent to the PCP office,  
as part of the HC Payor, Inc. care coordination process.

1785 ***Post-condition***

A peak flow meter order was sent electronically by the disease management (DM) program to their mail-  
order pharmacy. The peak flow meter will be delivered at no cost to the patient along with his asthma  
inhaler and spacer and a CD that describes how to use them. The health plan's standard asthma DM  
care plan is updated by Pamela CM/DM Payer Care-Manager with new goal to obtain a baseline peak  
1790 flow reading and monitor when wheezing starts, and to reflect interventions for asthma and for pre-

diabetes concerns. Pamela CM/DM Care Manager updates the DM care plan to document the reenrollment of Mr. Everyman in the Asthma disease management program. Within the scope of practice of RNs in Midwest state and Southern state, the DM care Plan includes interventions such as teaching or re-teaching use of a peak flow meter when the patient is not wheezing to establish baseline exhalation force to establish his/her own asthma action plan - good (green), intermediate (yellow), and low expiratory (red) force indicator. (NOTE: Per the scope of practice in the two states of the storyboard, and payer policy, the health plan can have the spacer and peak flow meter shipped directly to the patient as a feature of the asthma disease management program. In a state for which the RN scope of practice is more limited, either the payer Care Manager will work with the PCMH Case Manager to seek a PCP order, or the patient will be encouraged to make an office visit and ask for these devices. The goal in both cases is to improve patient self-management.

A letter and email are sent to patient's provider Dr. Patricia Primary to document the establishment of the resumed DM Program patient relationship, the addition of the diabetes program enrollment, as well as the intention to facilitate and coordinate other interventions as they arise. Ms. CM/DM Payer Care-Manager schedules a follow-up call with the patient to make sure he received the inhaler, spacer, and CD and what his baseline and subsequent peak flow readings have been. She tracks the data until it stabilizes and does periodic outreach calls to the patient at home. .

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**NOTE 4:** The patient in this storyboard had already been diagnosed with asthma by his PCP. For the self-monitoring intervention, the National Heart, Lung and Blood Institute's (NHLBI) guidelines for use of a peak flow meter has been followed. It is acknowledged that for the process of asthma diagnosis and ongoing clinical assessment, spirometry is recommended by the National Institute of Health (NIH) as the measure to establish the diagnosis of asthma.

## 1820 Encounter C: Hospital Admission

### ***Precondition***

The patient was attending an out-of-town business conference in a Northern state . Mr. Everyman had a severe ankle fracture as a result of a freak accident as he was walking on a weather-damaged sidewalk.  
1825 He was admitted to the local Northern hospital for emergency treatment of his ankle fracture

### ***Description of Hospital Admission Evaluation***

#### **Hospital-acquired pneumonia was documented as manifesting itself on the second day of the hospital stay.**

1830 Dr. Aaron Attend prescribes oxycodone/acetaminophen, "Percocet", in combination with the NSAID naproxen sodium "Aleve" for pain management, explaining that they will taper within a few days. Because of the patient's history of binge drinking Dr. Aaron Attend cautions Mr. Everyman to avoid drinking any alcoholic drinks while taking this pain medication. He prescribes levofloxacin "Levaquin" to treat the pneumonia. Then after discussing and praising the patient's resolving depression and success  
1835 in smoking cessation, Dr. Aaron Attend renews the bupropion "Wellbutrin." As is hospital practice for patients diagnosed with multiple conditions with a hospital stay of over two days, a formal multi-disciplinary care plan is created. The mornings are most difficult for Mr. Everyman so Dr. Aaron Attend adds a nicotine inhaler, instructing Mr. Everyman to use it before getting out of bed since it takes about 15 minutes to quell the cravings. While he was an inpatient, he receives it with his morning medications.

1840

### ***Post-condition***

In addition to writing his discharge note, Dr. Aaron Attend updates the patient's care plan to include the nicotine inhaler and the discharge interventions to be part of the formal Discharge Summary. He sends a prescription to the pharmacy. Dr. Aaron Attend reviews the discharge instructions with Mr. Everyman,  
1845 including the recommendation that the patient follow-up with primary physician within 5 days of discharge to check his lungs as well as to see an orthopedic specialist for his ankle fracture. A hard copy of the discharge summary is given to Aaron Everyman. A C-CDA file of the Discharge Summary, including the updated care plan, as well as diagnostic images and reports, is sent to PCMH primary care provider (PCP) of record and to the HC Payor, Inc. using the DIRECT protocol.

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## Encounter D: Primary Care Provider Follow-up Visit

### ***Precondition***

Mr. Everyman was discharged from the hospital recovering from ankle surgery and pneumonia, and was told to follow-up with his primary care physician in five days. The hospital discharge summary includes a  
1855 rehabilitation plan recommended by the hospital orthopedic specialist. The discharge summary is received by the EHR system of the PCMH.

### ***Description of Primary Care Provider Evaluation***

Mr. Everyman shares a copy of the discharge summary with Dr. Patricia Primary who had already obtained it electronically. Dr. Patricia Primary refers the patient to an in-network orthopedic specialist, Dr. Charles Bone. Dr. Patricia Primary prescribes a refill for the “Percocet” and NSAID, gives a verbal warning of the liver danger associated with [acetaminophen overdose](#), and answers “yes” when the patient asks if he can switch from the naproxen (which the doctor has told him is the over-the-counter (OTC), Aleve) to acetaminophen “Tylenol” that the patient already has at home. What Dr. Patricia Primary doesn’t realize is that the patient thinks it is ok for him to take Percocet and acetaminophen “Tylenol” together because the doctor used the brand name many people are familiar with rather than the more complicated generic drug name. The doctor meant for the patient to use both “Percocet” and “Aleve” OR “Tylenol”. By using the brand name, the doctor also did not realize that Patient Adam would not understand the danger adding acetaminophen to an opiate drug compounded with acetaminophen. Up to this time the practice had not been including over the counter drugs in their electronic health record-based medication reconciliation process so no alert was generated during documentation.

### **Post-condition**

Dr. Patricia Primary updates the care plan by performing a medication reconciliation to include the antibiotic and new prescriptions for pain and nicotine craving management. A C-CDA is created that includes the updated care plan and medications prescribed. The C-CDA including the Discharge summary, radiologist report and diagnostic images from the out-of-state hospital are sent to Dr. Charles Bone using the DIRECT protocol. As part of payment innovation with the HC Payor, Inc., a copy of the C-CDA is also sent to the health plan using the DIRECT protocol, and the HIE notification on the new C-CDA is also sent, which is performed as a routine automatic feature of their EHR system.

## **Encounter E: Specialist Visit**

### **Precondition**

Mr. Everyman is 3 weeks post ankle surgery and is receiving follow-up care with a local orthopedic specialist, Dr. Charles Bone. The C-CDA, the hospital Discharge Summary and Diagnostic Imaging Report is received by the EHR system of Dr. Bone – sent by PCMH staff using a forward and routing feature of their local HIE.

### **Description of Specialist Evaluation**

Dr. Bone reviews the C-CDA and diagnostic imaging report on his tablet PC during the office visit with Adam Everyman.

Dr. Charles Bone recommends physical therapy to continue for weight bearing exercises and further rehabilitation. Dr. Charles Bone suggests stepping down to NSAID/acetaminophen only for pain medication as needed and one half hour prior to physical therapy. Mr. Everyman is doing well and is expected to make a full recovery.

### **Post-condition**

A care plan with interventions related to wound care and instruction for the patient to follow-up with his PCP are entered in Dr. Bone’s EHR. A C-CDA with the specialist’s care plan and medication changes is

sent to the HC Payor, Inc. and a hard copy (Clinical Summary) was provided to the patient. An electronic notice is automatically sent to the local HIE that new C-CDA information is available on patient Adam Everyman. (NOTE: The office staff of the specialist sends the C-CDA to the HC Payor, Inc., as a routine payment innovation contract practice).

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## Encounter F: Health Plan Disease Management (DM) Care Manager Encounter

### Precondition

1910 Nurse Pamela CM/DM Payer Care-Manager has been monitoring Mr. Everyman's claim activity since the hospitalization in Northern state. She was his previously assigned asthma case manager as outlined above.

### Description of Health Plan Care Management Evaluation

1915 In this situation, Nurse Pamela Asthma DM Payer Care-Manager updates the patient's profile. She puts in a phone call to Mr. Everyman at home and they review his discharge plan. They agree that Mr. Everyman is self-sufficient and does not need a home nursing evaluation. Ms. Payer Care-Manager schedules a call for the next day to check on him. She will recommend that he appropriately dispose of his Percocet if he has been free of discomfort for 24 hours on the acetaminophen he is taking now for pain control. Based on a system flag, Nurse Pamela shares the risk of acetaminophen adverse reaction versus the original hospital prescription of naproxen sodium (Aleve). He has none of the reaction issues, but she reminds him to avoid alcohol until the Percocet is eliminated from his body. Care Manager Pamela realizes the patient needs complex care planning. She refers him to a Complex Case program, which he agrees to participate in. She notes the issues and discussion on the DM Asthma care plan as a referral to her caseload as his Complex Case Program care manager (CM). Now she begins functioning in the combined CM/DM role. She also feels he should have the option of support by a diabetes disease manager while convalescing at home so she offers a referral to Deborah Payer Disease-Manager who is the HC Payor, Inc.'s telephonic diabetes educator. Ms. CM/DM Payer Care-Manager recommends a care team meeting with the PCMH staff and PCP to make sure there are no other duplications, gaps or contraindications given the complexity of his overall situation, and reminds Mr. Everyman he can resume working with his PCMH office-based diabetes disease manager and obtain asthma care there whenever he is able to get to the primary care office. Her documentation in the health plan Disease Management (DM) Treatment Plan has been updated to include diabetes management. A notice was automatically sent to the patient's provider Dr. Patricia Primary to facilitate and coordinate the patient's interventions as appropriate.

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1935

### Post-condition

1940 Pamela CM/DM Care-Manager updates Mr. Everyman's payer care plan to reflect recent health activity including complex case management, asthma, and diabetes care and the continued use of "Percocet" with acetaminophen. She advises the patient to stop taking the "Percocet" in keeping with his care plan, making him aware of her outreach to Mr. Everyman's PCMH. A recommendation email notice was sent to patient's provider, Dr. Patricia Primary, requesting a conference call to facilitate and transition the patient's interventions to the PCMH as appropriate. The DM interventions are updated. The aggregated

- 1945 care plan, with the updated payer DM/CM interventions, and drug interaction concerns, a copy of the specialist care plan and copy of the hospital care plan is sent to the PCMH. Dr. Patricia Primary refers a request that PCMH Nurse, Betty Case-Manager, make a call or send email to verify the patient has stopped taking “Percocet” – she did so and learned the issue had resolved. The patient was doing well on acetaminophen. He promises to dispose of the “Percocet” if he still feels o.k. in another 24 hours.
- 1950 Betty Nurse Case-Manager updates the care plan to reflect her conversation with Mr. Everyman: how the drug-drug interaction concerns are being handled along with the patient’s improved understanding of them. She documents her review of the medication reconciliation information in the care plan and the EHR system. The PCMH C-CDA with the new CM/DM changes and visit summary is created, and a notice is sent to the local HIE.
- 1955

### **Encounter G: Primary Care Provider and Care Team Meeting Follow-up Visit**

- 1960 ***Precondition***
- Receipt of the Aggregated Care Plan from payer
- Receipt of the payer copy of the C-CDA from the specialist & Discharge Summary from Dr. Aaron Attend
- Update of the PCMH Care Plan, and an available new C-CDA with the visit summary and PCMH care plan by Betty Nurse Case-Manager.
- 1965 Receipt of a recommendation email notice requesting a conference call to facilitate and transition patient’s interventions to the PCMH
- Description of Primary Care Provider Follow-up Visit Evaluation and Care Team Meeting***
- 1970
- Dr Patricia Primary identifies a wound problem that could be evidence of a deep tissue infection. Because the patient is already partially weight-bearing the PCP thinks that bone healing is progressing properly, but thinks the cellulitis needs aggressive therapy with intravenous antibiotics. Due to complexity of the wound, specialist care is preferred.
- 1975
- Betty Nurse Case-Manager reviews the Orthopedic options with the patient based on his health plan benefits information from the Payer’s CM/DM nurse, Pamela Payer Care-Manager, on quality and co-pay cost options – the patient can return to his orthopedic surgeon office with the potential of subsequent referral to infectious disease, or go directly to infectious disease. Betty Nurse Case-Manager facilitates the Care Team meeting.
- 1980
- Reconciliation of the discipline-specific care plans (including those from Dr. Bone, the Physical Therapist, and the Home Care Nurse) is performed by the practice-based Nurse Case-Manager, Nurse Betty in collaboration with Dr. Bone. As part of the reconciliation process, a conference call with health plan Care Manager is included. In addition, the patient would be invited to be part of this call as part of the care team and to understand his role in the interventions. This interdisciplinary care plan reconciliation
- 1985

meeting would be expected to include discussions on the following: health concern(s), risk(s), goal(s), observations (on duplications, gaps or potential interactions), intervention(s) proposed, identified barriers to care and finally whether the care plan or a care plan component can be ended.

1990 Following the interdisciplinary team meeting and input from the PCP, Betty Case Manager will create an interdisciplinary care plan with new and updated interventions, and their probable timing. It is determined that most of care that is needed can be performed in the patient's home by the high tech company for IV antibiotic therapy and visiting nurses for wound care. The office-based Betty Nurse Case-Manager monitors the IV antibiotic therapy and wound care visits, unless a new problem emerges that warrant a PCP's review.

1995 **Post-condition**

2000 Presented with the options of referral to Infectious Disease or to Orthopedics, referral to the Orthopedist was selected by the patient for his wound infection. A diagnostic image test is ordered and performed, but no bone-related problems are identified. It seems to be an infection of soft tissue. A C-CDA with updated interdisciplinary care plan is sent to Ortho and to the HC Payor, Inc. The local HIE is also notified that an updated C-CDA is available.

2005 The PCMH Betty Case-Manager calls the health plan Nurse Pamela CM/DM Payer Care-Manager, to coordinate the prior authorization process and documents needs to schedule home visit for wound care and they discuss an order for I.V. antibiotic recommended by Dr. Charles Bone to be performed by a high tech company that makes home visits. Pamela Payer Care-Manager locates a contracted high tech home care organization and conveys the referral for care.

2010 Betty Nurse Case-Manager refers the case to the home health agency used by the PCMH. The HC Payor, Inc.- based Pamela Payer Care-Manager handles review of benefits for this patient to ensure coordinated care.

2015 A social worker from the primary care practice can be scheduled to visit with Mr. Everyman in his home to be sure he is using all community services available to keep his insurance coverage, keep up with bills, and use any company benefits available now in the event of lay-off during his medical leave.

2020

Condition	Generic	Brand Name Rx	Dose
Asthma	albuterol sulfate	Proventil	108 mcg per inhalation, given as two inhalations repeated every 4 to 6 hours. Dispense and use a spacer for best results.
Depression	bupropion HCl	Wellbutrin	200 mg per day, given as 100 mg twice daily. After 3 days of dosing, the dose may be increased to 300 mg per day, given as 100 mg 3 times daily, with at least 6 hours between successive doses.
Nicotine craving	nicotine inhaler	Nicotrol	inhalation regimen: 80 deep inhalations over 20 minutes) releases 4 mg nicotine, with 2 mg absorption; peak plasma concentration within 15 minutes
Pain	naproxen sodium 220 mg	Aleve	440 mg per day, given as 220mg twice daily.
Pain	oxycodone and acetaminophen	Percocet	7.5 mg/500 mg, 1 or 2 tablets, given up to four times daily, with at least 6 hours between successive doses. Do not exceed this. Taper as soon as possible to 1 tablet, then lengthen to every 8 hrs 3 times daily until you are not in pain or run out of medication or successfully transition to an NSAID
Pain	acetaminophen	Tylenol	500 mg, 1 tablet, given up to four times daily, with at least 6 hours between successive doses. Do not exceed this. Taper to 500 mg every 8 (or more) hours as soon as possible.
Pneumonia	levofloxacin	Levaquin	750 mg, capsule given once per day for five days to treat community acquired pneumonia, including pneumonia from Streptococcus pneumoniae

Table 4.



## Care Plan Models

- 2025 The Care Plan project team has developed a number of care plan model artifacts. A layered modeling approach was used which allows for separation of concerns by business requirements, information requirements and technical interoperability requirements, and to support forward and backward traceability through these layers. The model semantics are grounded on the clinical scenarios described in the Care Plan project storyboards and also review comments received from the care plan model team and the ONC LCC HL7 Tiger Team.
- 2030 The first layer, the conceptual model level, identifies the business domain concepts and concept relationships necessary to define the scope of the domain semantics covered by the subsequent levels. The second layer, the logical information model, elaborates the conceptual model by adding attributes necessary to capture the data elements resulting from dynamic care planning interactions and required for capturing static point in time snapshots of the care plan. At the logical information level the model retains a one to one mapping of all the domain concepts except abstract data types such as String, Boolean and Code start to surface. The logical information model contributes intrinsic data properties necessary to specify a class model with sufficient detail to support interoperability information requirements.
- 2035 In the third layer, the platform implementation model will be realized through independent technical specifications such as CCDA specification of the Care Plan and its exchange, dynamic care plan management system implementation, and SOA specifications for coordination of care. The logical model will be transformed into a technical specification to support message exchange and service interoperability.
- 2040 The platform implementation model does not necessarily map one to one with the logical information model as engineering constraints may result in denser, terser and more optimal data structures and abstractions. To be meaningful and have utility to the business domain users the platform implementation model is still traceable to the logical information model via explicit mapping.
- 2045 The layers provide different perspectives starting with the business domain semantics and ending with the technical interoperability (engineering concern) models with traceability to the storyboards and technical use cases.
- 2050 The conceptual and logical information model levels will be described in the following subsections.
- Care Plan Conceptual Model
  - Care Plan Logical Information Model
- 2055 The Care Plan model captures the necessary details for describing and supporting a broad set of uses cases encompassing dynamic use of care plans within the context of care planning and execution applications and also the exchange of point in time care plan snapshots via messages and documents.
- The Care Plan structure is designed to support the implementation of different types of plans including comprehensive multidisciplinary plans as well as discipline- or treatment- specific plans.. The generic “Plan” structure which together with a number of supporting components describe health concerns, health goals, interventions (plan activities), preferences, health risks, acceptance review, outcome review, care team roles, participations and their relationships.
- 2060 The care plan model provides the structure to support the differentiation of these (and other) types of plan through vocabulary driven attributes and the display name attribute of the Plan class.

2065 Information requirements and care processes discerned from the rich set of care plan storyboards have been used to validate the adequacy of the generic *Plan* structure and its components in supporting the implementation of the three types of Plans as defined by the LCC project.

Some important aspects of the model to keep in mind:

- 2070
1. The models do not specify governance, policy and business rules but support their use by capturing the necessary content and relationships to enable many policies and governance models.
  2. The model defines domain level semantics for future technical service, message and document standard specifications. Technical platform binding to services, messages and documents is out of the scope of the Care Plan DAM. Technical specifications will obtain their semantics from the Care Plan DAM.
  - 2075 3. The Care Plan DAM does not provide vocabulary binding but specifies coded properties which would be constrained via specific terminology bindings. Terminology bindings will be developed for downstream implementable artifacts. Coded properties within the Care Plan DAM may specify root concept hierarchies from an ontology, taxonomy or simple value set. The Care Plan DAM identifies those properties with coded representation at the information level and provides examples as  
2080 enumerated values to inform analysis for terminology binding.

The Care Plan DAM is an unconstrained model of the domain information which describes the semantics necessary to support various organizational use cases and international realm perspectives. It is expected that derived models will add constraints to determine which aspects or slices of the model are sufficient for their use case; for example, Clinical Document Architecture (CDA) representation of a care  
2085 plan instance does not represent dynamic care team participations as it is a point in time snapshot of the information and interactions only.

The model captures the features resulting from process interactions but does not specify or dictate what the process is; it is a domain information model. The model is agnostic to policy and business rules decisions. The model simply describes the features necessary to support diverse processes which  
2090 naturally occur across continuum of care, organization and geographical boundaries. External definitions of process, policy, business rules and governance will determine what subset of features is sufficient for their implementation based on one of the technical specifications derived from the Care Plan DAM. As a principle, organizations will provide their own policies, rules and decisions and the Care Plan model will provide a vessel for holding the data necessary to support the process interactions.

2095 A key aspect of the story boards which inform the Care Plan DAM is that the *Care Plan* exists in the continuum of care and changes in time and space through the interactions of a care team which includes the patient, his or her family, providers, care givers and social support structure. As such the plan emphasizes the involvement of care team members in a given role participating in documenting, managing, tracking, communicating and giving care to the patient.

2100 In order to support future standards based coordination of care processes the interactions or participations of the care team are as important as the resulting information elements necessary for static snapshots. The Care Plan DAM captures data resulting from care team interactions in order to support dynamic and collaborative coordination of care interactions. Knowing who, when and how an individual care team member was involved in an activity helps to answer why something was done and facilitates  
2105 awareness and harmonization of one shared and consistent Care Plan across the continuum of care.

## UML Notation Used in the Models

The Care Plan model is expressed as a single UML (Unified Modeling Language) model with various class diagrams that emphasize different features and aspects of the model.

2110 UML classes represent concepts from the domain and may and may not always map one to one to an implementable class.

The model makes use of the following UML capabilities:

- UML Class – Expresses a domain concept.
- UML Property – Represent intrinsic attributes of the concept.
- 2115 • UML Association – Specifies a relation between concepts.
- UML Association Class - An association class can be seen as an association with data properties. For example, the *Participation* association class used in the Care Plan model specifies attributes which identify where, when and how an individual care team was involved in an occurrence of the plan, goals, concerns, interventions, etc. These attributes are part of the associative type of *Participation*.
- 2120

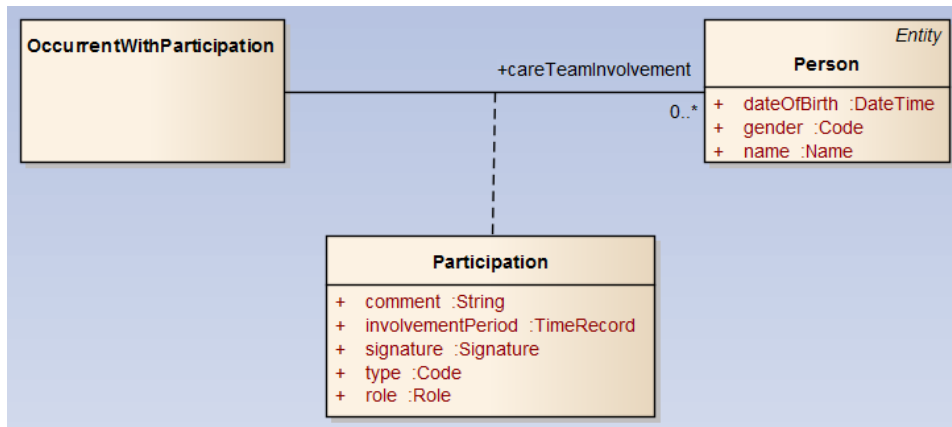


Figure 1 Participation Association Class Example

- UML Template - are model elements with unbound formal parameters that you can use to define families of classifiers. In the model, these are used to represent unconstrained place holders for clinical object references. For example, the reason for a Health Concern may be a Condition, an Allergy, a Medication, etc. The unbound place holder parameter allows specifying a Health Concern pertaining to any of these disjoint concepts.
- 2125 • UML Stereotype – Used to extend UML at the meta-level. This model uses a “<<Temporal Awareness>>”stereotype for UML associations. The “<<Temporal Awareness>>”stereotype indicates the association requires special temporal awareness by the care team (awareness of before and after values). For example, a priority attribute may be changed and the awareness of the change can be of special importance to care team decision making. The use of the stereotype in the model explicitly informs downstream artifacts that they should consider the capability to support awareness of the change through time.
- 2130
- 2135

## Care Plan Conceptual Model

The conceptual model is designed to capture high level business requirements and delineates the scope of the domain necessary to support definition of the logical information model and derived technical interoperability standards. Its focus is to identify the necessary concepts and relationships only. The model does not specify data properties; the data properties are elaborated in the logical information model. The conceptual model establishes common semantics for concepts and relationships required to establish the scope of electronic Care Plan interoperability for point-in-time care plan exchanges and dynamic, shared and collaborative care plan interactions.

The conceptual model classes/concepts are directly traceable to the business requirements captured in the various storyboards included in this document.

### Model Descriptions

The model consists of an abstract *Plan* which captures the shared components of collaborative, patient centered and holistic care. The Plan has associations to concepts for *Health Concern*, *Health Goal*, *Health Risk*, *Care Barrier*, *Care Preference*, *Conversation*, plan *Activity* (including interventions), *Acceptance Review*, *Plan Review* and key care team participations through time and space between the *Patient*, *Provider(s)*, *Care Giver(s)* and other *Supporting Member(s)*. Each is listed equally but it is the health concern, and the plan Activity that are directly driving the anticipated Health Goal (whether or not it is realistic). The Health Outcome(s) are tied to the health concern, goal and activity allowing evaluation of the progress of care towards the health goal(s).

The figure below from the HL7 CDA R2 IG SDTU R2 Vol 1: Intro shows key components of a Care Plan: health concern, health goal, intervention, evaluation/outcome, and the flow between them.

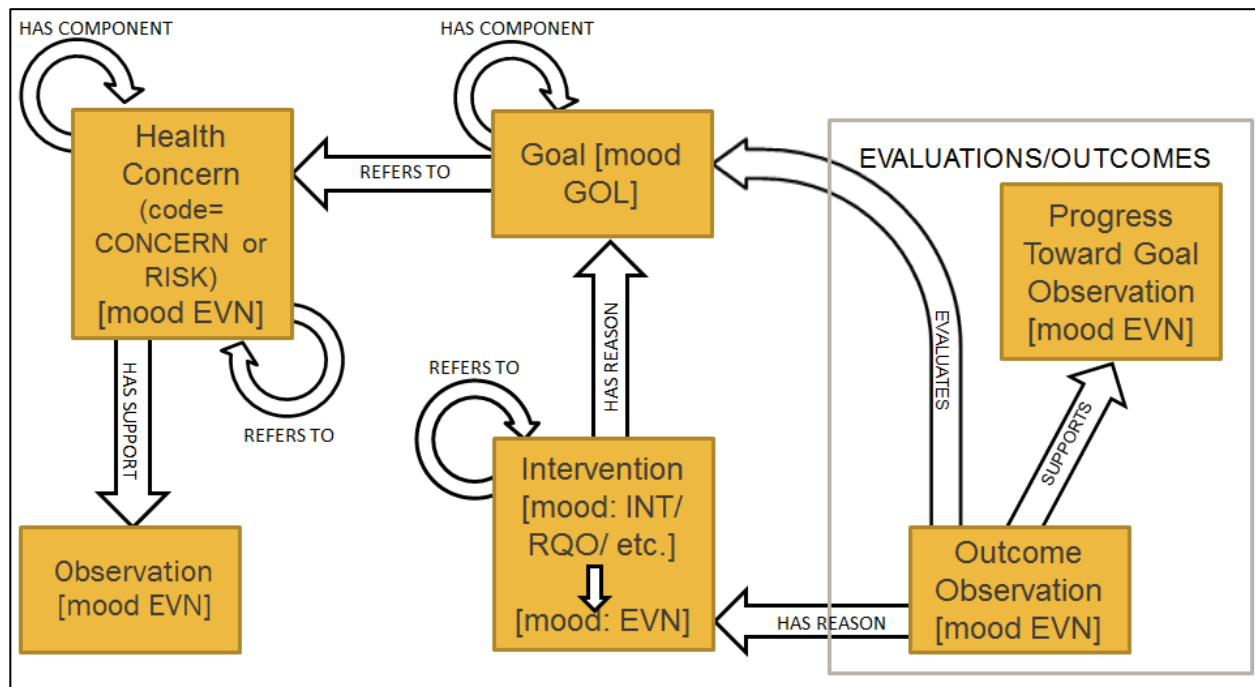


Figure 2 Care Plan Relationship Diagram

2165 The *Plan* and many of its associated classes support dynamic care team involvement as defined by the shared characteristics inherited from the *OccurrentWithParticipation* primitive concept. Many yet unspecified process models and realm specific policies and rules will specify how *Participation* occurs. The important point is that the Care Plan DAM has the capability to capture information about these participations. As an example, dynamic care planning interactions spread through time and space and directed towards harmonization of the *Plan* will result in specific involvement of multiple care team members. Capturing the details of participations enables awareness necessary to support coordinated care via standards based applications. In the *Plan* class the *careTeamInvolvement* association is further specialized to indicate key constituents consisting of the *Patient*, *Providers*, *Care Givers* and other *Supporting Members*.

2175 The details of the *Plan* result from the interactions of the *Care Team* which consists of the *Patient* and at least optional *Providers*, *Care Givers* or *Supporting Members*. A *Plan* is not intended to be static but continuously changing based on continual chatter, negotiation and interactions between the various care team members. When the *Plan* becomes static, cross care teams communications and care coordination will need to be managed by mechanisms outside the Care Plan system to prevent communication and care coordination breakdowns, information gaps and risks to care. The *Care Plan* by design is a collaborative, shared and dynamic structure with controlled *Care Team* involvement or participation.

2180 The *Care Team* is in many places, interactions span the continuum of care and time. Resolution of differences in opinion, correction of discrepancies and overall harmonization of the Care Plan requires raising awareness and visibility of care team *Participations* so that they are visible to all care team members (within the constraints of the circle of care which needs to know).

2185 A *Plan* may come into being as a result of one or more patient *Health Concerns* or simply as a result of a patient *Health Goal*. For example, in the stay healthy use case, a health care consumer may not have a specific concern but simply a desire (i.e. goal) to improve some aspect of their health. In this case the patient may have a *Plan* entirely driven by *Health Goals*. The *Plan* is created with simply a goal in mind. For patients with some health condition whether simple, chronic or complex the *Plan* will reference one or more *Health Concerns*. The *Health Concern* specifies the reason for creating the Plan. In this case the *Health Concern* reason eventually leads to the definition of *Health Goals* as a result of conversations between the patient and his or her providers, care givers and supporting care team.

2190 Certain individual may have predisposition to certain *Health Risk*, which may or may not become health concern(s) over time. The model supports representation of these *Health Risks* to enable the care team to monitor them and have the awareness to implement mitigating actions if the need arises. An intervention, plan *Activity*, in turn may present certain *Health Risks* to the patient which must be closely monitored to prevent the manifestation of additional health concerns (e.g. the risk of administration of an immunosuppressant, surgery, etc.)

2195 Please note that the various diagrams present partial views of the underlying model to improve clarity in the presentation. Review of all the models and how they relate to each other is expected for a comprehensive understanding of the Care Plan DAM.

2200 The following diagram illustrates the high level associations of the core domain concepts directly associated with the abstract *Plan*; subsequent diagrams will introduce additional features and associations of these domain concepts.

## HL7 PCWG Care Plan DAM

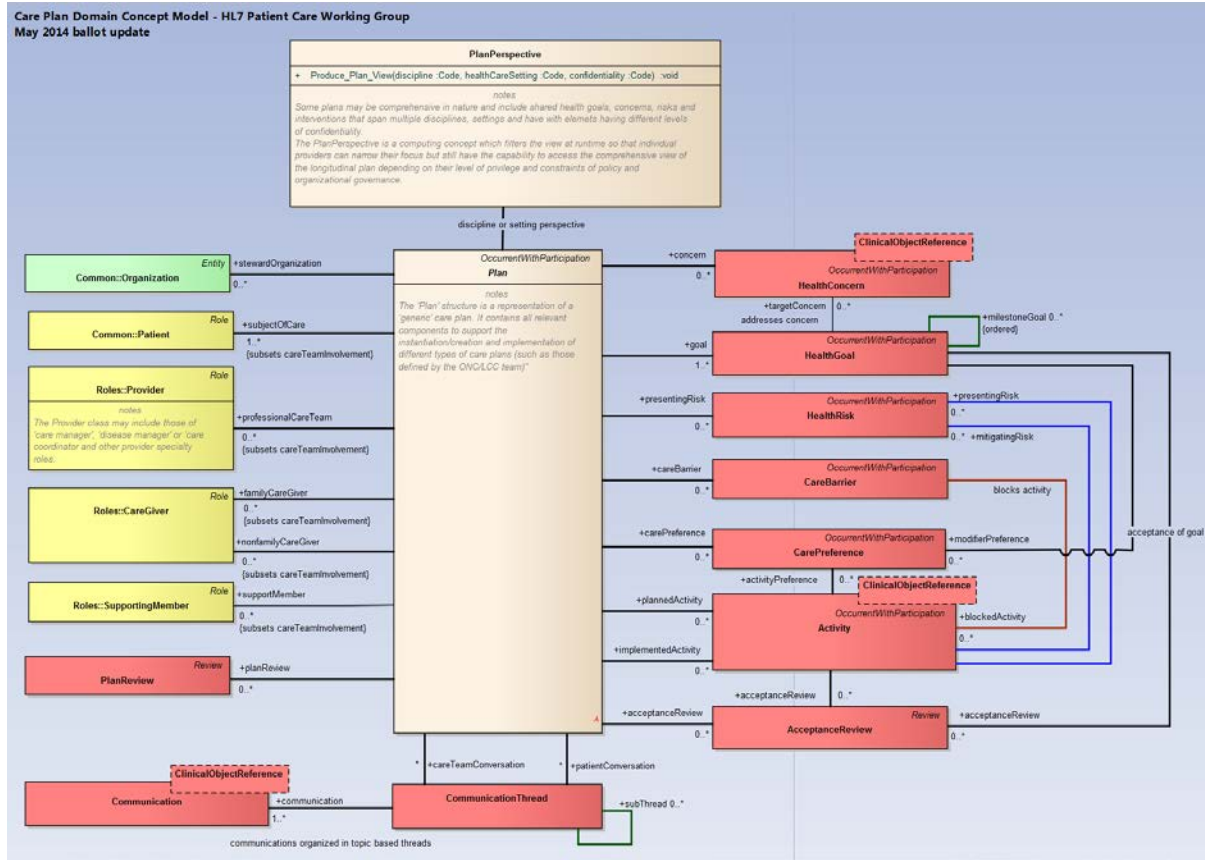


Figure 3 Plan Concept Model

### Plan Class - Summary of Associations

Associations represent relationships between classes/ concepts. The following are a set of associations depicted in the Care Plan conceptual model.

Focus Concept	Associated Class	Cardinality	Description
Plan	Organization	0..*	Stewardship of the plans is shared between the patient and zero or more organizations in which the patient is receiving care.
Plan	Patient	1..*	There is at least one patient who is the subject of care. Group therapy scenarios include more than one patient and as a result the cardinality is one or more.
Plan	Provider	0..*	The plan might have any combination of Providers, Care Givers or other Supporting Members forming the care team along with the Patient. These associations are different subsets of care team involvement or participation.
Plan	CareGiver	0..*	
Plan	Supporting Member	0..*	

## HL7 PCWG Care Plan DAM

<b>Plan</b>	HealthConcern	0..*	Health concerns specify the condition oriented reasons for creating the plan.
<b>Plan</b>	HealthGoal	1..*	A plan has at least one health goal which may either directly address a Health Concern or be the result of an internal patient motivation.
<b>Plan</b>	HealthRisk	0..*	A plan may capture a patient's inherent health risks or risks that may be associated with certain interventions, so that there can be awareness among the care team as they monitor any impact on the patient's health which may introduce new health concerns based on the risk.
<b>Plan</b>	CareBarrier	0..*	A care barrier presents a situation which impacts progression of the identified health goals by blocking specific interventions or activities. Interventions and other plan activities may be modified in order to remove the block.
<b>Plan</b>	CarePreference	0..*	<p>A care preference is a statement expressed by the patient, custodian or caretaker responsible for the patient in order to influence how their care is delivered.</p> <p>A preference expresses a personal choice and may be driven by cultural, religious and moral principles. As such it is a principal component of patient centered care and autonomy. Care preferences serve as modifiers of the Care Plan which influence how the plan is personalized for the individual.</p> <p>A care preference may be specified prospectively to influence future care planning and treatment or it may be expressed and recorded at arbitrary decision points during interventions.</p> <p>A preference expresses a request to fulfill a patient's choice or desire. The choice may be a strong and absolute statement such as an end of life directive. The request could also be a desire to be fulfilled if possible given care team capabilities and resources.</p>



## HL7 PCWG Care Plan DAM

<b>Plan</b>	Activity	0..*	Activities include interventions and other ancillary supporting activities necessary to carry out the plan. The plan references plan activities as well as implemented activities in order to support the planning and execution aspects of coordination of care workflows.
<b>Plan</b>	AcceptanceReview	0..*	<p>An AcceptanceReview captures the patient's acceptance of the plan upon discussion with his or her care team and weighting the pros and cons of treatment.</p> <p>The AcceptanceReview may also capture general agreement or disagreement about the plan among care team members.</p>
<b>Plan</b>	PlanReview	0..*	Plan reviews are performed at periodic intervals to assess the overall consistency, appropriateness, completeness and effectiveness of the plan. The plan review includes comprehensive review of all the goals.
<b>Plan</b>	CommunicationThread	*	A thread organizes individual plan related communications in a meaningful manner for the benefit and understanding of care team.
<b>Communication-Thread</b>	Communication	1..*	<p>Communication is ongoing during care coordination. Care team communications is what causes the unfolding of the plan as new participants join, propose actions, change goals, record interventions, review outcomes and assess effectiveness of individual actions and of the overall plan.</p> <p>A communication may pertain to any element of the care plan or the care record and reference the specific semantic context.</p>



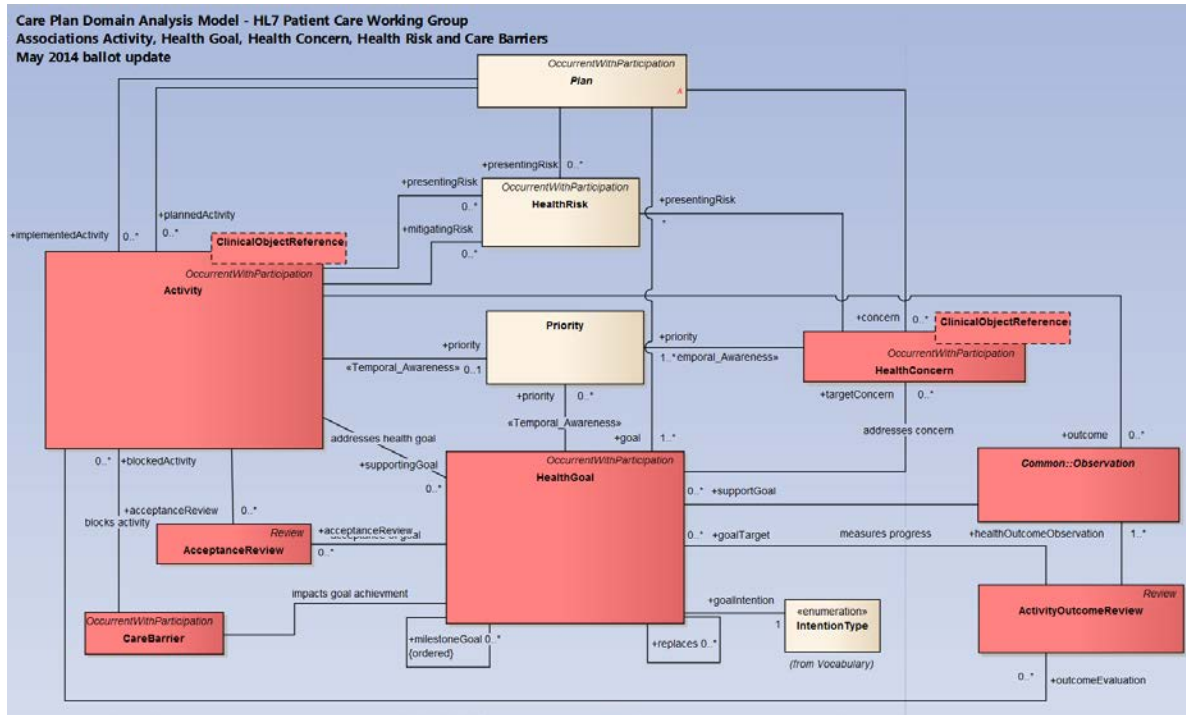


Figure 4 Associations Activity, Health Goal, Health Concern, Health Risk and Care Barriers

## 2215 Health Goal Class - Summary of Associations

Associations for the health goal class are summarized below:

Focus Concept	Associated Class	Cardinality	Description
<b>HealthGoal</b>	AcceptanceReview	0..*	An AcceptanceReview captures the care team's (including patient) agreement with the health goals of the plan.  It may also capture disagreement or compromises between care team members regarding what the goal should be. Capturing varying perspectives facilitates harmonization of the health goals in dynamic care plan applications.
<b>HealthGoal</b>	Priority	0..*	A goal may have priority specified by the care team members including the patient. Differing priorities help care team members focus on their areas but at the same time it aids with global team awareness of differences which may be important for care plan harmonization.
<b>HealthGoal</b>	HealthGoal (milestone)	0..*	A Health Goal may be composed of finer grained intermediary milestones.
<b>HealthGoal</b>	HealthGoal	0..*	A Health Goal may be replaced by an

	(replacement goal)		alternative at any point during the life span of the plan. This association captures replacement context in order to maintain awareness of a decentralized care team.
<b>HealthGoal</b>	HealthConcern	0..*	The Health Goal may address zero or more health concerns. This association links the goal to an underlying condition oriented reason for setting the goal.
<b>HealthGoal</b>	CareBarrier	0..*	A care barrier impacts goal achievement by blocking specific activities or interventions. This association raises awareness of blocks so that they can be addressed by the care team in collaboration with the patient.
<b>HealthGoal</b>	Activity	0..*	A Health Goal supports an activity or intervention.
<b>HealthGoal</b>	Observation	0..*	Outcome observations resulting from activities and interventions are linked to the supporting goal.
<b>HealthGoal</b>	ActivityOutcomeReview	0..*	A health goal determines a target which is evaluated when performing an Activity Outcome Review.

Activities in the context of planning express what is to be done, by whom, where it is to take place, and required resources necessary for execution. The following diagram elaborates on the concept of Activity and necessary associations.

2220

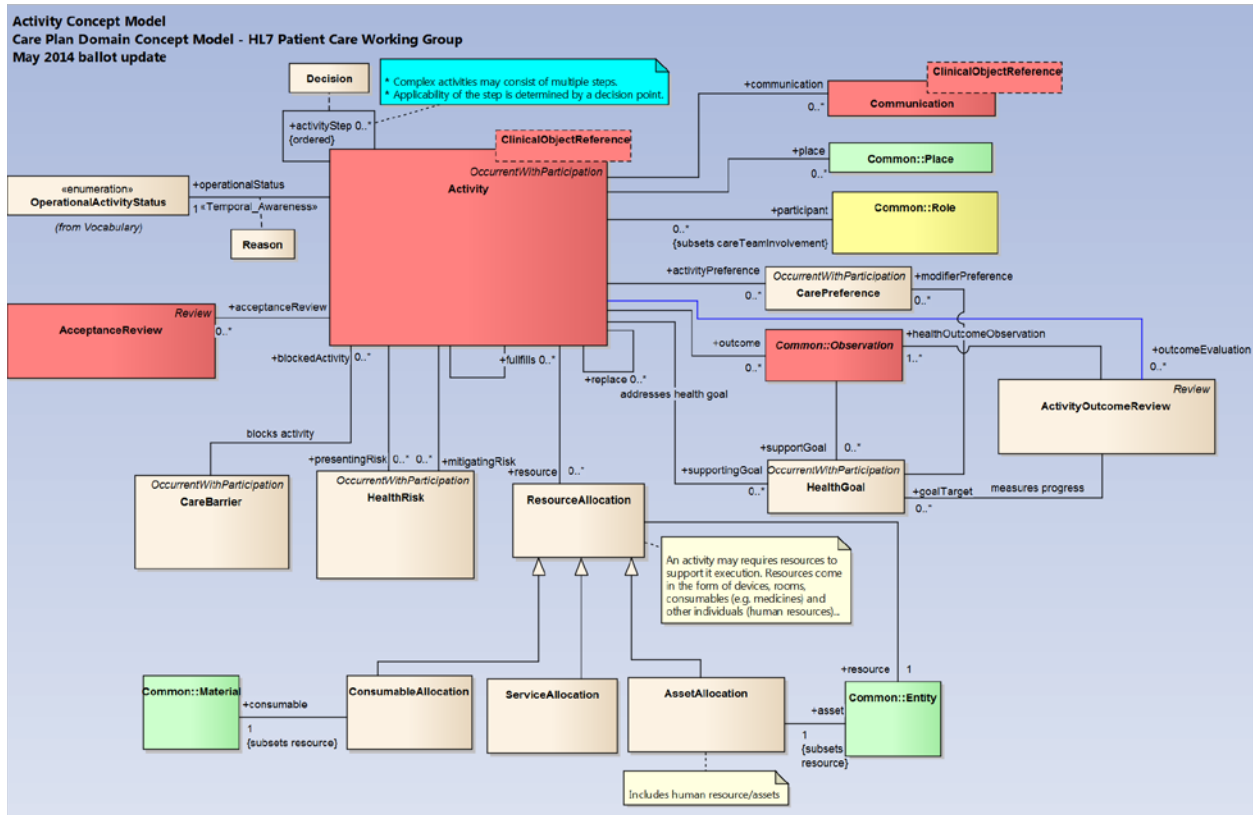


Figure 5 Activity Associations

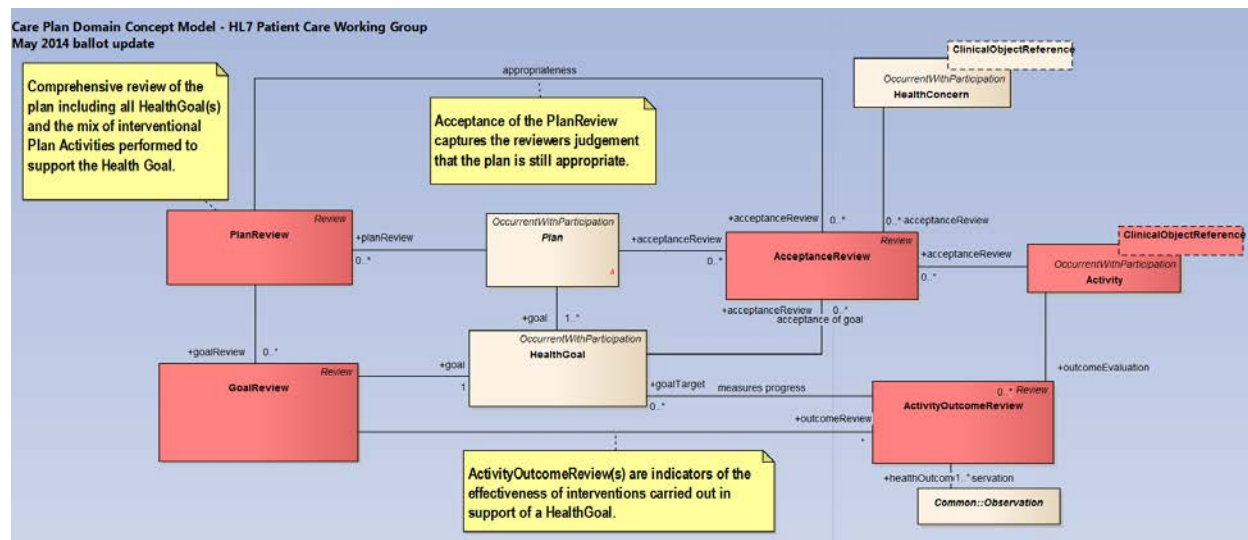
## 2225 Activity Class - Summary of Associations

Associations for the activity class are summarized below:

Focus Concept	Associated Class	Cardinality	Description
<b>Activity</b>	Activity	0..*	An <i>Activity</i> may consist of multiple steps which are activities themselves. The applicability of the step is determined by a decision point which determines conditional execution.
<b>Activity</b>	OperationalActivityStatus	1	An <i>Activity</i> has a participant driven operational status as it is proposed, started, suspended and cancelled. There is just one status at any given time but the model supports capturing overtime snapshots to facilitate coordinated activities and reference point awareness by the care team.
<b>Activity</b>	AcceptanceReview	0..*	An <i>AcceptanceReview</i> captures the patient's acceptance of an activity or intervention upon discussion with his or her care team

			<p>and weighting the pros and cons of treatment.</p> <p>The <i>AcceptanceReview</i> may also capture general agreement or disagreement about the activity among care team members.</p>
<b>Activity</b>	Place	0..*	An <i>Activity</i> takes place somewhere along the continuum of care.
<b>Activity</b>	Role	0..*	An <i>Activity</i> has many types of care team involvement over time. A care team member may propose, reject, comment, modify, implement, etc. Awareness of who participated, why and what they did helps coordinate care team actions as they span time and space.
<b>Activity</b>	HealthGoal	0..*	An <i>Activity</i> is planned and implemented in support of specific care plan goals.
<b>Activity</b>	HealthRisk - presentingRisk - mitigatingRisk	0..*	<p>An <i>Activity</i> may present Health Risks to the patient. In this case, the activity is linked to the Health Risk to be avoided in order to raise awareness within the care team.</p> <p>An <i>Activity</i> may also be implemented to mitigate a Health Risk introduced by either current patient health concerns, conditions or other planned activities.</p>
<b>Activity</b>	CarePreference	0..*	An <i>Activity</i> may be modified by a patient <i>Care Preference</i> . The preference is linked in order to raise care team awareness so they can maintain a respect any personalization done in support of the preference.
<b>Activity</b>	CareBarrier	0..*	An <i>Activity</i> may be blocked by a <i>Care Barrier</i> . Linking the barrier to the activity supports raised care team awareness of the obstacle which must be removed
<b>Activity</b>	Observation	0..*	An <i>Activity</i> may link to any outcome observations resulting from its execution.
<b>Activity</b>	Communication	0..*	An <i>Activity</i> may involve any series of communication exchanges between care team participants.
<b>Activity</b>	ConsumableAllocation	0..*	An <i>Activity</i> may require consumable materials as part of its planning. The allocated materials are used during the

			activity's implementation.
<b>Activity</b>	ServiceAllocation	0..*	An <i>Activity</i> may require any number of services to be scheduled as part of its planning. The services may be a requirement before the activity can be implemented.
<b>Activity</b>	AssetAllocation	0..*	An <i>Activity</i> may require any number of assets such as rooms, equipment or human resources to support successful planning. The rooms, equipment or human assets are required before the activity can take occur.



2230

Figure 6 Types of Reviews

### Review Classes - Summary of Associations

Associations representing for the review classes are summarized below:

2235

(Note – descriptions of these associations are similarly expressed in previous tables and will not be repeated here)

Focus Concept	Associated Class	Cardinality	Description
<b>AcceptanceReview</b>	Plan	0..*	
<b>AcceptanceReview</b>	HealthGoal	0..*	
<b>AcceptanceReview</b>	Activity	0..*	
<b>AcceptanceReview</b>	HealthConcern	0..*	

<b>ActivityOutcomeReview</b>	Activity	0..*
<b>ActivityOutcomeReview</b>	GoalReview	0..*
<b>GoalReview</b>	ActivityOutcomeReview	0..*
<b>GoalReview</b>	HealthGoal	0..*
<b>PlanReview</b>	Plan	0..*
<b>PlanReview</b>	GoalReview	0..*
<b>PlanReview</b>	AcceptanceReview	0..*

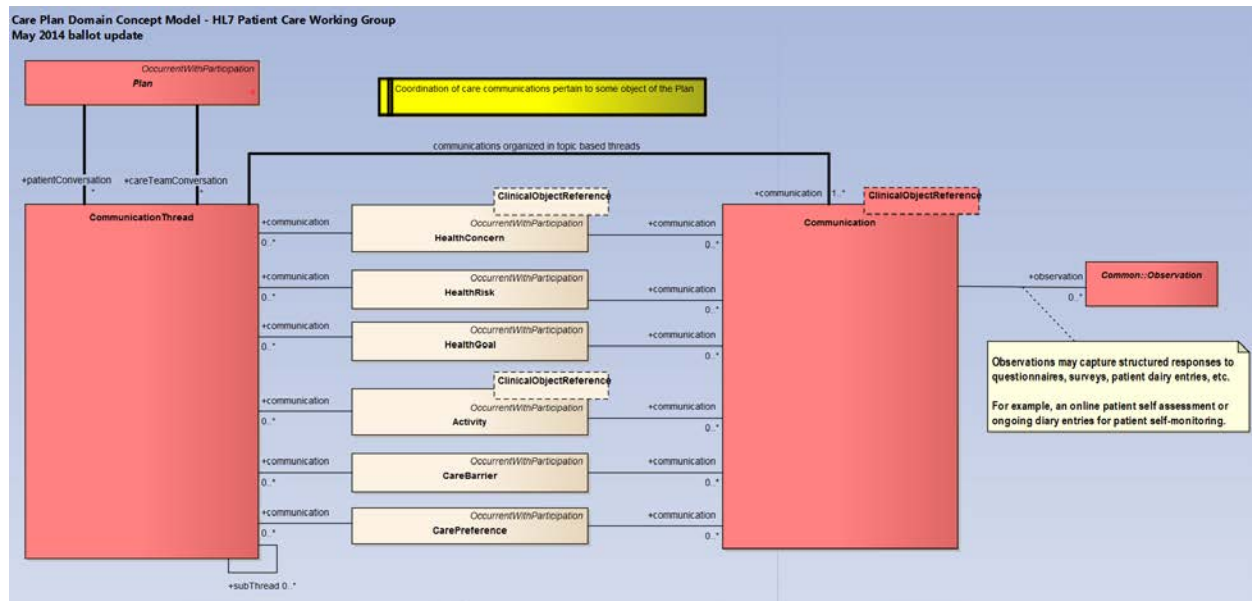


Figure 7 Care Team Conversations

2240

### Communication Classes - Summary of Associations

Associations representing for the communication classes are summarized below:

Focus Concept	Associated Class	Cardinality	Description
<b>Plan</b>	Conversation	0..*	A Plan may reference multiple conversation threads which group related communications for the benefit of the care team.
<b>CommunicationThread</b>	Communication	0..*	A conversation consist of multiple discrete communication exchanges between two or more care team members.
<b>Communication/Thread</b>	HealthConcern	0..*	Care team communications or communication threads may relate to any
<b>Communication/Thread</b>	HealthRisk	0..*	

<b>Communication/Thread</b>	HealthGoal	0..*	part of the plan.
<b>Communication/Thread</b>	Activity	0..*	These associations capture possible subjects of communications for <i>Health Concerns, Health Risks, Health Goals, Activities, Care Barrier, Patient Preferences and Observations.</i>
<b>Communication/Thread</b>	CareBarrier	0..*	
<b>Communication/Thread</b>	Observation	0..*	
<b>Communication/Thread</b>	PatientPreference	0..*	

### Externalizing Business Rules and Decision Points

2245 As mentioned in earlier sections the Care Plan model is agnostic to organizational policies and business rules. The model makes use of *Decision* and *Criterion* concepts to represent functional logic based on policies, organization decisions and business rules. For example, activities of the Plan may be conditionally executed based on decision points and they may also declare pre-conditions which use the care planning Context to determine applicability of an action and modify behavior.

2250

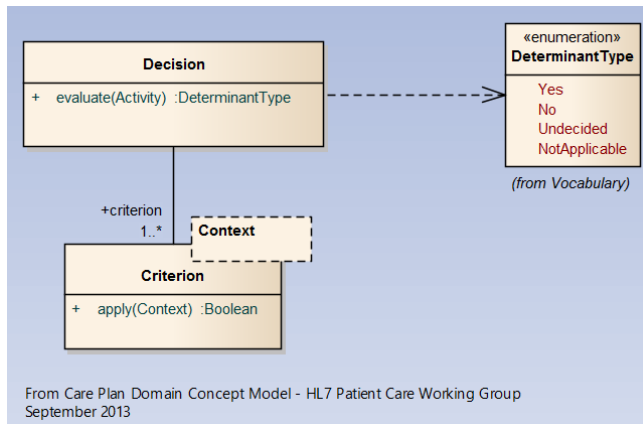


Figure 8 Decision Points and Criteria in Care Plan

### Care Plan Logical Information Model

2255 The logical information model augments the “primitive” concepts defined in the conceptual model with data properties necessary to capture information for point in time data exchange and dynamic coordination of care interactions. At the logical information level, the model includes the level of detail required for supporting IT systems but it is still not an implementation model. The model is open and unconstrained in order to support multiple use cases/specifications with varying viewpoints but shared information semantics.

2260 The logical information model classes map one to one with the conceptual model and are directly traceable to the Care Plan project’s collection of storyboards included in this document and incorporates review comments received from the ONC LCC HL7 Tiger Team. It is intended to support technological/platform specific implementable models including HL7 Care Plan R-MIMs, Consolidated Clinical Document Architecture (C-CDA) Care Plan documents and clinical statements (entries) within the

2265 C-CDA Plan of Treatment Section, and HL7/OMG Coordination of Care Services specification.



All concepts and associations from the concept model are preserved and necessary data properties are included. This section will focus on description of the attributes. Please refer to the conceptual model section for a comprehensive understanding of the concept relationships. They complete the conceptual model attribute details which we now describe.

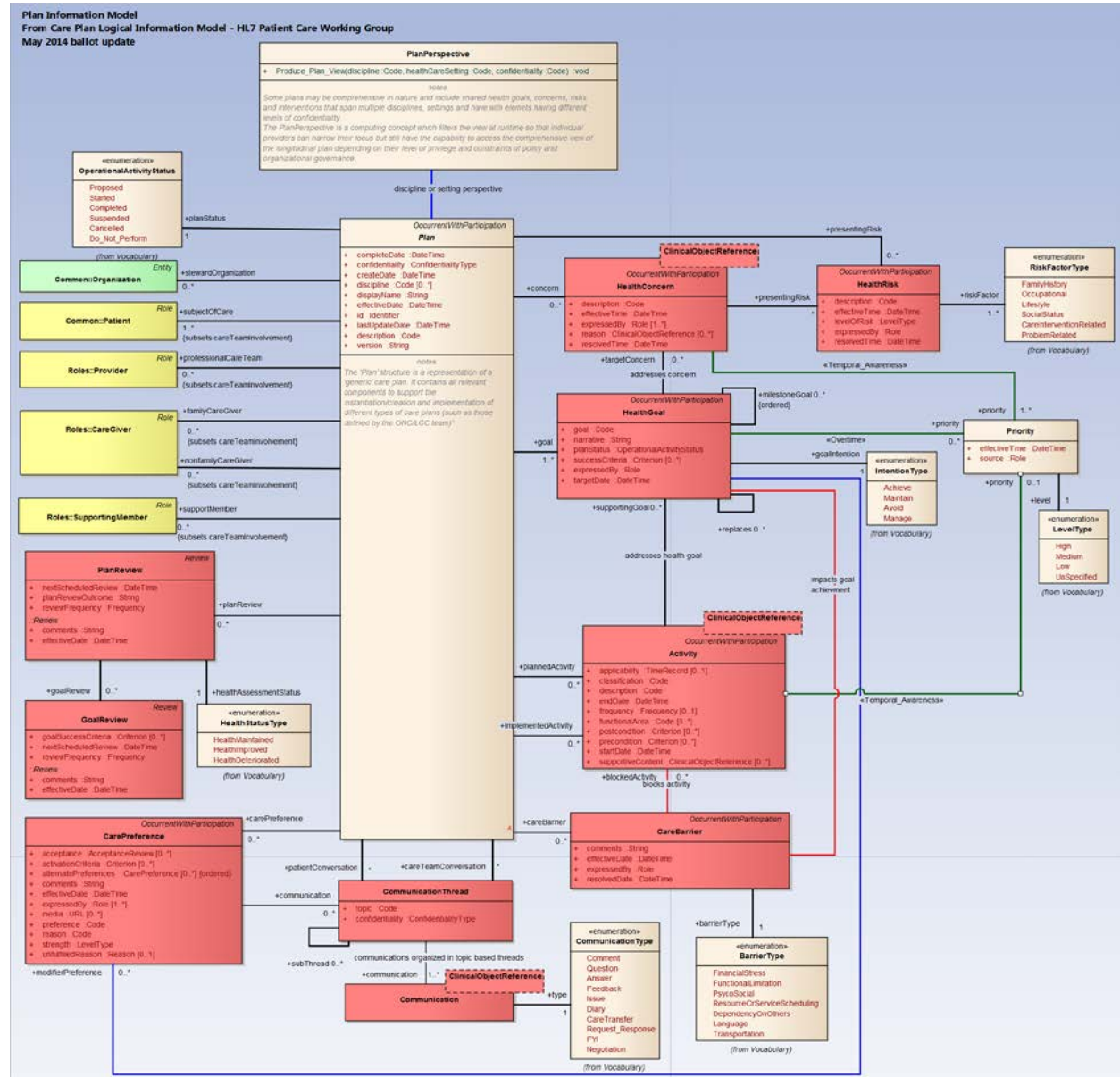
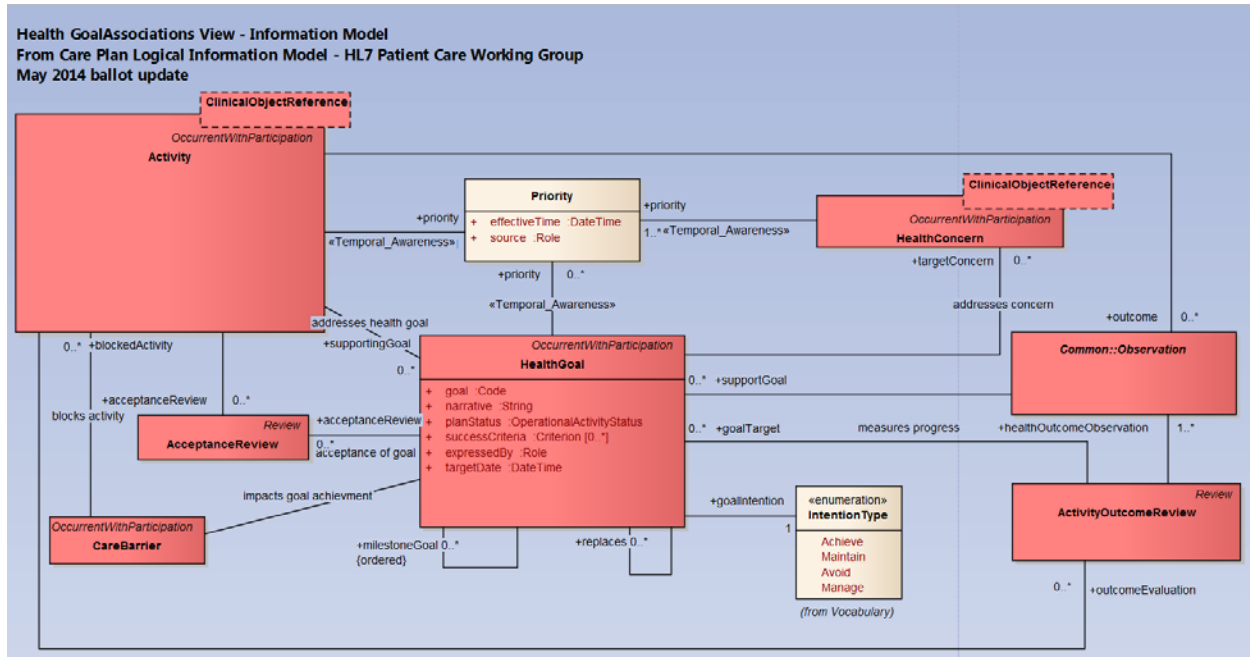


Figure 9 Care Plan Logical Information Model





2275 Figure 10 Health Goal Associations View

### OperationalStatusType Description

The operational status type applies to the Plan, individual Activity instances and to Health Goals. The status type is user determined; there is no deterministic state transition. The type specifies when the concept status is proposed, started, completed, suspended or cancelled.

2280

### Plan Attributes

The *Plan* captures the shared attributes for *Care Plan*, *Plan of Care* and *Treatment Plan*.

Attribute Name	Data Type	Description
<b>completeDate</b>	DateTime	Specifies when the plan status is changed to complete (e.g. when all goals are achieved, health concerns resolved)
<b>confidentiality</b>	ConfidentialityType	Specifies the plan's confidentiality level
<b>createDate</b>	DateTime	Specifies when the plan was created
<b>discipline</b>	Code[0..*]	Specifies zero or more discipline or clinical specialties viewpoints represented in the plan
<b>displayName</b>	String	Descriptive display name for the plan
<b>effectiveDate</b>	DateTime	Specifies the start of the plan implementation
<b>id</b>	Identifier	A unique identifier for the plan
<b>lastUpdateDate</b>	DateTime	Specifies the last date/time the plan was changed
<b>description</b>	Code	Indicates a descriptive coded type for the plan

<b>version</b>	String	A value indicating some changes (e.g. concern, goal, risk, proposed actions) in a plan and denoting that it is different from the previously published form.
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2285

### Health Concern Attributes

The Health Concern class is used to track current non-optimal physical or psychological situations drawing the patient to the health care system. These may be from the perspective of the care team or from the patient. A concern pertains to some recorded clinical object.

2290

Attribute Name	Data Type	Description
<b>description</b>	Code	A name or label for concern. The label may be derived from the clinical context it pertains to.
<b>effectiveDate</b>	DateTime	The time the concern is noted
<b>expressedBy</b>	Role[1..*]	The individual noting the concern
<b>reason</b>	ClinicalObjectReference[0..*]	A reference to clinical context pertaining to the concern. These could be conditions, diagnosis, symptoms, allergies, adverse reactions, a family history observation, etc...
<b>resolvedTime</b>	DateTime	The date/time the concern ceases to be an issue for the patient.
<b>priority</b>	Priority [0..*]	Indicates priority of a health concern as specified by an individual. For example, a patient and his PCP may attribute different priorities to an obesity concern.

### Health Goal Attributes

A *health goal* specifies a future target or achievement towards which the effort of care planning and execution is directed. Goals represent concrete targets to reduce or eliminate concerns or risks. A Goal may exist in the absence of concerns or risks. For example, a patient may have a goal to improve their fitness level. The plan always has at least one goal.

2295

Attribute Name	Data Type	Description
<b>goal</b>	Code	Names or describes the goal
<b>goalIntention</b>	IntentionType	The goal intent is a modifier of the goal purpose and indicates whether the goal target is something to achieve, maintain, manage or avoid. For example, in late stage diabetes the only path may be to simply manage or control the condition.
<b>narrative</b>	String	Captures comments or notes about the goal

<b>priority</b>	Priority[0..*]	Indicates the preference order to use for care planning purposes. The goal supports multiple priorities in order to support multiple care team perspectives and eventual harmonization.
<b>expressedBy</b>		The individual noting the goal
<b>planStatus</b>	OperationalActivityStatus	Indicates the implementation stage for the goal and related plan components.
<b>successCriteria</b>	Criterion[0..*]	Defines criteria which must be met to determine goal achievement.
<b>targetDate</b>	DateTime	Desired target date for meeting the goal

### Health Risk Attributes

- 2300 Risks may represent clinically significant potential concerns to the patient's health. They are captured in order to monitor and mitigate the manifestation of a future concern. Risks may be raised based on clinical evidences or they may capture a provider's judgment.

Attribute Name	Data Type	Description
<b>description</b>	Code	Names or describes the risk
<b>riskFactor</b>	RiskFactorType	Category for the risk
<b>effectiveTime</b>	DateTime	Date/time at which the risk is identified
<b>levelOfRisk</b>	LevelType	A risk is clinically significant but the level may be low, medium or high depending on care team judgment.
<b>expressedBy</b>	Role	Individual who identified the risk
<b>resolvedTime</b>	DateTime	The date the risk is no longer a threat to the health of the patient.

### Care Barrier Attributes

A barrier impacts specific interventions or other plan activities and may necessitate their modification. Barriers are situations outside the health care system which nonetheless reduce or block quality of care and also increase cost. Barrier may also impact on goals achievement if modifications to interventions cannot effectively overcome identified barriers.

2310

Attribute Name	Data Type	Description
<b>barrierType</b>	BarrierType	Names or describes what the barrier is
<b>comment</b>	String	Free form comments related to the barrier
<b>effectiveDate</b>	DateTime	The date/time the barrier was identified
<b>expressedBy</b>	Role	Individual who identified the barrier
<b>resolvedDate</b>	DateTime	The date/time when the barrier is either resolved or an acceptable alternative is found.

### Care Preference Attributes

A care preference is a statement expressed by the patient, custodian or caretaker responsible for the patient in order to influence how their care is delivered.

- 2315 A preference expresses a personal choice and may be driven by cultural, religious and moral principles. As such it is a principal component of patient centered care and autonomy. Care preferences serve as modifiers of the Care Plan which influence how the plan is personalized for the individual.

A care preference may be specified prospectively to influence future care planning and treatment or it may be expressed and recorded at arbitrary decision points during interventions.

- 2320 A preference expresses a request to fulfill a patient's choice or desire. The choice may be a strong and absolute statement such as an end of life directive. The request could also be a desire to be fulfilled if possible given care team capabilities and resources.

Attribute Name	Data Type	Description
<b>preference</b>	Code	Descriptive code which specifies the type of the patient preference
<b>reason</b>	Code[0..*]	Captures a reason indicator for the preference. The reason may be classified as cultural, religious, moral/ethical. The reason is a factor which should already be included in considering the strength of the preference. It is explicitly indicated in the model in order to provide context for handling with sensibility.
<b>effectiveDate</b>	DateTime	The date/time the preference becomes effective for consideration when providing care
<b>expressedBy</b>	Role	The individual who expressed the preference. This is typically the patient but it may also be the patient's caretaker (e.g. in the case of a patient who is not able to decide for himself/herself such as a child or individual with some form of incapacitation).
<b>strength</b>	LevelType	The strength indicates flexibility in the interpretation of the patient's choice by the care team participants. The strength may be High and indicate an absolute choice driven by moral principles, cultural or religious principles. Or it may indicate an important desire which the patient has but for which the patient has flexibility. The strength

		may have a value of either High (absolute choice) or Low (desired choice).
<b>notes</b>	Note[0..*]	Optional notes about the preference. The note captures a text narrative, date of the note and the individual making the note.
<b>media</b>	URL[0..*]	Optional link to external documentation supporting the preference (e.g. scanned advance directive or legal documents on file).
<b>activationCriteria</b>	Criterion[0..*]	Specifies how the preference is matched to an Intervention and the conditions under which it is activated.
<b>alternatePreference</b>	CarePreference[0..*]	A list of ordered alternate preferences acceptable to the patient or caretaker in case the primary preference cannot be fulfilled. The ordering indicates the next best alternative for the patient.
<b>acceptance</b>	AcceptanceReview[0..*]	Captures acceptance or acknowledgement of the preference by one or more care team members. Acceptance represents alignment of the patient and providers understanding.
<b>unfulfilledReason[0..1]</b>		Captures the reason why a preference cannot be applied during an intervention in which the preference should apply. This property can only be set for preferences associated with a Health Activity

2325

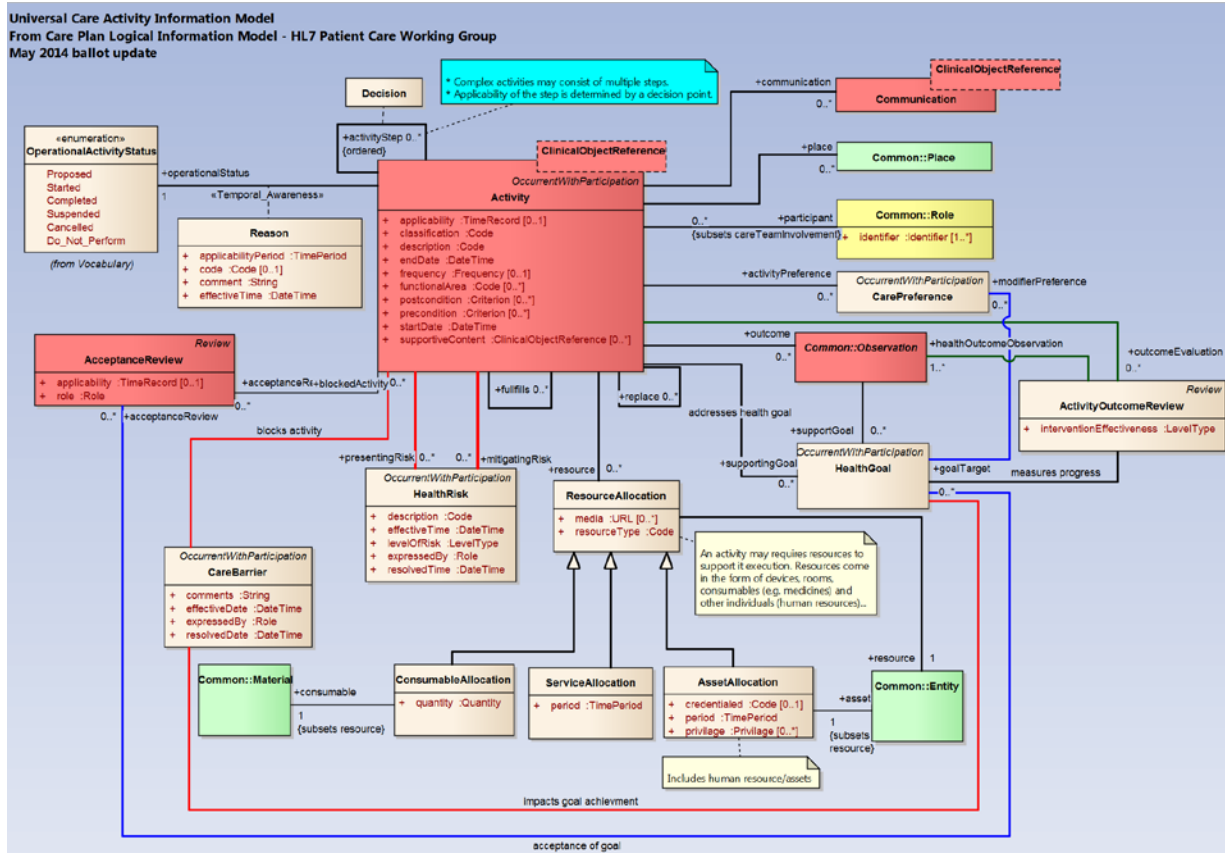


Figure 11 Plan Activity Logical Information Model

## Activity Attributes

2330 The activity is a general concept which represents the common attributes required for planning and execution. The activity has a timeframe, actual start and end dates and it may repeat over time at a given frequency.

Attribute Name	Data Type	Description
<b>applicability</b>	TimeRecord[0..*]	Applicability time point or time frame in which the activity may be carried out.
<b>classification</b>	Code	A classification of the activity such as “patient instruction”, “medication administration”, “self blood glucose monitoring”, etc.
<b>description</b>	Code[0..1]	A sub-classification of an activity such as “wound care” which modifies the “patient instruction” classification.
<b>startDate</b>	DateTime	The actual start instant of the activity.
<b>endDate</b>	DateTime	The end date/time of the activity.

<b>frequency</b>	Frequency[0..*]	Specification of repeating frequency of an activity.
<b>functionalArea</b>	Code[0..*]	A discipline categorization code for the activity.
<b>preCondition</b>	Criterion[0..*]	Any required preconditions which must be before the activity can be carried out.
<b>postCondition</b>	Criterion[0..*]	Any conditions expected to be true after the activity is carried out.
<b>supportiveContent</b>	ClinicalObjectReference[0..*]	Associated content to support the activity.

### Resource Allocation Attributes

2335 Successful execution of any plan requires resources. Plan activities indicate resources which must be allocated in preparation for implementation of the activity which uses the resources.

The achievement of plan activities requires allocation of human, asset, consumable and service resources.

2340 The Care Plan model captures three types of resource allocations which represent allocations for consumable/materials., services and assets.

Attribute Name	Data Type	Description
<b>media</b>	URL[0..*]	Specifies supporting media content for the resource.
<b>resourceType</b>	Code	Specifies the resource type.

### Consumable Allocation Attributes

Attribute Name	Data Type	Description
<b>quantity</b>	Quantity	Specifies the quantity of material or consumable.

2345

### Service Allocation Attributes

Attribute Name	Data Type	Description
<b>period</b>	TimePeriod	Specifies the time period for which the service needs to be available or scheduled.

### Asset Allocation Attributes

Attribute Name	Data Type	Description
<b>period</b>	TimePeriod	Specifies the time period for which the asset needs to be

		available.
<b>credentialed</b>	Code[0..*]	Specifies any credentials required by the resource.
<b>privilege</b>	Privilege[0..*]	Indicates required or held privileges for a human resource

2350

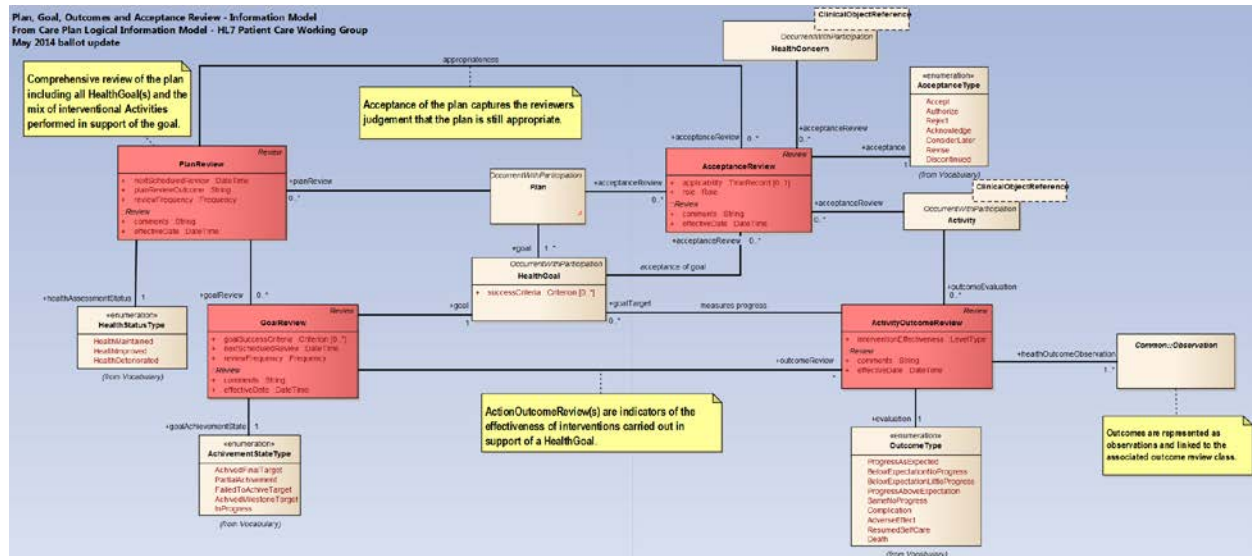


Figure 12 Plan Reviews Logical Information Model

### Review Type

Attribute Name	Data Type	Description
<b>role</b>	Role	Specifies the individual providing the review
<b>comments</b>	String[0..*]	Specifies optional comments for the review
<b>effectiveDate</b>	DateTime	Specifies the date/time of the review

2355

### Acceptance Review Attributes

Acceptance reviews capture understanding and agreement to adopt a proposal for health goals, interventional actions or the plan itself. E.g. Upon review of the goals and actions a care manager (e.g. nurse case manager, social worker, physical therapist, pharmacist), PCP, nurse and patient will indicate understanding and acceptance of the Care Plan. Acceptance reviews may be used to indicate a provider's authorization to perform an intervention and another's provider acknowledgement.

2360

Attribute Name	Data Type	Description
<b>acceptance</b>	AcceptanceType	Indicates the type of acceptance expressed by the care team member and/or patient.



<b>applicability</b>	TimeRecord[0..1]	Indicted if there is an applicable time period for the acceptance. The acceptance is invalid when outside the specified time period.
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2365

### **Activity Outcome Review Attributes**

An activity outcome review measures the result of individual implemented action (observational or interventional) against goal success criteria. The action outcome review might address only a subset of goal success criteria.

2370

Attribute Name	Data Type	Description
<b>evaluation</b>	OutcomeType	Specifies the type of outcome determined based on the review
<b>interventionEffectiveness</b>	LevelType	Indicates a judgment evaluation regarding the intervention effectiveness

### **Goal Review Attributes**

Goal reviews reference multiple action outcomes reviews which support overall assessment of a HealthGoal.

2375

Attribute Name	Data Type	Description
<b>goalAchievementState</b>	AchievementStateType	Specifies a judgment on the goal achievement state
<b>goalSuccessCriteria</b>	Criterion[0..*]	Indicates criteria for assessment goal achievement
<b>nextScheduledReview</b>	DateTime	Specifies the date/time of the next review
<b>reviewFrequency</b>	Frequency	Specifies a periodic frequency for future reviews

### **Plan Review Attributes**

2380 Plan reviews are performed at periodic intervals to assess the overall consistency, appropriateness, completeness and effectiveness of the plan. The plan review includes comprehensive review of all the goals.

Attribute Name	Data Type	Description
<b>healthAssessmentStatus</b>	HealthStatusType	Indicates assessment of the health of the patient

<b>nextScheduledReview</b>	DateTime	Indicates the next scheduled review date
<b>planReviewOutcome</b>	String	Captures a text comment of the outcome review
<b>reviewFrequency</b>	Frequency	Specifies a periodic frequency for future reviews

2385

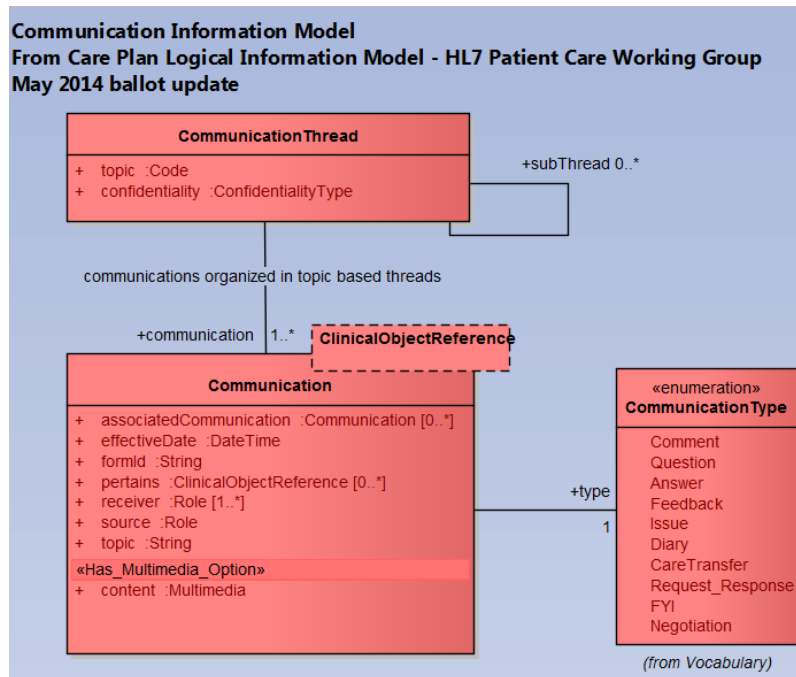


Figure 13 Plan Communications Logical Information Model

## 2390 Conversation Attributes

A conversation organizes individual communications in a meaningful manner for the benefit and understanding of care plan stakeholders.

Attribute Name	Data Type	Description
<b>topic</b>	Code	Indicates the topic of the conversation
<b>confidentiality</b>	ConfidentialityType	Indicates whether the conversation is visible to all care team members or to a specific subset of care team members.

## 2395 Communication Attributes

Communication is ongoing during care coordination. Care team communications is what causes the unfolding of the plan as new participants join, propose actions, change goals, record interventions, review outcomes and assess effectiveness of individual actions and of the overall plan.

A communication may pertain to an element of the care plan or the care record and reference the specific semantic context.

Attribute Name	Data Type	Description
<b>associatedCommunication</b>	Communication[0..*]	Specifies past associated communications
<b>effectiveDate</b>	DateTime	Specifies the date/time of the communication
<b>formId</b>	String	Specifies a formId if the communication is a response to a structured form
<b>pertainsTo</b>	ClinicalObjectReference	Links the communication to some clinical object which is the target of the communication
<b>receiver</b>	Role[1..*]	Specifies the receiver of the communication
<b>source</b>	Role	Specifies the source or sender of the communication
<b>topic</b>	String	Specifies the subject of the communication
<b>content</b>	String	Specifies the content of the communication

## Care Plan Process Model

Many models are used to describe care coordination and Care Plan. These models were considered and were influential during the development of the CP DAM. .

## Coordination of Care Model

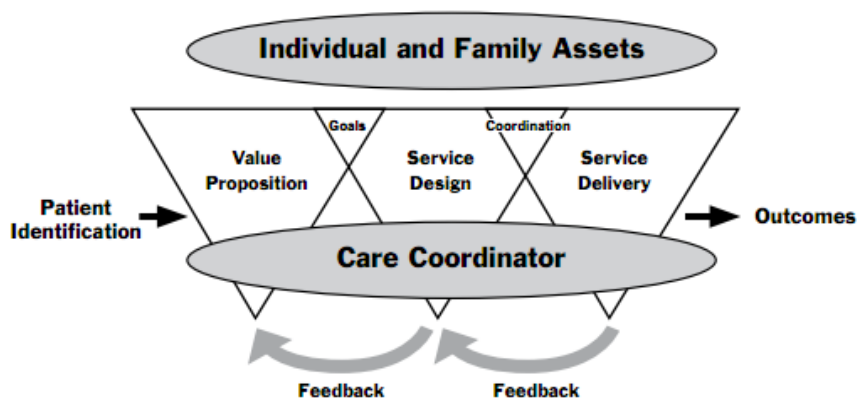


Figure 14 Institute of Health Improvement Coordination Model for people with multiple health and social needs<sup>4</sup>

<sup>4</sup>(Craig C, Eby D, Whittington J, 2011, Care Coordination Model: Better care at lower cost for people with multiple health and social needs. Innovation Series 2011. Institute for Healthcare Improvement) (<http://www.healthtransformation.ohio.gov/LinkClick.aspx?fileticket=hvymeMjFI-E%3D&tabid=70>)

## 2415 High Level Care Plan Development

Although the CP DAM does not address the care planning process and governance across care settings and disciplines, it was determined there is a core process to building or creating a Care Plan that is important to the data model. This process is described in the diagrams below.

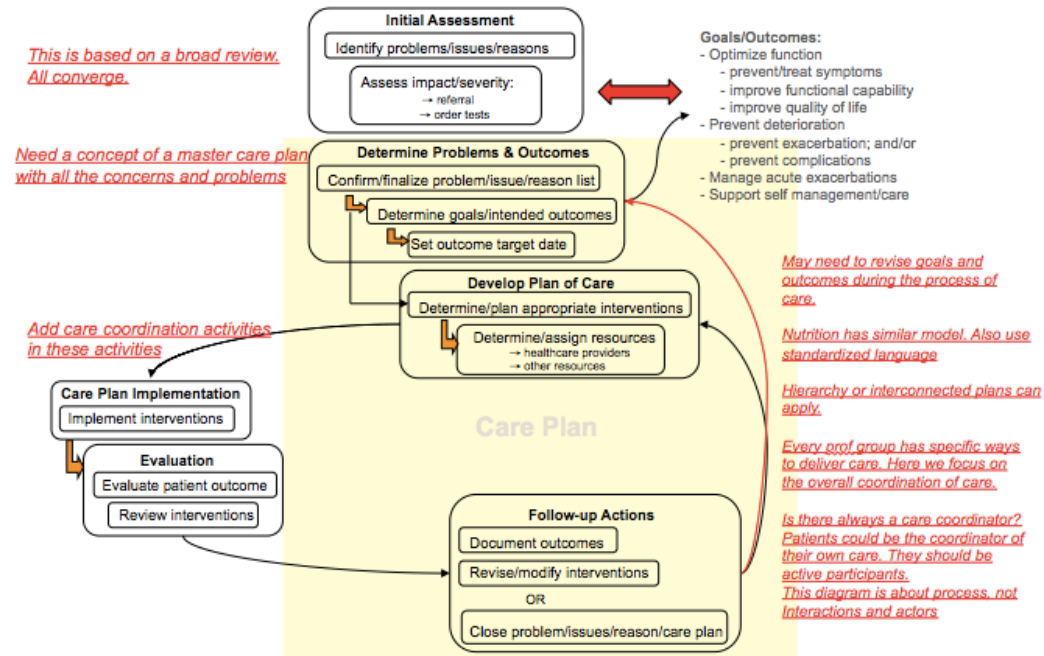
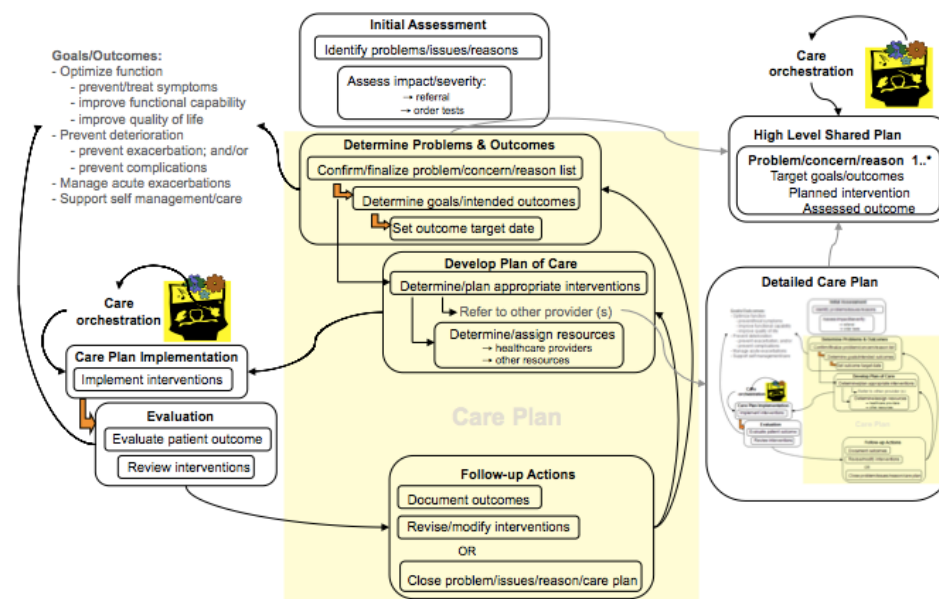


Figure 15 Care Plan Development.



2425 Figure 16. Care Plan Development, Care Orchestration and Care Plan Exchange

## Requirements

The model below was developed by the S&I Framework LCC community and describes the relationship and requirements of many items included in the CP DAM.

2430

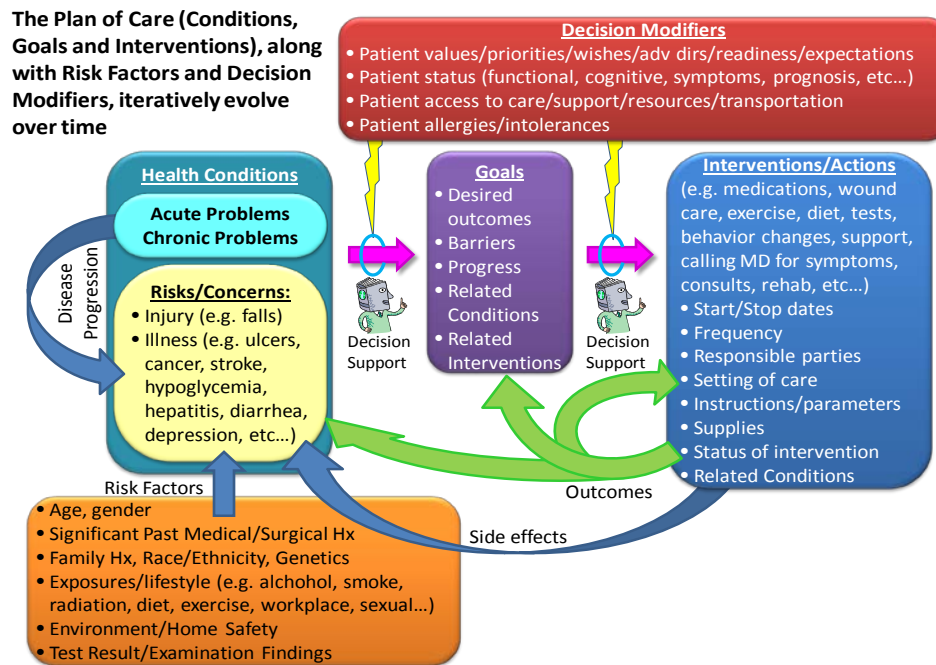


Figure 17. Vision for Care Plan High Level Functional Requirements. (ONC S&I Framework Longitudinal Coordination of Care Community)

## Intended Implementation

The care plan model and its components described in this document are intended to support effective coordination of care of patient with complex health problems and needs. They can be used in implementation of dynamic and static care plans.

2440 Dynamic care plans require the support of complex workflow management and standard care coordination services (CCS) profiles and capabilities. A CCS functional model incorporating CCS profiles was developed in collaboration of the HL7 Services Oriented Architecture (SOA) Group. The CCS functional model had gone through one cycle of (for comments) ballot. The ballot reconciliation process is ongoing. The CCS specification can be accessed through this link:

[http://wiki.hl7.org/index.php?title=Care\\_Coordination\\_Service](http://wiki.hl7.org/index.php?title=Care_Coordination_Service)

2445

Static care plans are instances of dynamic care plans at given points-of-time and can be exchanged, for example, as CDA documents.

The Consolidated CDA (C-CDA) care plan implementation guide developed with the sponsorship of the ONC Longitudinal Care Coordination project in the Structured Documents Workgroup (planned for HL7

2450 Ballot September 2013 cycle) is intended to support the implementation of static care plan exchanges using CDA infrastructure based on the Care Plan model.

The care plan model supports nesting of different types of plans (e.g. treatment plan, plan of care and care plan). But that is not necessarily how Care Plan should be implemented.

2455 **Risks to Implementation**

The Care Plan model and DAM contents are still evolving as the model and related DAM contents are exposed to wider reviews and comments. Substantial changes to the model and related contents are likely based on ballot comments received. Backward compatibility of later version of subsequent versions may not be guaranteed.

2460

## APPENDICES

### *Appendix 1: Example Relevant Quality Data Model Definitions*

2465 Excerpt from: National Quality Forum, Quality Data Model, December 2012,  
<http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=72517>

#### **Care Goal**

2470 A defined target or measure to be achieved in the process of patient care; an expected outcome. A typical goal is expressed as a change in status expected at a defined future time. That change can be an observation represented by other QDM categories (diagnostic tests, laboratory tests, symptoms, etc.) scheduled for some time in the future with a particular value. A goal can be found in the plan of care (care plan). The plan of care (care plan) is the structure used by all stakeholders, including the patient, to define the management actions for the various conditions, problems, or issues identified for the target of the plan. This structure, through which the goals and care-planning actions and processes can be organized, planned, communicated, and checked for completion is represented in the QDM categories as a Record Artifact. A time/date stamp is required. Specifically, a care plan is composed of the following elements:

- Problem, which is managed by other QDM standard categories (condition/diagnosis/problem) and their related data elements.
- Procedure, which is managed by other standard categories and their related data elements. Note that procedures are a continuum of interventions ranging from actions patients can do for themselves or those that can be performed by others (caregivers or clinical professionals) to and including detailed complex surgical procedures requiring highly trained physicians, nurses, and state-of-the-art facilities.
- Goal, which is what is expected to happen.
- Outcome, which is what happened that can be shown by other QDM standard categories and their related data elements.

2485

#### **Condition/Diagnosis/Problem**

2490 A scientific interpretation of result, assessment, and treatment-response data that persists over time and tends to require intervention or management or a clinical feature that includes but is not limited to those treated, monitored, evaluated, or impacts other treatment or venues of care (e.g., encounters or lengths of stay). It is used to guide planning, implementation, treatment, and evaluation. A problem or condition includes, but is not limited to, acute, intermittent, or chronic conditions; diagnoses; symptoms; functional limitations; or visit- or stay-specific conditions

2495

#### **Intervention**

2500 An intervention is a course of action intended to achieve a result in the care of persons with health problems that does not involve direct physical contact with a patient. This category is included to help differentiate care provided to patients that does not involve direct hands-on activity. Examples include patient education and therapeutic communication.

#### **Risk Category / Assessment**

2505 Risk category assessments include tools and calculators that suggest vulnerabilities for any given patient. Distinct from functional status, risk categorization uses findings, observations, results, and sometimes judgments and patient-generated information for use within clinical care algorithms, clinical decision support, and severity analysis. A time and date stamp is required. Examples: Braden Score for Predicting Pressure Score Risk, Morse Fall Risk Scale, Pneumonia Severity Index.<sup>18</sup>

#### **Symptom**

2510 An indication that a person has a condition or disease. Some examples are headache, fever, fatigue, nausea, vomiting, and pain.<sup>20</sup> Also, symptoms are subjective of the disease perceived by the patient.<sup>21</sup> As an example to differentiate symptom from finding, the patient's subjective symptom of fever is distinguished from the temperature (a finding). For a finding, there is a source of either a temperature-measuring device, and there is a recorder of the device (electronically) or an individual (healthcare provider, patient, etc.)

2515

## ***Appendix 2: International Care Plan Structures Comparison***

In 2011 the HL7 PCWG Care Plan project team requested international contributors to provide care plan models that were designed and/or in use from various realms. The team received contributions from Australia, IHE, Sweden, and NHS England. A comparative analysis of these care plan structures was conducted. Common components have been identified from the different structures:

2520

Context related components, e.g. type, date and time, participants (subject of care, provider/care team), version tracking

Content related components, e.g. problem, goal and milestone, action (orders, implementation, outcome review)

2525

Result of this analysis was used to inform the initial discussions and modeling works on care plan models.

A diagrammatic representation of the comparative analysis can be downloaded from this HL7 PCWG Care Plan wiki link (under the "Working Documents and Project Deliverables section):

[http://wiki.hl7.org/images/4/46/CarePlanStructure\\_compare\\_Australia\\_Sweden\\_IHE\\_NHS\\_20110406.jpg](http://wiki.hl7.org/images/4/46/CarePlanStructure_compare_Australia_Sweden_IHE_NHS_20110406.jpg)

(NOTE: the Care Plan structure comparison diagram contains too many details to be incorporated into this document. It is available as an image file at the link given above to allow visualization of full details of the content)

2530

2535