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Care Plan Domain Analysis Model, Release 1

Pre-publication Draft, November 2015

10 **HL7 Informative Ballot**

Sponsored by:
Patient Care Workgroup

Additional Interested Work Group Name:
15 **Structured Document Workgroup**

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NOTE: Care plan models contents included in separate parts of the draft care plan DAM document

1.1 Project Coordinator and Document Editor

Laura Heermann Langford RN, PhD

120 Stephen Chu, MD

Emma Jones, RN

Enrique Meneses

1.2 Collaborators and Contributors

125 Elaine Ayers, MS, RD

Andre' Boudreau

Emma Jones, RN, MS, PhD

Gaye Dolin RN, MS

Denise Downing, RN MS

130 Jon Farmer

Sarah Gaunt

Leslie Hall

Lindsey Hoggle, MS, RD, PMP

Lenel James

135 Susan Campbell, RN

Rosemary Kennedy, RN, PhD

Russell Leftwich, MD

Terry Meredith

140 Lisa R Nelson, MS, MBA

Gordy Raup

Carolyn Silzle, MS, RD

Ray Simkus

Dave Stumpf, MD

145 Iona Thraen, MSW

HL7 Service Oriented Architecture Workgroup

IHE Patient Care Coordination Technical Committee

ONC Standards & Interoperability Framework
150 Longitudinal Coordination of Care Initiative

National Quality Forum

1.3 Project Sponsor

HL7 Patient Care Work Group

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1.4 Care Plan DAM Specification – Status Note

NOTE:

As of November 4, 2015, this is a pre-publication draft of the Care Plan DAM specification. The document is still undergoing review and revision by the core project team members.

160 There are likely to be structural changes to this document resulting from the review and revision processes. One of the changes will be moving all storyboards to the Appendix section. This change is based on the rationale that storyboards are intended to provide readers background and context information that underpin the design of the care plan models. They are not considered core materials of the care plan DAM specification.

165 It is anticipated that the final version will be ready for publication before end of December 2015.

2 EXECUTIVE SUMMARY

2.1 Project Overview

The scope of this project is to create a Domain Analyses Model (DAM) as a common reference to support the development of implementable care plan models. The care plan is a tool used by clinicians to plan and 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 the 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 planning processes and care plan structure. 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 (and at times debated) topic in many healthcare venues throughout the world. Identification of what is needed within the care plan for coordination of care and healthcare delivery 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 supports the Care Provision Domain Message Information Model (D-MIM). The care plan D-MIM is a specification of the Care Statement with a focus on defined Acts in a guideline. The transformation of those Acts occur when the selected Acts are added within an individualized care plan.

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 care team 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 goals and management of activities for the various conditions identified for the patient, or recipient of care provided. It is the structure in which the care planning by all individual professions or groups of professionals can be organized, planned and checked for completion. Communicating explicitly documented goals and planned actions 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.

2.2 DAM Overview

This project provides guidance for the HL7 community and beyond 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 plans. 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 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.

2.3 Ballot Scope

The Care Plan DAM 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 or the Consolidated CDA Templates for Clinical Note, DSTU R2 (C-CDA R2)) Efforts have been made to maximize synergy between these balloted documents, 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.

2.3.1 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.

2.3.1.1 Orders and Scheduling

Orders and scheduling are related to the execution of the care plan and execution of the care plan is out of scope for this domain analysis model. The Care Plan model has structure (Plan Activity) to support the expression and the intent of orders. Actual placement of orders however are through computerized provider order entry (CPOE) and not represented in this work.

Further discussion is needed to define how orders in care plan are instantiated as order sets. It is noted order sets are not care plans. Order sets are created for certain health conditions to realize certain goals. Order sets can be the results of a computerized decision support system and can be incorporated into a care plan. However, additional work is needed to identify what order sets need to include to support care plans. Collaboration with the CDS team is needed to determine standards for order sets incorporated into the CP DAM.

2.3.1.2 Reconciliation

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 health problems/concerns (which include allergies/intolerances), goals and interventions (which include medications) 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 storyboards that depict the reconciliation and synchronization process are in the CCS document.

2.3.1.3 Quality Measures

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. 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.

2.3.1.4 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 adaptions 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.

2.3.1.5 Terminology Binding

Terminology bindings are not included as part of the Domain Analysis Model. This work will be done and available with the implementable model design. Works on high priority value sets for both using in C-CDA R2.x conformant care plan CDA documents and Fast Healthcare Interoperable Resources (FHIR) care plan resource are scheduled to commence in July 2015.

2.4 Target Audience of the CP DAM

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
- Software implementers
- Policy makers
- Subject matter experts
- Secondary users of care plan data
- Health Information Exchange

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

2.5 Introduction

The provision of healthcare today often encompasses multiple disciplines that may be spread across several settings and 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.

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 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 includes structural components sufficient for accommodating the implementation of different types of care plans that fit these descriptive titles to allow the greatest utility in all care situations.

The care plan is widely acknowledged to be an effective tool for coordinating delivery of integrated care to patient with chronic conditions. 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[1] estimates 63% of all annual deaths (~36 million people) are attributable to non-communicable or chronic diseases. As the number and complexity of health conditions increase and episodes of acute illness are superimposed, the number of care providers contributing to individual care often increases. With this complexity, it becomes significantly more difficult to align and coordinate care among diverse providers who frequently span multiple sites.

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. These issues 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[2]. 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. [1]

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.

The Care Plan DAM supports the creation of interoperable care plans necessary for any process that is developed to reconcile or harmonize conflicting plans relating to a single individual. 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.

As information moves across settings through 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.

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 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[3]. 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 transmission 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
- Exchange of interoperable plans

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, home health, emergency departments, trauma centers, labor and delivery) providing clinical care with comprehensive interdisciplinary patient-centric care plans. While other settings use multiple tools (templates, protocols,care pathways, ordersets) which

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[1] World Health Organization, http://www.who.int/features/factfiles/noncommunicable_diseases/en/index.html

[2] 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.

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

are highly specialized to unique care areas. These tools are often called “care plans” even though they usually lack patient specific content such as patient goals, preferences, barriers to care, a care team roster and other common features of a care plan as specified in the care plan DAM. These highly specialized tool are also often used without regard to overlap or discrepancy to other care settings or disciplines engaged in the patient’s care. The terms care plan and plan of care are used in different contexts with different meaning. Such terms are often used in specific clinical domains or settings to refer to the care plan for an individual in that context, and even when interdisciplinary, do not necessarily represent all of the care or all of the care providers for that individual. This care plan DAM acknowledges and sets the foundation for consolidating these specialized templates, protocols, pathways and ordersets into integrated interdisciplinary patient centric plans supporting coordinated care and delivery.

2.6 Background

The care plan as a tool representing one or more health issues/problems, goals and a set of planned care activities is traditionally known to be a piece of that is updated or replaced when either a patient’s condition changes, or according to rules or regulations. Efforts have been made to make the care plan accessible to users of the EHR resulting in multiple proprietary electronic formats. 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 Transition 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.

2.6.1 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

440 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
445 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
450 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.

455

2.6.2 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
460 planning could be considered dynamic and constantly changing, the CP DAM recognizes the power of computers allowing the care plan to be managed in ways not possible with paper or plans in non-interoperable electronic format.

Figure 1 illustrates a collaborative care model where the care plan is dynamically updated and maintained
465 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
470 insight to a potential path the care plan may have. This line of thinking was considered when developing the care plan information model. The diagram is representative and not intended to be all inclusive or exhaustive of all care settings, care processes, or stakeholders that may be involved in care coordination.

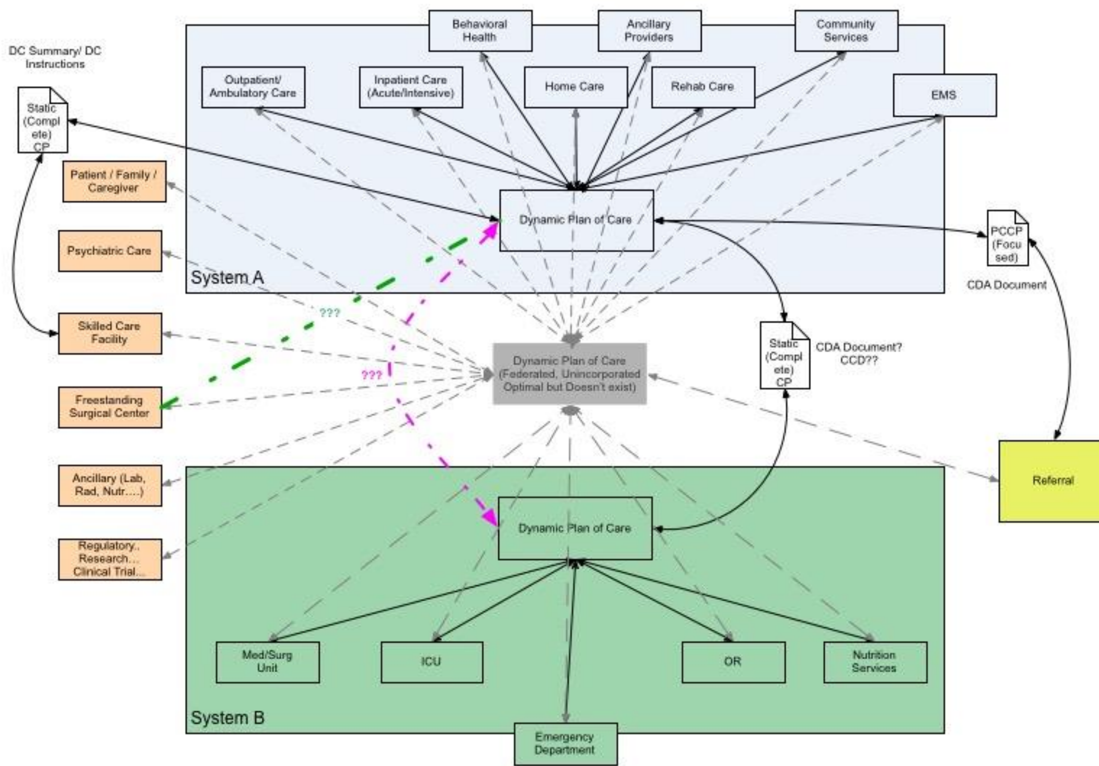

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Figure 1. Collaborative Care Model

We envision Dynamic care plans related to the care of a patient 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 should be organic. They 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.

2.6.3 Stakeholders

500 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.
505
The ONC S&I Framework Longitudinal Care Coordination (LCC) community of interest and their definitions were included in the first Care Plan DAM informative ballot. The contents have generated extensive debates. A compromised approach was decided – that modifications would be applied to contents to reflect ballot comments dispositions, but also to preserve as closely as possible the original
510 ONC LCC contents.

Table 1 is the list of Communities of Interest and their definitions as defined by the ONC S&I Framework LCC Community. Please note that recommended edits from CP DAM ballot comment disposition are included via cross outs, parenthesis and italics.
515

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. *The role is not necessarily a job title but a functional role. In some cases, a high functioning patient or family member may serve this role. The data needs of the role are the same regardless who is filling it.*
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. *In some cases, the surrogate may be a defacto individual without a formal "designation".*

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.
*Pharmacist/*Pharmacy	~~Entity that exists as~~ *A*n expert on medication therapy and is the primary health professional that optimizes medication use to provide patients with positive health outcomes. *In the US system, a typical retail pharmacist/pharmacy does not routinely play this role.*
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. *The care team may be selected by the PCP, the patient, the family, or may grow organically in the course of the patient's care.*
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~~ *(ancillary care)* 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, *Accountable Care Organizations, Patient Centered Medical Home*,

	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 heath 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 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.
Standards *Development* Organization *(SDO)*	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.

Table 1. List of Stakeholders

The CP DAM project team emphasizes patients and their designees (family care givers and others) must be included in care plan design. The National Partnership for Women and Families and other consumer
520 advocates have provided guidance and policy support to ONC emphasizing this need. (http://www.nationalpartnership.org/research-library/health-care/HIT/consumer-principles-for-1.pdf). Care plans used in the provider, payer and population health arenas benefit when patients provide their goals of care, preferences for treatment, decisions, medications taken, home observations, home based results (like device data) and care support changes (i.e rides to care, care giver access). Shared decision making
525 with patients will result in better care plans. As recently demonstrated in the Health Story project, care plans can begin with the patient preference and direction even in the most acute treatment. (http://www.himss.org/health-story-project). Dependence on this information source as clinical only, further disintermediates the patient from the care process and leaves opportunities for efficiency, engagement and accuracy to be ignored. As a foundation to care planning the patient/designee should be
530 incorporated within and harmonized with other efforts for patient generated data.

2.7 Project Goals

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,
535 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
540 articulating the domain of the care plan. It is expected to generate more discussion and evolve over time.

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 interoperability, reconciliation/synchronization and greater care collaboration.

2.8 Assumptions

The CP DAM assumes the care team is 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.

2.9 Out of Scope

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.

3 CARE PLAN DOMAIN ANALYSIS MODEL ARTIFACTS

3.1 Storyboards

565 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.

570

3.2 Storyboard Elements

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

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

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

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

3.2.1 Participant Information for Storyboards

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

585

3.3 Storyboard 1: Acute Care

3.3.1.1 Short Description of the health issue thread covered by this storyboard

The purpose of this storyboard is to illustrate the dynamic nature of care plans, which are informed by
590 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.

595 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:

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

605 ### *3.3.1.2 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
- 610 Triage Nurse: Pat Sorter, RN/BSN, CEN
- Emergency Nurse: Jean Careful, RN/BSN, CEN
- Respiratory Therapist: Brie Theeply, RRT
- Paramedic (EMT-P): Sam Scooper

615 ## 3.3.2 Encounter A: Primary Care Provider Encounter

3.3.2.1 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
620 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.

3.3.2.2 Description of Evaluation and Management

625 Dr. Primary performs a history and physical examination, as well as administers two standardized assessment scales for depression severity (Patient Health Questionnaire-9 (PHQ-9) and Hospital Anxiety and Depression Scale (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
630 expressed some concern that he was shaving, showering and dressing, professionally less often than desired. These are agreed upon goals. He prescribes a selective serotonin re-uptake inhibitor (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
635 substance abuse, and a follow up visit in four weeks.

3.3.2.3 Post-condition

Both the PHQ-9 and HADS indicate moderately severe depression, the screen for suicide indicates low
640 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

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.

3.3.3 Encounter B: Second Outpatient Encounter

3.3.3.1 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.

3.3.3.2 Description of Clinic Visit #2 Evaluation and Management

Dr. Primary determines that the citalopram is a likely cause for the increased frequency of headaches, and discontinues the medication, noting an 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 as a substitute for the citalopram.

3.3.3.3 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).

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

3.3.4.1 Precondition

The patient's wife has called for an ambulance after he took an overdose nortriptyline (a tricyclic antidepressant TCA)). 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.

3.3.4.2 Description of EMS Evaluation and Transportation

The patient has mild tachycardia, is somewhat agitated, and is confused as to date/time and circumstances surrounding 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 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.

3.3.4.3 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.

3.3.5 Encounter D: Emergency Department Encounter

690

3.3.5.1 Pre-condition

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, SaO2 99% on room air. The patient has not complied with requests to consume the activated charcoal by mouth.

695

3.3.5.2 Description of ED Course

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
700 level, activated charcoal, urinalysis, serum TCA level, blood alcohol level, urine toxicology screen, intravenous line with normal saline.

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
705 restraints.

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.

710

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.

715 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 lorazapam to combat the seizure. The wide complex tachycardia converts into a sinus tachycardia after the first dose of sodium bicarbonate.

720

The patient is given intravenous fentanyl, lidocaine, and a low dose of vecuronium. The protocol orderset 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 the placement of the tube confirmed by EtCO2.

725

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.

730 Vital signs showed a continued sinus tachycardia with a HR of 136, BP of 102/62, SaO2 of 100% on FiO2 of 0.5 and MMV of 10L/min.

The bicarbonate infusion is begun at a rate of 150 cc/hr, and an orogastric tube is placed. Activated

charcoal administered via the orogastric tube.

735

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.

740

3.3.5.3 Post-condition

The patient has a care plan in place accommodating multiple protocols and ordersets for the various treatments occurring. The patient is transferred to the ICU. The care plan is used to coordinate care.

745

3.4 Storyboard 2: Chronic Conditions

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

The purpose of the chronic conditions care plan storyboard is to illustrate the communication flow and
750 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:

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

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

3.4.1.2 Storyboard Actors and Roles

- Primary Care Physician: Dr. Patricia Primary
- Patient: Mr. Bob Anyman
- Diabetic Educator: Ms. Edith Teaching
765
- Dietitian/Nutritionist: Ms. Debbie Nutrition
- Exercise Physiologist: Mr. Ed Active
- Optometrist: Mr. Victor Vision
- Pharmacist: Ms. Susan Script
- Podiatrist: Mr. Barry Bunion
770
- Psychologist: Mr. Larry Listener
- Hospital Attending Physician: Dr. Allen Attend

3.4.2 Encounter A: Primary Care Physician Initial Visit

3.4.2.1 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.

3.4.2.2 Description of Encounter

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.

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. Anyman are entered into the new care plan.

Dr. Primary also discusses with the patient the importance of good nutrition and medication management and exercise 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.

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.

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.

3.4.2.3 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.

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

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.

3.4.3 Encounter B: Allied Health Care Provider Visits

3.4.3.1 Pre-Condition

Mr. Anyman's 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:

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

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

D. In certain countries (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.

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

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.

3.4.3.2 Description of Allied Health Care Provider Encounter

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.

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.

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.

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 advice to the patient. The date of next visit is also determined.

Provider / Allied Health Provider	Encounter Activities	Outcomes	Communications

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

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

Table 2. Allied Health Encounter – Activities and Outcomes

870

3.4.3.3 Post Condition

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

875 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 880 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.

885

3.4.4 Encounter C: Hospital Admission

3.4.4.1 Pre-Condition

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 890 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.

Mr. Anyman presents himself at the emergency department of his local hospital as Dr. Primary's clinic is 895 closed over the weekend.

3.4.4.2 Description of Encounter

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

900 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 905 influenza immunization before the next influenza session and updates this as recommendation to Dr. Primary in the patient's discharge plan.

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 910 discharge and a discharge summary is generated.

3.4.4.3 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.

915 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.

3.4.5 Encounter D: Primary Care Follow-up Visits

3.4.5.1 Pre-Condition

920 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.

925 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.

3.4.5.2 Description of Encounter

Primary Care Physician Dr. Patricia Primary reviews patient Mr. Anyman's hospital discharge summary
930 and discusses the pre-influenza season immunization recommendation with the patient. The patient agrees with the recommendation. The care plan is updated.

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
935 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.

940 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

Dr. Primary changes patient's follow-up visits from four monthly to two monthly for the next two
945 appointments with the aim to review the follow-up frequency after that.

3.4.5.3 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.

The patient also makes an early appointment to see the dietitian and exercise physiologist. A copy of
950 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.

955
3.4.5.4 General Observations about Coordination of Care

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.

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.

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.

3.5 Storyboard 3: Home Care

3.5.1.1 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:

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

3.5.1.2 Storyboard Actors and Roles

- 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)
- Home Health Nurse (Not in HL7 list): Nancy Nightingale
- Dietitian: Connie Chow

3.5.2 Encounter A: Hospital Discharge

3.5.2.1 Pre-Condition

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.

3.5.2.2 Description of Encounter

Hospital Attending Physician Dr. Aaron Attend performs a discharge assessment to verify that patient Eve
1000 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 difficulties in walking and in speaking, and therefore recommends some rehabilitation activities with the
1005 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 request be sent to the Ambulatory Rehabilitation Clinic, and schedules a list of rehabilitation activities that
1010 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).

3.5.2.3 Post Condition

1015 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
1020 provider. A copy of the care plan was also given to the patient and the patient was discharged to home.

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

3.5.3.1 Pre-Condition

The Ambulatory Rehabilitation Clinic has scheduled a first visit with patient Eve Everywoman to conduct a
1025 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 Speaker. He informs them of the case. He is aware from the care plan that a Home Health Nurse will be
1030 providing home care in parallel and that there will be a need for coordination of rehabilitation efforts with the home care nurse.

3.5.3.2 Description of Encounter

Patient Eve Everywoman arrives at the Ambulatory Rehabilitation Clinic and is shown to an assessment
1035 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
1040 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
1045 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.)

3.5.3.3 Post Condition

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.

3.5.4 Encounter C: Home Health Visit (in parallel to Ambulatory Rehabilitation Clinic Visit)

3.5.4.1 Pre-Condition

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.

3.5.4.2 Description of Encounter

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 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 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.

3.5.4.3 Post Condition

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 provider.

3.5.5 Encounter D: Primary Care Visit

3.5.5.1 Pre-Condition

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.

3.5.5.2 Description of Encounter

1095 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 1100 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.

3.5.5.3 Post Condition

After patient Eve Everywoman leaves the office, Primary Care Physician Dr. Patricia Primary takes a few 1105 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 1110 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.)

3.5.6 Encounter E: Dietitian Visit

1115

3.5.6.1 Pre-Condition

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.

1120

3.5.6.2 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. 1125 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.

1130

3.5.6.3 Post Condition

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 1135 events of the appointment.

3.5.6.4 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.

3.6 Storyboard 4: Pediatric Allergy

3.6.1.1 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

3.6.1.2 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

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

3.6.2.1 Pre-Condition

Patient Kari Kidd has been sneezing and sniffling 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.

3.6.2.2 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.

3.6.2.3 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.

3.6.3 Encounter B: Allied Health Care Provider Visits

3.6.3.1 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.

3.6.3.2 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.

3.6.3.3 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.

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.

1230 **Table 3. Provider and Allied Health Provider Encounters – Activities and Outcomes**

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

3.6.4.1 Pre-Condition

1235 Dr. Richard Reaction receives a referral for evaluation of allergy from the patient's Nurse Practitioner.

3.6.4.2 Description of Encounter

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
1240 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.

3.6.4.3 Post Condition

Dr. Reaction completes a consult note, including Kari's allergy care plan that includes asthma management. 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.

3.6.5 Encounter D: Primary Care Follow-up Visits

3.6.5.1 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.

3.6.5.2 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 and control of her cough variant asthma. The care plan is updated to reflect well-controlled seasonal allergy.

3.6.5.3 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.

3.7 Storyboard 5: Pediatric Immunization

3.7.1.1 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.

3.7.1.2 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

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

3.7.2.1 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).*

3.7.2.2 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.

3.7.2.3 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.

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

3.7.3.1 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.

3.7.3.2 Description of Encounter

1335 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
1340 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 2 of 3 given, follow-up in two months for number 3 of 3." The information is entered in the Immunization section of the care plan.
1345 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.

3.7.3.3 Post Condition

1350 Nancy updates the care plan. Ned and Nelda make the final appointment on their way out.

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

3.7.4.1 Pre-Condition

1355 Ned and Nelda receive their reminder notices of appointment for Ned's third HPV vaccine injection.

3.7.4.2 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 and documents in Ned's record "HPV 3 of 3 given;
1360 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.

3.7.4.3 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
1365 days before the next annual visit date.

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

3.7.4.4 About Coordination of Care

1370 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.

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3.8 Storyboard 6 – Perinatology

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

The purpose of the Perinatology story board is to illustrate the communication flow and documentation 1380 between a patient and various collaborating care team members (i.e. diverse health care professionals) involved for a patient experiencing pregnancy, labor and delivery). 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:

A. First pregnancy visit
1385 B. Post ultrasound visit
C. First Perinatologist visit
D. Giving Birth

Patient Eve Everywoman experiences her first pregnancy. She initiates prenatal care with Obstetrician/ 1390 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 1395 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).

3.8.1.2 Storyboard Actors and Roles

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- OB/Gyn Physician: Dr. Flora Fem
- Perinatologist: Dr. Patricia Perinatologist
- Patient: Eve Everywoman
- Receptionist: Ruth Receptionist
- OB/Gyn Office Medical Assistant: Melissa MedAssist, MA
- 1405 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

1410

3.8.2 Encounter A: First Pregnancy Visit

3.8.2.1 Pre-Condition

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.
1415

3.8.2.2 Description of Encounter

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. 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. 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 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 the patient record and updates Eve's Perinatal care plan with items relevant to her current pregnancy.
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1425
1430
1435

3.8.2.3 Post-Condition

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.
1440

3.8.3 Encounter B: Post ultrasound visit

3.8.3.1 Pre-Condition

Patient Eve Everywoman's 1st 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.
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1450

3.8.3.2 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.

3.8.3.3 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.

3.8.4 Encounter C: First Perinatologist visit

3.8.4.1 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.

3.8.4.2 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.

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

3.8.5 Encounter D: Giving Birth

3.8.5.1 Pre-Condition

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 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.

3.8.5.2 Description of Encounter

Eve Everywoman begins to go into labor on the 5th day of her 39th 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 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 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 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 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.

3.8.5.3 Post Condition

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 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

1550 appropriate for care assignments. Each caregiver is appropriately alerted and the documents have been updated. Follow up appointments for Eve are made with the OB/Gyn specialist. Follow up appointments are made for the baby with a Pediatrician.

3.9 Storyboard 7 – Stay Healthy/Health Promotion

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

1555 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:

A. Visit to Primary Care Physician
B. Dietitian Visit (1560)
C. Follow Up Dietitian Visit
D. Primary Care Follow Up

3.9.1.2 Storyboard Actors and Roles

1565
- Primary Care Physician: Dr. Patricia Primary
- Patient: Adam Everyman
- Dietitian: Connie Chow

3.9.2 Encounter A: Visit to Primary Care Physician

1570
3.9.2.1 Pre-Condition

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.

1575

3.9.2.2 Description of Encounter

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. 1580 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 1585 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.

3.9.2.3 Post Encounter Visit

1590 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.

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.

3.9.3 Encounter B: Dietitian Visit

3.9.3.1 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.

3.9.3.2 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. 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.

3.9.3.3 Post Condition

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.

3.9.4 Encounter C: Follow Up Dietitian Visit

3.9.4.1 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.

3.9.4.2 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. 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.

3.9.4.3 Post Condition

Connie Chow updates her care plan with weight loss progress as well as new goals for healthy eating when out and including wife in cooking discussion next month. This nutritional plan is shared with Dr. Primary Care.

3.9.5 Encounter D: Primary Care Follow Up

3.9.5.1 Pre-Condition

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.

3.9.5.2 Description of Encounter

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.

3.9.5.3 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.

3.10 Storyboard 8 – Case Management/Disease Management Care Coordination[2]

Note:
Storyboard 8 is currently under review and editorial revision. Once finalized, it will be incorporated into this document for final publication.