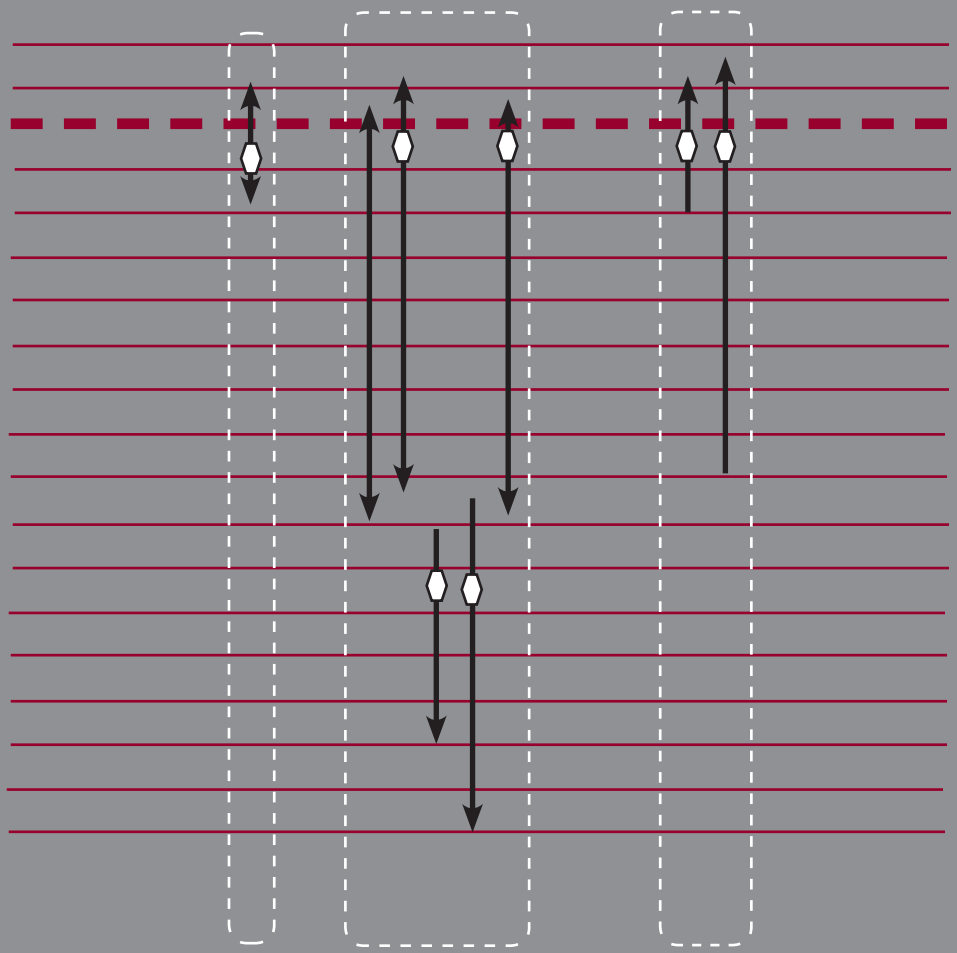
Modeling Patient-Centered Medical Home Principles, Attributes, and Patient Experiences



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HEALTH IT

PCMH

Final Report

Modeling Patient-Centered Medical Home Principles, Attributes, and Patient Experiences

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Executive Summary

Background

There are multiple definitions and descriptions of a patient-centered medical home (PCMH). Some of these descriptions consist of sets of principles associated with the concept of PCMH. However, the evolution of the PCMH concept has not yet led to a clear understanding of how its core principles relate to the actual experiences of patients and providers within a PCMH. This limitation points to the need for a tool to support the process of linking core principles to clinical activities and health IT capabilities. Such a tool should lead to the development of a functional definition of the PCMH that would resonate with consumers, providers, policymakers, and health IT vendors. Because patient and provider interactions form the core of the PCMH concept, this tool needs to provide details explaining the capabilities and information flows of the PCMH. An information framework and model can be such a tool. It can organize concepts, relationships, and information flows into a structure that can be documented and shared.[1]

Purpose

Through the work of this project, AHRQ sought to advance the PCMH concept by supporting a broad understanding of the PCMH as a series of information flows among patients and other PCMH stakeholders. This report describes the framework developed to meet this need by linking core principles and attributes of a PCMH to clinical activities and experiences (e.g., information flows) of patients within a PCMH. This framework can be used to organize the various elements of a PCMH, understand their relationships, and examine the information flows within and outside the PCMH. Information systems that support the PCMH can be developed based on the description of this set of clinical activities and experiences.

Components of the Framework

The primary components of this framework are PCMH principles, PCMH attributes, and patient scenarios. The core principles were identified from the literature as follows:

- Access
- Coordinated care
- Continuity of care
- Community linkages
- Information system support
- Payment alignment
- Patient-centered care

- Provider type
- Quality
- Scope of care
- Active care management
- Other

Each of these principles has a set of attributes that describes how the principle may be identified or operationalized. Appendix A provides the list of the attributes associated with each of these principles.

This report includes nine fictitious patient scenarios that provide examples of modeling using this framework. The scenarios illustrate experiences within a PCMH and describe the PCMH attributes in action. Detailed analysis of those experiences is conducted to identify discrete interactions and flow of information across different sites, subsites, and actors involved.

Implications

Patients, clinicians, and anyone else with an interest in PCMH may use this framework to gain a better understanding of what the principles found in the literature mean in terms of specific attributes and real-life experiences of patients within a PCMH. The framework also provides an approach to examine the details of interactions and flow of information within and outside the PCMH. Although further work is necessary to clarify PCMH principles and attributes and their inter-relationships, , this framework provides an approach in identifying the current attributes of an existing PCMH and the potential for change.

Gaps and Further Work

The framework proposed here needs to be validated by structured engagement of various stakeholder groups. Examining the framework and applying it to real-life situations will test whether the approach works in a variety of situations and allow stakeholders to study the range of outcomes when this approach is applied.

The principles and associated attributes need to be further defined and clarified, with the goal of achieving standardization that would support universal understanding and interpretation. In particular, matching attributes to the principles needs to be examined and tested further. Classification of the attributes into essential and non-essential categories would help in prioritizing the attributes for future work aimed at developing this model.

More work is needed to develop additional illustrative scenarios that would address unique combinations of attributes and patient characteristics and experiences. Further validation of these scenarios as examples of modeling of patient care using our framework also is warranted.

Modeling Patient-Centered Medical Home Principles, Attributes, and Patient Experiences

Introduction

This report describes the framework for a patient-centered medical home (PCMH) that brings together the principles associated with a PCMH, the attributes associated with each of those principles, and illustrative patient scenarios that can be used to describe how the attributes may be fulfilled within a PCMH. The purpose of this framework is to develop a better and broader understanding of how well-known PCMH principles may be translated into attributes, actions, and flow of information within and outside a PCMH. This report focuses only on these components of the framework, and provides nine illustrative patient scenarios to show how modeling of the framework can be used by patients or clinicians to gain a better understanding of how to apply the principles and attributes to real-life clinical experiences within a PCMH. Please refer to the "Patient-Centered Medical Home Information Framework Technical Report" for additional details on the origin of the project, the project team and approach, graphic illustrations of the scenarios, and mapping of attributes to technical specifications.

Background

As health care costs continue to accelerate and the overall level of quality of care remains unsatisfactory, the PCMH offers a promising model of care delivery. The PCMH concept originated in the 1960s, but until now the environment, including health information technology (IT), was unable to fully support it. The American Academy of Pediatrics (AAP) in 1967 introduced the term "medical home" in the context of caring for children with special needs.[2] A key issue at that time was the need for a central location for the patient's health information. The PCMH concept has continued to evolve over the past four decades. In 2002, the AAP expanded the concept to include many additional attributes.[3] Independently, the American Academy of Family Physicians (AAFP) in 2004 defined a "new model of care" as part of the Future of Family Medicine Project.[4] The AAFP's model included an emphasis on health IT and had core attributes that overlapped with those of the AAP's medical home concept. Following the AAFP's recognition that its new model shared many attributes with the medical home, the term "patient-centered medical home" gained currency. In 2007, the main professional societies for primary care (the American Academy of Family Physicians, the American Academy of Pediatrics, the American College of Physicians, and the American Osteopathic Association) established a set of joint principles for the PCMH, and the model has received widespread endorsement in the larger health care community.[5]

The evolution of the PCMH concept has not yet led to a clear understanding of how its core principles relate to the actual experiences of patients and providers within a PCMH. Similarly, health IT vendors have faced difficulties in defining the process flows and specific functionalities that are needed to support the PCMH.[6] These limitations point to the need for a tool to support the process of linking core principles to clinical activities and health IT capabilities. Such a tool should lead to the development of a functional definition of the PCMH that would resonate with consumers, providers, policymakers, and health IT vendors. Because

patient and provider interactions form the core of the PCMH concept, this tool needs to provide details about the capabilities and information flows of the PCMH. An information framework can be such a tool. It can organize concepts, relationships, and information flows into a structure that can be documented and shared.[7]

A literature review revealed that the published research lacks a PCMH information framework or model. Existing health IT information models focused more on the data requirements than on modeling the interactions and capabilities of the interdisciplinary care team that forms the core of the PCMH. The purpose of this project was to development a framework that would (1) describe the capabilities of the PCMH, (2) represent the information flows among different participants in the PCMH, (3) account for the flexibility in how the PCMH is implemented, and (4) allow for changes as the PCMH continues to mature and evolve.

This report focuses on several patient scenarios that illustrate key PCMH attributes and interactions. The companion report, Patient-Centered Medical Home Information Framework Technical Report, provides details on the process used to develop a PCMH information framework to support the development of PCMH scenarios and information flows.

Current Definitions of the Patient-Centered Medical Home

To develop a working PCMH definition that would take into account this project's priorities, we identified popular definitions that could serve as reference points. The first was the AHRQ definition[8] summarized here:

> *The medical home model holds promise as a way to improve health care in America by transforming how primary care is organized and delivered. Building on the work of a large and growing community, the Agency for Healthcare Research and Quality (AHRQ) defines a medical home not simply as a place but as a model of the organization of primary care that delivers the core functions of primary health care. The medical home encompasses five functions and attributes:*

- *Patient-centered*
- *Comprehensive care*
- *Coordinated care*
- *Superb access to care*
- *A systems-based approach to quality and safety*

> *AHRQ recognizes the central role of health IT in successfully operationalizing and implementing the key features of the medical home. Additionally, AHRQ notes that building a primary care delivery platform that the Nation can rely on for accessible, affordable, and high-quality health care will require significant workforce development and fundamental payment reform.*

A second definition consisted of the PCMH joint principles that were developed by the American Academy of Family Physicians, the American Academy of Pediatrics, the American College of Physicians, and the American Osteopathic Association. The joint principles describe these characteristics of the PCMH:

- Relationship with a personal physician
- Physician-directed practice
- Whole-person orientation
- Coordinated and/or integrated care
- Quality and safety
- Enhanced access
- Appropriate payment structure[6]

A third definition, the Institute for Healthcare Improvement (IHI) Triple Aim, tied the principle of payment change with improvements in quality and cost efficiency. The three aims are to improve the health of the population, enhance the patient experience of care, and reduce the per capita cost of care.[9]

Finally, the literature[10-16] suggests additional attributes of the PCMH concept that have the potential to improve quality, including patient engagement, team-based care, continuity of information, population management, and a systematic approach to quality improvement.

Working Definition of the Patient-Centered Medical Home

Creating a comprehensive set of scenarios and information flows that would cover every combination of attributes of a PCMH was beyond the scope and the capabilities of this project. Thus, we created a set of nine illustrative scenarios as examples of our approach. The working definition of the PCMH used for this project takes into account the definitions cited above, with a project-specific focus on patient experiences, clinical interaction and information flows, and the intended audiences (patients, providers, policymakers, and health IT vendors). For this project, the ***PCMH is an evolving, patient-centered, interconnected, health IT-enabled primary care delivery model that provides access to high-quality, coordinated, efficient, and satisfying care that promotes positive outcomes***. The PCMH information framework was designed both to organize and prioritize the current work, and to support the entire PCMH concept as it continues to mature and evolve over time.

During the creation of the PCMH information framework, a comprehensive list of PCMH attributes was identified (Appendix A). This attribute list allowed validation that the information framework would support the full PCMH, and provided a tool to demonstrate gaps in the current patient scenarios and other constructs such as health IT use cases.

This work also benefited from the input of providers and received guidance from an expert advisory panel that played an important role by keeping the project team apprised of ongoing work on the PCMH concept and reviewing the project team's interim work products.

Expert Advisory Panel

To support the project team and expand the expertise focused on the project, an expert advisory panel was established. This panel had representatives from policymakers, health IT vendors, provider organizations, and patient advocacy organizations. The individuals making up the panel are listed in Table 1.

Table 1. Expert advisory panel members

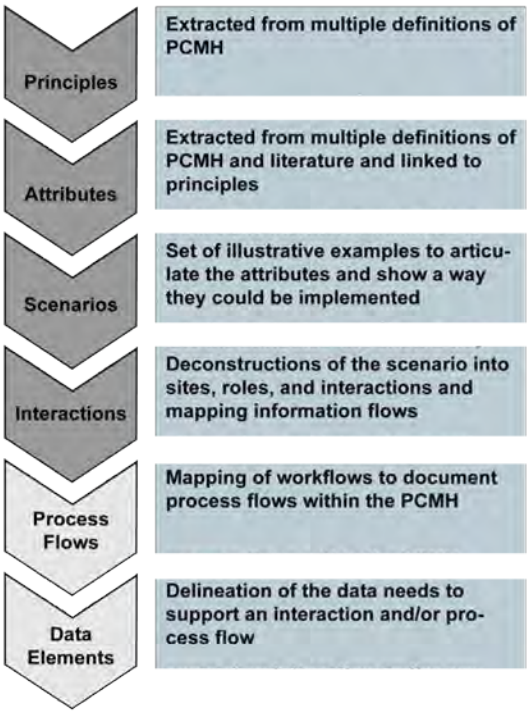
Name	Organization	Stakeholder group
Melinda Abrams, M.S.	Commonwealth Fund	Patient
John Klien, MD	American Academy of Pediatrics	Provider
Carmella Bocchino	America's Health Insurance Plans	Health Plans
Christine Bechtel	National Partnership for Women and Families	Patient
Shawn Martin	American Osteopathic Association	Provider
Carol Diamond, MD	Markle Foundation	Policy
Paul Grundy, MD	IBM	Employer
Charles Kilo, MD	American College of Physicians	Provider
Terry McGeeney, MD	TransforMED	Provider
David Nace, MD	McKesson	Vendor
Bob Phillips, MD	American Academy of Family Physicians	Provider
Rick Ratliff	Accenture	Vendor
Cris Ross	SureScripts	Provider/Policy
Chris VanWeel, MD	President, World Organization of Family Doctors	International/Provider

A PCMH Information Framework

The PCMH is a potentially significant paradigm shift in health care delivery, but common understanding of the PCMH is limited to principles and high-level concepts. Our PCMH information framework links these principles and concepts to a set of interactions and process flows, resulting in a richer definition of the PCMH that can be easily understood by PCMH stakeholders (patients, providers, policymakers, and health IT vendors). Linking together principles, attributes, scenarios, interaction diagrams, and process flows is our method for expanding the current understanding of the PCMH and filling the gaps in the current incomplete approaches to this methodology.

Figure 1 gives an overview of the PCMH Information Framework.

Figure 1. Overview of the PCMH Information Framework



The framework starts with the *identification of principles* to define the domain of the PCMH. These are used to create a *set of attributes* that are needed to fulfill the principles. *Prototypical clinical scenario*s are created describing how sets of attributes may be fulfilled within certain sites, subsites, and roles played by different actors. *Domain experts* (in our project, the expert advisory panel and the provider workgroup) then review these scenarios. The scenarios are then broken down into the *discrete interactions* that are needed to support the scenario. The sites, subsites, and roles within a PCMH are then defined to clarify the locations and actors. From the discrete interactions, a *process flow diagram* is created to represent what the workflow may be to support the interactions. At this point, specific data that are needed to support an interaction can be identified. The last two elements, process flow and specific data elements, were outside the scope of this project.

Provider Workgroup

To validate the prototypical patient scenarios, a group of seven primary care providers from different practice types (e.g., rural/urban, small/large, primary care only/multispecialty, private practice/residency practice) reviewed the clinical scenarios and provided input on how they had implemented the PCMH attributes. Their input is reflected in the discussions following each of the nine scenarios in this report.

Almost all practices struggled with two attributes: continuity of care and population management. Regarding continuity of care, the struggle involved the need to convince entities outside of the PCMH to exchange data electronically with them. This reinforced the importance of focusing on the interactions between the PCMH and subspecialty and inpatient care. Since our scenarios were focused on the patient experience, they do not adequately describe the information and process flows required to support population management within a PCMH, which is an important attribute.

Several of the PCMHs in the workgroup were using patient feedback surveys and group visits, which represent two of the attributes that are not covered in the scenarios.

Almost all of the providers discussed challenges in transforming to a PCMH without payment alignment. One of the providers thought that provider leadership was critical to achieve the PCMH and suggested that it should be one of the attributes of the PCMH.

Documenting and Modeling of Key PCMH Interactions

Using the working definition and focusing on the PCMH attributes that are thought to improve quality, lower cost, or differentiate the PCMH, a list of 44 of the total 59 PCMH attributes was selected for inclusion in the scenarios. From these attributes, a set of nine patient scenarios was constructed. The scenarios presented cover the following interaction categories:

Interactions Focused on PCMH and Patient:

- Childhood Acute Illness
- Adult Acute Illness
- Adult Acute Illness (with different PCMH attributes)

Interactions Focused on PCMH and Subspecialty Care:

- Childhood Acute Illness
- Adult Prevention
- Adult Chronic Disease

Interactions Focused on PCMH and Inpatient Care:

- Young Adult Acute Illness
- Senior Chronic Disease
- Senior Acute Illness

These patient scenarios are fictitious and are only illustrative of the PCMH. They are not intended to represent all aspects of the PCMH or to represent the only way to implement the PCMH. The intent is to describe the potential interactions and information flows in a PCMH-supported health care ecosystem. At the end of each scenario is a discussion of the PCMH attributes that are reflected in the scenario. The discussion may provide information about limitations in the scenario or alternative implementations of an attribute in a PCMH. These scenarios were presented to the provider working group and to the expert panel for feedback, and appropriate revisions were made following the feedback. A matrix of all covered and not covered PCMH attributes, by scenario, is available in Appendix B.

This method can be tested by using any real-life health event or experience as a descriptive scenario and analyzing it for the attributes of the PCMH that came into play, followed by identification of discrete interactions and mapping of information flow within and outside the PCMH if applicable.

Interactions Focused on PCMH and Patient

Scenario Number 1: PCMH and Patient Interaction – Childhood Acute Illness

The mother of 3-year-old Kyle Wilson reports that he has been irritable since yesterday and may have a slight fever since this morning. He also has a runny nose and is not as active as usual. She is concerned that Kyle may have an ear infection and, because today is Thursday, she doesn't want the problem to get worse over the weekend. She sends a secure message to Dr. Prima's office (the family's PCMH), and quickly receives a response from Dr. Prima's nurse, Gina, advising her to make an appointment for Kyle to be seen by Dr. Prima. Kyle's mother uses the clinic's secure patient portal to schedule an appointment for 7:00 p.m. (Dr. Prima has office hours until 7:30 p.m. on Tuesdays and Thursdays). Gina's message also includes recommendations for symptomatic treatment for Kyle and key symptoms that merit immediate notification to the clinic. The message also links to a tool on the Web site that can be used to calculate the dose of an antipyretic (fever control) medication for Kyle.

This scenario demonstrates the following attributes of the PCMH:

Secure Messaging. In this scenario, secure messaging is used to enhance access to the PCMH. There are multiple options for implementing secure messaging in a PCMH. The PCMH might offer a patient portal to provide this functionality, and could offer patients interoperability between their personal health records (PHR) and the practice's electronic health records (EHR).

Practice Web Site. Establishing a practice Web site as a trusted site for patient educational information is a valuable way to provide quick access to needed health information.

Patient Portal. A patient portal extends a practice Web site to provide a secure location that patients can use to receive and send information related to their health and care. In this scenario, the portal is used to show available appointment times and allow the patient to select the best time. A portal can also allow patients to access their personal health information (PHR).

Patient Education. Educating patients about their health is an important part of health care delivery. In this scenario, the nurse's instructions to the patient in the secure message fulfilled this function, although that is only one of many ways patients are educated in a PCMH.

Self-Care. Patient engagement can be supported through the use of self-service tools. In this scenario, the patient uses a simple drug-dosing calculator to find the right dose for over-the-counter fever-control agents. More complex tools can be provided to support self-management of chronic diseases and wellness.

Open-Access Scheduling. The attribute is alluded to in this scenario through the use of the patient portal's online appointment scheduling capability. Open-access scheduling focuses on doing today's work today, so patients don't have to wait days, weeks, or longer for an appointment. Allowing the patient to create an appointment online is a useful option, but is not a requirement to achieve open-access scheduling.

Extended Office Hours. Enhanced access can be achieved by providing service outside of regular hours, such as on evenings or weekends. This provides more options for patients, especially those who have a typical work schedule. Another way to extend access is to partner with an urgent care clinic or other facility, while ensuring that information will flow between the PCMH and the contracted clinic to provide continuity of care.

Scenario Number 2: PCMH and Patient Interaction – Adult Acute Illness

Steven Joplin, a 28-year-old with a 1-week history of cough, now has a productive cough, fever, chills, and worsening fatigue. He presents to Dr. Prima's clinic after calling to schedule a morning visit. Ellie Forman, the receptionist, quickly verifies his demographic data and insurance eligibility and messages Dr. Prima's medical assistant, Donna McGowan, to get him back to a room as he appears moderately ill and uncomfortable. Donna obtains a history and vitals from Mr. Joplin (including pulse oximetry) and initiates one of the practice's standing protocols. CBC and chest x-ray results are available to Dr. Prima when he enters the room to evaluate Mr. Joplin. An acute left lower lobe pneumonia is diagnosed, and an antibiotic is e-prescribed, but the first antibiotic dose is given in the office. Mr. Joplin heads home with a printed care plan including specific reasons to contact Dr. Prima prior to the scheduled followup visit. The care plan, and a copy of Dr. Prima's clinical note, is securely uploaded to Mr. Joplin's PHR.

Within a couple of days, Mr. Joplin notes a rash across his chest and back. He takes a photograph and sends it securely to Dr. Prima, who elicits additional information from Steven via email, and then concludes that Mr. Joplin has developed an allergic reaction to the antibiotic. He submits an alternate prescription to Steven's preferred pharmacy, updates his allergy data, and coordinates an updated care plan with Steven.

Six weeks later, Mr. Joplin receives an automated reminder that he is due for followup with Dr. Prima, and instructions for obtaining a repeat chest x-ray. Dr. Prima reexamines Steven and shows him the electronic x-ray images that reveal complete resolution of the infiltrate/pneumonia. Steven asks that the images be made available in his PHR. He is reminded also that his entire health record is always available to him through the PCMH's secure patient portal.

This scenario demonstrates the following attributes of the PCMH:

Secure Messaging. In this scenario, secure messaging is used to communicate not only with the patient but also with care providers. The e-prescribing of the prescriptions and the eligibility verification demonstrate clinical messaging with other individuals and organizations in the care team. Intra-office messaging (the message from the receptionist to the medical assistant) also helps support team-based care.

Patient Portal. In this scenario, the patient portal is used as it is in Scenario 1. Furthermore, the patient is able to upload a picture of his rash and send it to the PCMH. The reminder for his followup also could be delivered through the portal.

Patient Education. The patient is given a copy of his care plan and patient instructions.

Electronic Visit. The interaction between the patient and provider regarding the rash is an example of an electronic visit. History taking, diagnostic evaluation, and medical decision-making all took place without the need of a face-to-face visit.

Open-Access Scheduling. Same-day appointments are a part of open-access scheduling.

Integrated Ancillary Services. In this scenario, the laboratory and imaging diagnostics were available within the PCMH. Another approach is to contract with such services. The key interactions for integrating ancillary services are to understand the information needs of both parties (i.e., the PCMH and the ancillary service).

Automated Technologies. The patient reminder would have been set in the system at the time of the initial diagnosis of pneumonia. The health information system would then trigger the reminder when 6 weeks had passed. This could be done with a traditional paper tickler system, but the technology creates a streamlined, reliable process.

Accessible Patient Health Information. The patient is given an electronic copy of his health information. This makes the information accessible by others, should the patient wish to share it, perhaps with other care providers.

Scenario Number 3: PCMH and Patient Interaction – Adult Acute Illness

For several years, 33-year-old Natalie Brown has been seeing Dr. Prima for health maintenance and acute illnesses. Her parents also come to the clinic, but see another provider. Natalie has been experiencing worsening sadness over the last few months. She is not eating well, not sleeping well, and her family is very concerned about these changes. She arrives for her appointment with her husband. Physical exam is normal, she denies suicidal ideation, and social supports seem strong. She completes a standardized depression instrument in privacy on the exam room computer. Lab orders are sent electronically using the depression order set, and potential next steps and depression issues are fully discussed.

The following day, lab results are available to Dr. Prima (in his results workflow), and directly to Mrs. Brown, with all results normal. She starts a generic selective serotonin reuptake inhibitor (SSRI) and uses a pedometer to track her activity. Step counts are uploaded to her computer and a weekly summary is sent securely to Dr. Prima. After 2 weeks, Dr. Prima increases the SSRI dose, with no side effects noted. After 6 weeks, with only slight symptomatic improvement noted on serial screening with a standardized depression instrument, Natalie and Dr. Prima decide that the SSRI is not helping enough. Natalie's pharmacy benefit requires prior authorization for a serotonin-norepinephrine reuptake inhibitor, which is automatically generated by Dr. Prima's EHR system as he writes the e-prescription. Natalie has also started to see a local psychologist, Dr. Kryer, who, with Natalie's consent, sends assessments to Dr. Prima after their weekly visits.

This scenario demonstrates the following attributes of the PCMH:

Patient Portal and Secure Messaging. In this scenario, the patient uses the portal to upload her exercise history data. She also receives her lab results through the portal. Although the

scenario is not constructed to have the patient perform the depression screening online, this could be another function of the portal.

Self-Service Tools. Using the portal, the patient is able to upload and view her progress on her exercise regimen.

Electronic Visit. The followup visit to check the efficacy of the initial treatment is done via secure messaging.

Accessible Patient Health Information. The patient is provided timely access to her lab results.

Integrated Ancillary Services. In this scenario, the laboratory testing is not provided within the PCMH. The integration of the services is through the use of electronic order entry and results delivery.

Evidence-Based Best Practices. The use of predefined order sets for lab testing for new-onset depression allows for quick and systemic use of best evidence.

Electronic Orders and Results Management. This is an important set of interactions to allow testing to be integrated into the patient's care.

E-Prescribing. Using e-prescribing, the health IT system can determine that the drug being prescribed requires a prior authorization. This streamlines the process, eliminating the need to obtain prior authorization after the patient has already tried to fill the drug at the pharmacy. That would cause frustration and potential rework for both the patient and the PCMH.

Regulatory Compliance. The identification of the need for prior authorization at the time of the prescription allows the PCMH to more easily comply with that administrative requirement.

Integrate Disparate Data Sources. The PCMH's health IT system is able to integrate the lab test results into the patient's record.

Provider-to-Provider Communication. To provide continuity of care and maximize the effect of treatment, the PCMH and the psychologist exchange routine updates. Another approach to integrating mental health is for the mental health provider to be housed within the PCMH.

Interactions Focused on PCMH and Subspecialty Clinic

Scenario Number 4: PCMH and Subspecialty Clinic Interaction – Childhood Acute Illness

Jennifer Davis, a 9-year-old gymnast, fell on her right arm at practice yesterday. The coach appropriately recommended rest, ice, compression, and elevation, but Jennifer continues to have significant pain and swelling in her right wrist and doesn't want to use the hand. Dr. Prima examines the injured wrist and obtains x-rays, which reveal a fracture involving the growth plate.

He splints the injured wrist and coordinates referral to Dr. Skelton, an orthopedic surgeon, after discussing possible complications and options with the Davis family.

Ellie Forman, the receptionist, works with the Davis family to schedule an appointment with Dr. Skelton for tomorrow morning and authorize the referral with their insurance carrier. Dr. Prima sends his visit summary and x-rays to Dr. Skelton and gives him access to Jennifer's full chart, if needed. Dr. Skelton determines that a cast will be sufficient and provides updates to Dr. Prima at 3 and 6 weeks regarding Jennifer's recovery. Based on this information, when Jennifer's parents call for an activity release for her to return to gymnastics, Dr. Prima feels comfortable providing it electronically through the portal.

This scenario demonstrates the following attributes of the PCMH:

Secure Messaging. Since a visit was not required for the activity release, secure messaging through the portal was used to quickly fulfill the request.

Patient Portal. Use of the portal for the activity release request provides convenience for the Davis family.

Accessible Patient Health Information. Since the information about treatment by the orthopedic surgeon was included in the PCMH EHR, all the information is available to facilitate Dr. Prima's decision about activity release. Also, by sharing the patient's record, the orthopedic surgeon has all the needed information to treat the patient effectively.

Integrated Ancillary Services. The x-ray capability was integrated into the care of the patient. This could be provided in the practice or could be contracted out with proper relationships to ensure continuity of care.

Supports Care Transition. The orthopedic surgeon is provided access to the PCMH record to support continuity of care. Also, the patient's family is helped through the referral process. A practice in the provider workgroup has a process to push a care summary to the specialist and then allow the specialist to request or pull additional information (such as an x-ray) as needed.

Provider-to-Provider Communication. Communication happens before the transition of care and continues through the treatment by the orthopedic surgeon.

Task Designation. Dr. Prima tasks the receptionist to handle the referral. Dr. Prima should have the ability to see when the task is completed and see any outstanding tasks.

Clear Employee Roles and Responsibilities. Dr. Prima and the receptionist work well together because each employee has a clear set of roles and responsibilities.

Risk Management. Dr. Prima is able to manage the risk of the activity release request without scheduling an unnecessary office visit.

Engage Patient in Health Care Process. The Davis family is part of the decision process, including the choice of provider for referral.

Although this scenario does not include integration of care at the patient's school, one of the members of this project's provider workgroup reported working on this capability, to allow the school nurse to collaborate with the PCMH.

Scenario Number 5: PCMH and Subspecialty Clinic Interaction – Adult Prevention

During a well-patient exam, 47-year-old Amy Smith notes significant stressors at work but describes home life as good. Physical exam and Pap smear are normal. Screening labs are within normal range, though her cholesterol values have been trending up in recent years. Mammography shows a new, suspicious finding in the right breast. Diagnostic images and ultrasound are obtained while she is still at the imaging center. Dr. Prima discusses the findings and options with Amy by phone and they decide on referral to Dr. Mallory, a breast surgeon, for further evaluation. Dr. Prima forwards to Dr. Mallory Amy's medical history, current and prior radiology studies, and a personal note regarding Amy's social supports and recent increased stressors.

When seen by Dr. Prima for an acute illness, Amy's husband asks for updates on Amy's conditions. After confirming in the EHR that Amy previously consented to sharing of information with her husband, Dr. Prima answers his questions about Amy based on updates from Dr. Mallory, and discusses the current treatment plan. Dr. Prima calls to follow up with Amy and her husband about the negative biopsy results as soon as they are available.

This scenario demonstrates the following attributes of the PCMH:

Secure Messaging. This is used to share the patient's information with the breast surgeon.

Accessible Patient Health Information. The breast surgeon has all of the patient information before the visit.

Integrated Ancillary Services. X-ray and laboratory results are integrated into the EHR. Communication between the imaging center and PCMH extends the orders to include the diagnostic imaging after the screening mammogram. This did not require the patient to make another trip to the imaging center, and thus accelerated resolution of the issue.

Provider-to-Provider Communication. Both the raw medical data and the concerns of the patient are communicated.

Clear Employee Roles and Responsibilities. The imaging center had clear roles to perform additional diagnostic testing if needed. The PCMH was available should additional orders be needed.

Comprehensive Care. The PCMH was able to help the patient with preventive screening, handle management of the breast mass, and address the mental health of the patient.

Prevention/Screening. An annual well-patient exam was performed.

Multidisciplinary Team. The PCMH, imaging center, and breast surgeon all worked together to deliver efficient, seamless care to the patient.

Integrate Family and Community Information. At the direction of the patient, the family was brought into the care of the patient.

Confidentiality and Security. The PCMH managed consent to allow the patient's information to be shared with family members.

Scenario Number 6: PCMH and Subspecialty Clinic Interaction Adult – Chronic Disease

Mr. Johnson, a 52-year-old with hypertension, type 2 diabetes, and high cholesterol, has a fainting spell over the weekend. He calls his doctor, who recommends that he be seen in the office on Monday morning. Mr. Johnson calls his doctor's office on Monday morning and, since the practice has open-access scheduling, he is seen that day. When Mr. Johnson gets to the practice, he is presented with a form containing his medical information and asked to make any necessary changes or additions. Mr. Johnson is surprised to see the lab values from his visit just last week with Dr. Smith, his endocrinologist. Mr. Johnson sees the nurse, who helps enter the modified information into his medical record, then uses a decision tree for syncope to ask additional questions of Mr. Johnson. Dr. Peter, Mr. Johnson's personal physician, meets and examines Mr. Johnson. They decide that, with his history, he should have a full cardiology workup. Based on evidence on who would be the best cardiologist for Mr. Johnson, they pick Dr. Connor. Dr. Peter attaches a care summary to an electronic message to Dr. Connor asking for a cardiac evaluation for syncope. Mr. Johnson is asked if he would rather have an email interaction to set up the appointment, or if he would like Mrs. Cordey, the practice's coordinator, to meet with Mr. Johnson now, get his preferences for an appointment, and then call him when the appointment is made. Mr. Johnson prefers the personal touch.

Later that week, Mr. Johnson shows up at his appointment with Dr. Connor. When he meets Dr. Connor for the first time, Dr. Connor already knows almost everything about Mr. Johnson's condition, since all of Mr. Johnson's information has been loaded into his EHR. At the end of the visit, Dr. Connor sends a quick message to Dr. Peter letting him know they will be doing a 24-hour Holter monitor study to rule out dysrhythmia.

This scenario demonstrates the following attributes of the PCMH:

Open-Access Scheduling. A feature of open-access scheduling is the ability to have same-day appointments for urgent and non-urgent issues.

24/7 Emergency Access Directly to Physician. The patient is able to get to a provider regardless of the time or day of the week. This may be his personal provider or another provider who is covering for his provider. If it is a covering provider, he or she would have access to the EHR and would communicate information about any encounters to the personal provider.

Patient Participation. The patient is part of the referral decision process.

Multidisciplinary Team. The referral specialist, nurse, and primary care provider work together to provide the care to the patient in the PCMH.

Evidence-Based Best Practices. The best evidence would include outcomes data from the different providers and organizations to whom the PCMH refers patients.

Electronic Health Record. The EHR gives the provider access to the patient chart even after hours. The EHR also supports the interoperability of data between the PCMH and the subspecialty clinic.

Electronic Orders and Results Management. The results for laboratory tests ordered by another provider are retrieved and integrated into the patient's record.

Interactions Focused on PCMH and Inpatient Care

Scenario Number 7: PCMH and Inpatient Interaction – Young Adult Acute Illness

Mary Jones is a previously healthy 17-year-old recently seen for a sports physical. Her immunizations are up to date. Her mother calls after regular office hours, noting that Mary has complained of worsening abdominal pain through the evening. She now has a fever, nausea, and doesn't want to move at all. Dr. Prima recommends immediate evaluation in the local emergency room (ER). He contacts Dr. Statton at the Harley Street Hospital ER, relaying Mary's immediate story and providing her health history and most recent evaluation electronically, through remote access to his clinic's EHR system. Mary's CT scan reveals acute appendicitis, and Dr. Statton contacts Dr. Prima to identify a surgeon of choice. Dr. Steele is consulted, provided with Mary's complete history, including latex allergy, and he performs surgery that night. Mary is discharged to home late the next day, with followup appointments established with Dr. Steel and Dr. Prima. All reports are forwarded to Dr. Prima's EHR at Mary's discharge.

This scenario demonstrates the following attributes of the PCMH:

Accessible Patient Health Information. The patient's information is made available to the ER prior to her arrival.

Supports Care Transition . In addition to the transfer of the patient's electronic information, the patient's personal physician notifies the ER physician by phone about the patient and their interaction.

Provider-to-Provider Communication. The communication between providers ensures continuity of care. It also ensures that the receiving provider is aware of any pertinent medical issues with the patient.

Coordination/Integration of Care. The transitions of care between the PCMH, ER, surgeon, and followup are seamless to the patient. Each transition includes transfer of information needed to support safe and efficient care.

24/7 Emergency Access Directly To Physician. The patient's personal physician or an informed covering provider is available for consultation whenever needed by the patient.

Wellness Promotion. The patient was supported to ensure that her immunizations were up to date.

Scenario Number 8: PCMH and Inpatient Care Interaction – Senior Chronic Disease

Susan Miller is a 72-year-old woman with a history of moderate chronic obstructive pulmonary disease (COPD) after smoking for 40 years. She has a chronic cough but notes that it has become productive of purulent sputum in the last 3 days, along with increasing shortness of breath. Her baseline FEV_1/FVC is 45 percent. Pulse oximetry reveals a SaO_2 of 88 percent on room air. Chest x-ray shows no infiltrate. CBC shows mild WBC elevation. Susan and Dr. Prima decide on admission to Harley Street Hospital for COPD exacerbation. Given Susan's current clinical findings, the clinical decision support-based order set suggests initiation of antibiotics. Admission information, history and physical exam note, and orders are received by the hospital; a room, nursing staff, and therapeutic interventions are ready for Susan on her arrival. Dr. Alvey, the consulting pulmonologist, verifies her treatment plan electronically and sees her the next morning. Susan improves over the next 3 days and is discharged with home health care, respiratory therapy, and supplemental oxygen all ready for her at home. The consultant's care plan is modified slightly by Dr. Prima, with the adjustments reviewed and accepted by Dr. Alvey prior to Susan's discharge. Followup visits are also scheduled before she goes home. Dr. Prima takes this opportunity to review his entire population of patients with COPD in his practice's disease registry. Based on this experience, he implements a quality improvement effort to reduce hospitalizations in his COPD patients.

This scenario demonstrates the following attributes of the PCMH:

Accessible Patient Health Information. The patient health information is accessible at each transition of care.

Population Management and Registry. The PCMH takes an inventory of the quality of care provided to all patients with a particular condition.

Chronic Disease Management. Patients with chronic disease are actively managed to optimize their outcomes and minimize their costs.

Supports Care Transition. The patient sees a seamless transition of care, from the ambulatory setting to the inpatient setting and back to the ambulatory setting.

Provider-to-Provider Communication. The patient's personal physician makes sure that all providers are up to date about the patient's care plan and the activities of the other providers.

Coordination/Integration of Care. The providers work on a common plan of care.

Multidisciplinary Team. The personal physician and pulmonologist work together as members of a team to coordinate and integrate care.

Clinical Outcomes Analysis and Quality Improvement. Using the patient registry, the PCMH can measure outcomes for chronic disease and work to improve those measures.

Electronic Medical Record. It is a critical piece to support the advanced activities of the PCMH.

Evidenced-Based Decision Support. The use of standardized order set for common issues ensures that elements of the care plan are not forgotten.

Scenario Number 9: PCMH and Inpatient Care Interaction – Senior Acute Illness

Roberto Morales, an 81-year-old, is brought to Dr. Prima's office by his son without an appointment. Mr. Morales is acutely weak and somewhat confused, and complains of blood in his stools. Spanish is his primary language and translation services are accessed. He appears pale with an elevated pulse, but his blood pressure is normal. Stool is grossly bloody and hemoglobin is 6.5 (had been 12.5 3 months ago). Dr. Prima contacts Dr. Statton at the local ER by phone and forwards his current evaluation and Mr. Morales' medical history. Ambulance services are contacted for transport of Mr. Morales to Harley Street Hospital ER. Paramedics arrive at Dr. Prima's office and take Mr. Morales out through a special side entrance, thereby avoiding the reception area. Mr. Morales is further evaluated in the ER and admitted to ICU for close monitoring by Dr. Crittenden. His most recent advance directive and durable power of attorney for health care are included in the records from Dr. Prima. Emergent consultation is made to Dr. Collins, gastroenterology, who reviews electronic summaries of
Mr. Morales' entire record and performs colonoscopy and EGD. Results of these evaluations are immediately available to Dr. Prima. Mr. Morales receives blood transfusions and his condition stabilizes, but no definitive source of bleeding is found, even after additional technical evaluations of the GI tract. Dr. Prima attends to Mr. Morales and his family while he is hospitalized. Though still weak, Mr. Morales and his family refuse temporary nursing home placement, and home assistance is arranged with family members, home health services, and community assistance programs for the elderly. The Morales family is very uncomfortable that the source of bleeding was not identified. Dr. Prima reviews with them the previous interventions and the most recent evidence for the care plan. They are reassured that all appropriate measures have been taken and that Roberto will continue to be followed closely by trained health care providers through home care, e-visits, and office visits. Educational materials in English and Spanish are provided to family members who are assisting with his acute recovery.

This scenario demonstrates the following attributes of the PCMH:

Accessible Patient Health Information. The patient's health information and condition is made available to the ER.

24/7 Emergency Access. Even during business hours, the PCMH practice must support emergency access. If the patient or patient's family had called the practice, they would have been directed to call 911 for an ambulance to the ER.

Provider-to-Provider Communication. The patient's personal physician has direct communications with the patient's other providers. All providers on the care team communicate with each other to help ensure coordination of care.

Coordination/Integration of Care. The transitions of care are seamless to the patient and all needed information is actively shared.

Integrated Ancillary Services. Basic laboratory testing is available in the PCMH (i.e., hemoglobin testing).

Supports Care Transitions. The PCMH actively manages the transition of care, making sure that receiving providers understand what is going on with the patient and why there is a transition of care.

Integrate Family and Community Information. The patient's family members are critical participants in the patient's care and are integrated into the care delivery process.

Optimized Office Design. The PCMH facilities were carefully designed to support a patient-centered approach to care. In this example, the design eliminates the spectacle of the patient being paraded through the waiting room on a stretcher.

Personal Physician. The patient's physician takes responsibility for all of the patient's care.

Whole-Person Orientation. All aspects of care, including socioeconomic issues, are managed by the PCMH.

Language, Cost, and Needs Appropriate. Translation services and patient education materials in Spanish were made available to the patient.

Implications

Describing the PCMH is not a simple or easy task. By providing a series of patient scenarios, we believe that a common mental model of what the PCMH is—and is not—can be constructed. The nine scenarios provided in this report cover many of the attributes of the PCMH but are far from describing all the information flows and interactions that characterize the PCMH. Scenarios can provide an anchor for discussions among different stakeholders. We believe that these scenarios can provide such a resource to patients, providers, policymakers, and health IT vendors, and that the PCMH information framework and associated tools assembled by the authors provide a roadmap and capability to continue the work started by this project. These scenarios also embody how the shared PCMH principles can be realized using current resources and technologies, and how the principles should be continuously updated as new technologies and approaches are added to the practice of medicine to reflect best practices.

Further validation of the scenarios is warranted with providers and patients. Additional scenarios are needed to further define the PCMH. One of the limitations of this work is the lack of formal definitions of the PCMH attributes in the literature. It would be valuable to have the PCMH community provide consensus regarding the key performance indicators and goals of each of the PCMH attributes. Such a consensus would facilitate evaluation of the scenarios and the extent to which they fully represent the PCMH attributes.

Given a robust set of PCMH scenarios, the scenarios can be broken down into interaction diagrams, process flows, and data requirements. From these components, IT use cases and test cases can be constructed to support health IT vendors to produce products and services that fully support the PCMH.

Another potential use of such a robust set of PCMH scenarios, along with the PCMH information framework, is to provide patients and policymakers with a tool for deciding whether or not a practice is a PCMH. For example, the National Committee for Quality Assurance could use the scenarios and information framework to inform future program requirements for medical home recognition.

For clinicians seeking to transform a practice to a PCMH, the scenarios can provide examples of interactions and process flows that demonstrate how the care currently delivered in the practice may differ from a PCMH. By creating interaction diagrams and process flows based on the scenarios, clinicians can think outside the traditional care delivery box and gain insight into how to implement the PCMH.

For clinicians in other settings who treat and interact with patients from a PCMH, the scenarios will provide a better understanding of how a PCMH operates, and a willingness to coordinate care in a way that is suitable for PCMH processes and practices. This awareness also may help these clinicians to better meet the expectations of patients from a PCMH, including an increased emphasis on accessible and coordinated care.

For clinicians who have little exposure to the PCMH model and are interested in learning more about it, the scenarios provide a way to relate to real-life situations. The scenarios also could be used to help clarify the intent of PCMH principles and attributes and reduce confusion about the characteristics of the PCMH.

Future Work

Current Gaps

As our literature review indicated, this effort was first of its kind to combine the principles and attributes of a PCMH with the associated sites, subsites, and roles and to create a framework for identifying the flow of information. This high-level effort created the framework by assembling these components and documenting their interactions. However, it would be beneficial to examine each component in detail to explore its full scope and potential. The lack of explicit definitions in the literature regarding the attributes of the PCMH makes it difficult to create an accurate and precise model. More work by the PCMH community is needed to define

and clarify the attributes that make up the PCMH. Classifying these attributes into essential and non-essential categories may help in prioritizing these attributes for further development of an information model.

The nine scenarios presented in this report show how the information framework can be used to examine interaction details and the flow of information. More work is needed to develop additional scenarios that include other information flows in the PCMH. Further validation of these scenarios by providers and patients is warranted.

Finally, the data needs for each interaction should be defined. This would provide needed detail to construct health IT systems that are interoperable and to help with defining clear roles and responsibilities among individuals and organizations participating in a PCMH.

Alternative Interaction and Process Maps

As the PCMH continues to mature and evolve, the interactions and information flows will need to be maintained. A major part of that work is the creation of alternative interaction diagrams and process flow maps to support flexibility where appropriate in implementation of the PCMH.

Validation and Dissemination

Strategic engagement of various stakeholder groups (patients and clinicians) is essential in a dual effort to disseminate and validate this framework. This dual approach will achieve the goals of providing guided education and explanation of the framework to the groups (dissemination), and receiving feedback from the groups about the framework (validation)

Patient advocacy organizations need to be engaged to reach out to patients in explaining the framework and seeking feedback on how well it relates to their experiences with a PCMH. Similarly, clinical associations need to be engaged to reach out to clinicians in a variety of settings. Structured feedback loops need to be established for these groups to gauge their understanding of the framework and provide their insights into its relevance and application to their own experiences and expectations of a PCMH. Following such structured efforts to engage stakeholder groups, the consolidated feedback needs to be utilized to further refine this framework and its modeling using the scenarios.

Large scale dissemination can be undertaken following the structured engagement of the stakeholder groups and further refinement of the framework. This large scale dissemination can be undertaken by packaging the relevant parts of the framework for the appropriate groups of audiences including patients, providers, policymakers, and health IT vendors. Several members of the project expert panel who represent different patient and clinician associations and vendors have volunteered to help with the dissemination of this framework.

References

1. Y. T. Lee: “Information Modeling: From Design to Implementation,” Proceedings of Second World Manufacturing Congress September 27-30, 1999, at the University of Durham, U.K.

2. American Academy of Pediatrics, Council on Pediatric Practice. Pediatric records and a “medical home.” In: Standards of Child Care. Evanston, IL: American Academy of Pediatrics 77-79; 1967.

3. Medical Home Initiatives for Children With Special Needs Project Advisory Committee. The Medical Home. Pediatrics 110:184-6; 2002.

4. Future of Family Medicine Project Leadership Committee. The Future of Family Medicine: A Collaborative Project of the Family Medicine Community. Annals of Family Medicine. 2004;2:S3-32.

5. Patient-Centered Primary Care Collaborative. Joint principles of the patient-centered medical home. PCPCC Web site. http://www.pcpcc.net/content/joint-principles-patient-centered-medical-home. February 2007. Accessed March 10, 2011.

6. D. W. Bates and Asaf Bitton. The Future Of Health Information Technology In The Patient-Centered Medical Home. Health Aff April 2010 29:614-621.

7. Y. T. Lee: “Information Modeling: From Design to Implementation,” Proceedings of Second World Manufacturing Congress September 27-30, 1999, at the University of Durham, U.K.

8. Agency for Healthcare Research and Quality. What is the PCMH? Patient-Centered Medical Home Resource Center Web site. http://pcmh.ahrq.gov/portal/server.pt/community/pcmh home/1483/what_is_pcmh_. Accessed March 10, 2011.

9. Institute for Healthcare Improvement. The IHI Triple Aim. IHI Web site. http://www.ihi.org/IHI/Programs/StrategicInitiatives/IHITripleAim.htm. Accessed March 10, 2011.

10. American Academy of Family Physician. Definition of patient-centered medical home. http://www .aafp.org/online/en/home/policy/policies/p/patientcenteredmedhome.html.

11. American Academy of Pediatrics. Children's health topics: Medical home. http://www.aap.org/healthtopics/medicalhome.cfm.

12. American College of Physicians. The Advanced Medical Home: A Patient-Centered, Physician-Guided Model of Health Care. Philadelphia: American College of Physicians; 2005: Position Paper.

13. America's Health Insurance Plans. Principles on Patient-Centered Medical Home. http://www.ahip.org/content/pressrelease.aspx?docid=23732

14. P.H. Keckley and H.R. Underwood. The Medical Home: Disruptive Innovation for a New Primary Care Model. Deloitte. July 06, 2010.

15. Patient Centered Primary Care Collaborative. Meaningful Connections. http://www.pcpcc.net/content/meaningful-connections-it-resource-guide.

16. TransforMed. TransforMed Model of care. http://www.transformed.com/transformed.cfm.

Appendix A: List of PCMH Principles and Attributes

Access
- Open-access scheduling
- Flexible & expanded office hours
- 24/7 emergency access directly to physician
- Electronic visits
- Group visits

Coordinated care
- Provider-to-provider communication
- Task designation
- Clear roles and responsibilities
- Clear and consistent processes
- Multidisciplinary team
- Effective communication

Continuity of care
- Supports care transition
- Accessible patient health information

Community linkages
- Community-based resources
- Integrate family and community information

Information system support
- Automated technologies
- Electronic health record
- Electronic orders and results management
- e-Prescribing
- Evidence-based decision support
- Population management registry
- Practice web site
- Patient portal
- Secure messaging
- Structured, codified data capture
- Integration of information from diverse sources
- Informatics infrastructure to support practice-based research, quality improvement, and generation of knowledge
- Confidentiality and security

Payment
- Payment alignment
- Accountability
- Structured payment to align with measurable improvements

Patient-centered care
- Self-care
- Patient education
- Patient participation
- Engage patient in health care process
- Goal setting
- Language, cost, and needs appropriate

Provider type
- Personal physician
- Physician-directed medical practice

Quality
- Evidence-based best practices
- Medication management
- Patient satisfaction feedback
- Clinical outcomes analysis
- Quality improvement
- Risk management

Scope of care
- Comprehensive care
- Integrated ancillary services
- Whole-person orientation
- Any provider can treat patient as "his or her own"

Active care management
- Prevention screening
- Wellness promotion
- Chronic disease management
- Population management
- Cost-benefit decisionmaking

Other
- Regulatory compliance
- Financially responsible and successful practice
- Optimized office design

Appendix B: PCMH Attributes X Scenario Matrix

To catalog the breadth and depth of the PCMH, a set of attributes was constructed as described above (Appendix A). The set of attributes constitutes the "y" axis of the matrix. The names or identifiers of the scenarios constitute the "x" axis. When an attribute is used or "present" in a particular scenario, the intersection is marked. This makes it possible to quickly observe which attributes are incorporated into which scenarios and where there are gaps. This information will be useful later when use cases are mapped, to ensure that they represent all known attributes of the PCMH. The following four pages present the matrix of the nine scenarios and the complete list of attributes identified in this framework.

PCMH Attributes	Visit to PCMH			Visit to PCMH Referral to Specialist			Visit to PCMH Referral to Hospital		
	Scenario 1 Childhood – Acute Illness Kyle Wilson	Scenario 2 Adult – Acute Illness Steven Joplin	Scenario 3 Adult – Acute Illness Natalie Brown	Scenario 4 Childhood – Acute Illness Jennifer Davis	Scenario 5 Adult – Prevention Amy Smith	Scenario 6 Adult – Chronic Disease Mr. Johnson	Scenario 7 Young Adult - Acute Illness Mary Jones	Scenario 8 Senior – Chronic Disease Susan Miller	Scenario 9 Senior – Acute Illness Robert Moore
Access									
Open access scheduling		1				1			
Flexible & expanded office hours	1								
24/7 emergency access directly to physician						1			1
Electronic visits		1							
Group visits									
Coordinated care									
Provider to provider communication				1	1		1	1	1
Task designation				1					
Clear roles and responsibilities				1					
Clear and consistent processes		1			1				
Multidisciplinary team					1	1		1	
Effective communication									
Continuity of care									
Supports care transition				1	1		1	1	1
Accessible patient health information		1					1	1	1
Community linkages									
Community-based resources								1	1
Integrate family and community information									1

PCMH Attributes	Visit to PCMH			Visit to PCMH Referral to Specialist			Visit to PCMH Referral to Hospital		
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9
	Childhood – Acute Illness	Adult – Acute Illness	Adult – Acute Illness	Childhood – Acute Illness	Adult – Prevention	Adult – Chronic Disease	Young Adult - Acute Illness	Senior – Chronic Disease	Senior – Acute Illness
	Kyle Wilson	Steven Joplin	Natalie Brown	Jennifer Davis	Amy Smith	Mr. Johnson	Mary Jones	Susan Miller	Robert Moore
Information system support									
Automated technologies		1							
Electronic health record		1	1			1	1	1	
Electronic orders and results management		1	1		1	1		1	
e-Prescribing		1	1						
Evidence-based decision support		1	1					1	
Population management registry								1	
Practice Web site	1	1							
Patient portal	1	1	1	1	1				
Secure messaging	1	1	1	1	1				
Structured, codified data capture						1		1	
Integration of information from diverse sources						1			
Informatics infrastructure to support practice-based research, quality improvement, and generation of knowledge									
Confidentiality and security									

PCMH Attributes	Visit to PCMH			Visit to PCMH Referral to Specialist			Visit to PCMH Referral to Hospital		
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9
	Childhood – Acute Illness Kyle Wilson	Adult – Acute Illness Steven Joplin	Adult – Acute Illness Natalie Brown	Childhood – Acute Illness Jennifer Davis	Adult – Prevention Amy Smith	Adult – Chronic Disease Mr. Johnson	Young Adult - Acute Illness Mary Jones	Senior – Chronic Disease Susan Miller	Senior – Acute Illness Robert Moore
Payment									
Payment alignment									
Accountability									
Structured payment to align with measurable improvements									
Patient-centered care									
Self-care									
Patient education									
Patient participation	1								
Engage patient in health care process	1	1		1					
Goal setting			1	1		1		1	
Language, cost, and needs appropriate						1			
Provider type									
Personal physician									
Physician-directed medical practice									1
Quality									
Evidence-based best practices									
Medication management					1	1			1
Patient satisfaction feedback									
Clinical outcomes analysis									
Quality improvement			1			1			
Risk management									

PCMH Attributes	Visit to PCMH			Visit to PCMH Referral to Specialist			Visit to PCMH Referral to Hospital		
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9
	Childhood – Acute Illness Kyle Wilson	Adult – Acute Illness Steven Joplin	Adult – Acute Illness Natalie Brown	Childhood – Acute Illness Jennifer Davis	Adult – Prevention Amy Smith	Adult – Chronic Disease Mr. Johnson	Young Adult - Acute Illness Mary Jones	Senior – Chronic Disease Susan Miller	Senior – Acute Illness Robert Moore
Scope of care									
Comprehensive care									
Integrated ancillary services								1	
Whole-person orientation								1	
Any provider can treat patient as "his or her own"				1					
Active care management									
Prevention screening									
Wellness promotion									1
Chronic disease management		1			1				1
Population management									1
Cost-benefit decisionmaking									
Other									
Regulatory compliance									
Financially responsible and successful practice									
Optimized office design							1		
Total						1		1	