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Evidence Check

The Patient Centred
Medical Home:
barriers and enablers
to implementation

An **Evidence Check** rapid review brokered by the Sax Institute for COORDINARE.
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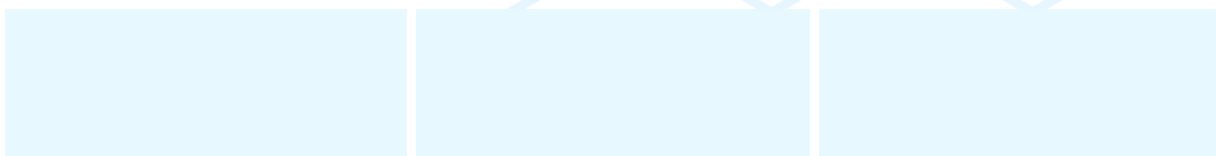
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The Patient Centred Medical Home: barriers and enablers to implementation

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Executive summary

Background

The Sax Institute commissioned Health Policy Analysis to undertake an Evidence Check for COORDINARE (South Eastern NSW Primary Health Network) on the barriers and enablers of implementing a patient centred medical home (PCMH) model of care.

COORDINARE is a Primary Health Network (PHN) with responsibilities for supporting and strengthening general practice and primary health care services in South Eastern NSW, a region that has approximately 600,000 residents. COORDINARE has a vision to achieve a coordinated regional health system which provides exceptional care, promotes healthy choices and supports resilient communities. The organisation is pursuing this vision through supporting primary care services to be comprehensive, person-centred, population oriented, coordinated across all parts of the health system, accessible, safe and high quality.

COORDINARE is progressing a project aimed at designing and evaluating a PCMH pre-implementation logic model, with the aim of building capacity and capability in South Eastern NSW general practices and developing enhanced PHN support functions required for transformational change. As part of this project a small number of practices in South Eastern NSW will implement change aimed at moving towards a more PCMH model of care which will also be evaluated. The Evidence Check will provide an evidence basis to assist implementation of the PCMH model of care. It will be used to identify the support required by practices in the transition towards a PCMH model and facilitate discussions on the topic between COORDINARE and stakeholders.

Review questions

Two questions have been articulated for the review:

1. What barriers or challenges have been identified in the implementation of a PCMH approach?
2. What enablers have been identified that address these barriers and challenges in supporting the implementation of the PCMH?

Summary of methods

For question 1, COORDINARE specified that the Evidence Check update a previous published paper; *A systematic review of the challenges to implementation of the patient-centred medical home: lessons for Australia* undertaken by Janamian, Jackson, Glasson & Nicholson.[1] This was a narrative review of qualitative evidence related to barriers to the implementation of the PCMH, covering papers published between 2007 and 2012.

Therefore, this review used a similar search strategy to the Janamian et al.[1] review, but covered papers published from January 2013 to June 2017. The search was conducted using PubMed with 1,459 titles identified. A further four titles were identified through a grey literature search.

Following a review of titles and abstracts, 238 titles were selected for full text review. Following the full text review, 68 titles were excluded based on three criteria (did not relate to a primary care setting, did not address PCMH implementation, not an empirical study or literature review), leaving 170 titles that have been included in the review.

Evidence grading

The quality of each study was assessed using the criteria described by Janamian et al.[1] which were based on criteria derived from Harden et al.[2], Kmet et al.[3], and Pawson et al.[4] (see Appendix B). This yields a score for

each title of between one and ten. Of the included titles, 26 (15%) were assessed as low quality (score below five), 102 (60%) were assessed as moderate quality (score of five to seven), and 42 (25%) were assessed as high quality (score of eight to ten).

Key findings

Questions 1 and 2 were considered together, as they are closely related.

The Evidence Check identified a range of barriers. Enablers were sometimes identified by the same study as that documenting the barriers, and sometimes by separate studies. Key barriers, and enablers addressing them, are described in the table below. They are organised by components required to transition to a PCMH identified in the literature.

Table 1 – Barriers/challenges and enablers for the implementation of the PCMH

Component of change and why it's important	Barriers/challenges	Enablers
Policy context: Can either provide support for or inhibit practices' motivation to uptake PCMH.	• Negative perceptions about factors such as regulation, reimbursement, labour supply, and/or alignment of incentives at the national, state or local levels can hinder PCMH implementation • Policies that appropriately incentivise PCMH implementation and sustain it over time are required but are not in the control of individual practices.	• Coaching/facilitation can help practices interpret the policy landscape and build a case for change.
Payment arrangements/ incentives: May provide motivation for change and/or focus efforts of practices/ general practitioners (GPs).	• Traditional payment policies (such as fee-for-service) may focus GPs/practices on activities that are not aligned with PCMH • Lack of financial incentives coupled with the cost of implementing PCMH may deter practices from pursuing it.	• Consider payment models that move the focus away from specific service interactions to ones that focus on patient needs over time • Include additional incentives that focus on quality of care delivered • Explore models that allow primary care practices to share in savings arising from reduced hospital care • Acknowledge the role of other factors as incentives for change (see 'change management').
Implementation costs: Cost impacts practices' decisions to uptake PCMH and sustain it.	• PCMH implementation is costly and, therefore, may not be achievable without payment incentives/grants.	• Tap into start-up grants if available • Ensure overall payment effect is sufficient to cover ongoing costs of PCMH model.
Change management: Requirement for large-scale, organisation-wide, comprehensive change.	• Inadequate motivation for change • Lack of readiness for change.	• Sequencing of change tasks • Pilot interventions with practices willing to do so • Flexibility to modify initiatives to suit local circumstances • Financial incentives

Component of change and why it's important	Barriers/challenges	Enablers
		• Acknowledge role of peer pressure and community recognition • Mechanisms to assist decision-makers to understand what is involved and what the benefits are, such as field trips to sites implementing the change, practice facilitation/coaching and learning communities • Recognise the difference between the change process required for transformation to a PCMH versus recognition as a PCMH (such as for accreditation purposes) • Tools to assess readiness for change and to track progress • Understanding patient perspectives and requirements of a PCMH • Understanding key concerns or challenges that leaders have in implementing PCMH.
Leadership: Requirement for large-scale, organisation-wide, comprehensive change.	• Lack of leadership to initiate and/or sustain change • Turnover of leaders/leadership stability.	• Leadership at all levels of an organisation/practice • 'Meta-leadership' to operate in a medical neighbourhood.
Culture: Impacts on the ability to innovate and achieve quality of care.	• Existing culture may not support change.	• Training • Incorporating new roles into the practice, such as community care worker, clinical pharmacist, medical assistant.

Component of change and why it's important	Barriers/challenges	Enablers
Teamwork: Key feature of the PCMH model and central to achieving quality care.	• Lack of intentional focus on developing teams • Preoccupation with data/measurement • Workflow is too prescriptive • Inadequate re-distribution of tasks amongst team members • Lack of effective health information technology to support communication between team members and delegate tasks and/or avoid task duplication.	• Leadership • Supportive culture • Training • Huddles • Sanctioned time for team communications and structured communication approaches • Use of data/measures • Implementing changes incrementally • Incorporating new roles and/or role expansion of existing staff • Health information technology with appropriate functionality to support teamwork.
Staff experience: Without adequate staff/staff support, the model cannot be adequately implemented or sustained.	• Inadequate staff • Staff dissatisfied with roles • Staff burnout.	• Participatory decision-making • Having adequate staff • Trust-building exercises.
Time: Major change initiatives such as PCMH take time. Beyond implementation, many of the facets of PCMH take time (e.g. preventative measures, care coordination).	• Inadequate time allocated to transition to a PCMH • Inadequate time allocated to undertake comprehensive assessments and holistic interventions.	• Recognition of the time it takes to make changes • Separate visits for preventive care • The use of electronic medical records (provided they have a user-friendly interface).

Health information technology: Benefits of health information technology are widely	• Time, effort and other resources for implementation.
	• Available technology is inadequate to support quality initiatives
		• Training, specifically,
		  • Applied to real cases
		  • Delivered over a period of time

Component of change and why it's important	Barriers/challenges	Enablers
documented and are central to supporting PCMH functions.	• May lead to worse performance on adoption • Ability to be used as a substitute for face-to-face visits.	• Recognition of the time it takes to make changes by organisations providing grants/supporting change • Development of 'meaningful-use' criteria, specifying minimum interoperability and reporting features that must be met by vendors.
Substitution of face-to-face consultations: Alternatives to face-to-face consultations can enhance patient-centred care.	• Concerns from providers about workload, including picking up the load of other providers as soon as they free up face-to-face time in their own schedule • Concerns with how alternatives are reflected in performance metrics • Alternatives are not suitable in all circumstances • Concerns by patients that they may lose touch with their providers • Technology does not necessarily facilitate substitution of face-to-face consultations and may result in additional face-to-face visits.	• Understand where non-face-to-face consultations can work best • Recognise workload created by non-face-to-face patient contacts, including in any performance metrics • Protect time of providers freed up by reducing face-to-face time.
Care plans/planning: Central to PCMH, contributing to effective care coordination and other benefits.	• Time, labour and cost intensive.	• Education/training on developing effective care plans and the benefits of effective care plans • Vendors of care planning tools to work alongside practicing clinicians to develop them.
Care coordination within a practice: Care coordination has foundations in chronic care management and is emphasised in PCMH models.	• Care coordinator working remotely, primarily using the telephone or e-mail • Lack of a close relationship with clinicians treating patients, and patients and their family members.	• Dedicated care coordination roles • Located within doctor's office.

Component of change and why it's important	Barriers/challenges	Enablers
Care coordination beyond the practice: Supports effective management of patients and transition between emergency department/hospital and primary care.	• Continued reliance on paper-based systems for care coordination • Lack of dedicated care-coordination position(s) • Lack of knowledge amongst primary care providers about the availability of community supports, and lack of infrastructure to support collaboration between primary care and community services • Lack of specialty care or hospital involvement with patient care and other linkages between secondary and tertiary care • Inability to share patient information across different providers and organisations.	• Use of mechanisms to establish relationships with other providers to facilitate coordinated patient care • 'Wraparound' initiatives which coordinate use of comprehensive community services combined with care coordination offered through PCMH can help align health and community services • Use of care compacts to make explicit the mutual responsibilities of providers for communicating and coordinating shared patient care • Move forward with a subset of partners who were willing and able to participate in establishing the shared infrastructure for information sharing.
Risk stratification: Identifying patients that will benefit most from PCMH initiatives and prioritising them in change initiatives.	• Predictive ability • Clinical acceptance • Identifying which patients are most likely to benefit/have conditions that are amenable to change.	• Identifying those patients most amenable to change (rather than targeting high-need and/or high-cost patients) • Use multidisciplinary teams to select an appropriate tool and modify for local use • Incorporate data as well as clinical perspectives • Optimise through feedback from front-line staff using the tool.
Data and performance measurement: Lack of data and/or quality of data limits practices' ability to understand the	• Undue focus on measures at the cost of patient-centred care • Lack of consistency of the metrics with PCMH principles • 'Top-down' approach to performance measurement	• Ensuring that metrics align with PCMH principles, including balancing patient care process measures and clinical outcomes • Investigating patients' priorities for care quality

Component of change and why it's important	Barriers/challenges	Enablers
impact of their changes, adequately engage staff/teams and prepare documentation for external recognition as a PCMH. Performance measures indicate the standard of quality to be achieved by a PCMH, provide transparency of the effectiveness of initiatives that have been implemented, and stimulate further motivation for improvement.	• Opportunity cost of responding to the measures • Measures may not be clinically meaningful • Manual compilation • 'Shaming' through visible tracking of measures.	• Investigating the time it takes to respond to metrics and titrating to the time available • Articulating the clinical rationale for each measure • Incorporating feedback loops so that front-line staff can feedback unintended consequences of metrics • Information systems to obtain real-time data and minimise manual compilation.
Practice size/ capacity: Some practices face additional challenges to implementing PCMH due to their size and/or capacity.	• Infrastructure or resources to implement PCMH for smaller practices.	• Use of a range of staff (non-clinical or clinical health professionals and support staff) to deliver patient-centred care • Organisations providing incentive funding for PCMH implementation should streamline processes associated with accessing the incentive funding and applying for recognition as a PCMH.
Provision of specific services (such as mental health and substance abuse and lifestyle interventions): Creates capacity/ access and ensures that these issues are addressed.	• Time • Resources • Lack of expertise • Clinicians' perceptions of their roles in providing these services • Anticipated outcomes (especially of lifestyle interventions).	• Clarifying roles and responsibilities of individual members of primary care teams in providing these services • Training/skills development • Dedicated appointments for patients for these services • Dedicated role(s) to provide these services • Availability of programs to which practices can refer.

Enablers that can address a range of barriers have also been identified in the literature. They are described in the table below.

Table 2 – Key enablers for the implementation of the PCMH

Enabler	Description
General	Range of strategies available to PCMH practices for transformation.
Education programs	Wide variety of educational approaches are possible but should be evaluated. Programs and evaluation should be built with the desired endpoint in mind (patient outcomes).
Practice facilitation/ facilitators	Can help with all aspects of a practice's transformation to a PCMH, including: getting started; technical assistance with/training for key elements of PCMH practice, such as teamwork; assessing a practice's/individual staff member's competency; and, sustaining PCMH approach over time.
Learning collaboratives	Provide a means for practices to exchange information and experiences, and test and share tools and resources.
Learning resources/ 'toolkits'	Can support transformation to PCMH by describing the changes required, providing the evidence base and rationale for a given initiative/concept, laying out implementation steps and activities, and providing tools and case studies to support implementation.
Performance measurement and feedback	Collecting, submitting and receiving feedback on data helps with process improvements necessary for becoming a PCMH despite difficulties in collecting and reporting reliable measures.
Roles supporting PCMH functions: • Medical practice assistants • Community health workers • Pharmacists • Integrated community specialists	A range of roles exist or are emerging that practices could use effectively in delivering PCMH care: • Medical practice assistants are playing an increasingly important role in PCMH practices due to their ability to take on both clinical and administrative duties • Community health workers can perform a range of PCMH functions, including liaising between health and/or social care agencies/workers and community members, assisting patients with non-medical obstacles to care, and facilitating patient self-management over time. They are usually drawn from the communities that they service, thus can provide culturally appropriate care and/or have greater ability to link patients to local services • There are many advantages of integrating pharmacists into PCMH practices, however, there are barriers • There are various models integrating specialists into PCMHs.

Enabler	Description
Enablers for Indigenous populations	Ownership of health service by the community, such as of Aboriginal Community Controlled Health Organisations. Community health workers (CHWs), who are characterised by their strong ties with their local communities, also have the potential to improve health outcomes for high-needs populations, including Indigenous.

The components of change described in the table above broadly align to the ten building blocks of high-performing primary care identified by Bodenheimer, Ghorob, Willard-Grace & Grumbach.[5] The mapping between these and the components of change described in Table 1 are outlined below. There are three building blocks that are not directly addressed in Table 1. These are: empanelment, continuity of care and prompt access to care. The detailed description of the literature reviewed touches on these building blocks. Some studies have, for example, outlined the tensions that occur between continuity of care provided by a specific medical practitioner and prompt access to care. Within studies of teamwork, there is also discussion on the challenges of achieving continuity of care with teams (or teamlets). Many of the discussions on empanelment and prompt access to care relate to characteristics of the health system within which the PCMH practices are operating.

Table 3 – Mapping from the ten building blocks of high-performing primary care (Bodenheimer et al.[5]) to the components of change described in Table 1

Building blocks of high-performing primary care	Component of change from Table 1
Building block 1: Engaged leadership: Creating a practice-wide vision with concrete goals and objectives	Leadership
Building block 2: Data driven improvement using computer-based technology	Health information technology
Building block 3: Empanelment	Not directly addressed
Building block 4: Team based care	Teamwork
Building block 5: The Patient-Team Partnership	Change management
Building block 6: Population Management	Risk stratification
Building block 7: Continuity of care	Not directly addressed
Building block 8: Prompt access to care	Not directly addressed
Building block 9: Comprehensiveness and care coordination	Care plans/ planning Care coordination within a practice Care coordination beyond the practice
Building block 10: Template of the future	Substitution of face-to-face consultations Payment incentives

Gaps in the evidence

The focus of this rapid review is on evidence around barriers and enablers in the implementation of the PCMH. This evidence principally arises from qualitative and quantitative methods that have focussed on eliciting perspectives of the stakeholder involved with implementation. Only rare instances were identified of comparative/quasi experimental studies that directly test different approaches to implementation, and in these the focus was typically on a very narrow aspect of implementation.

In most instances comparative/quasi experimental studies of the PCMH focussed on estimating difference in outcomes for practices that have implemented PCMH (or some version of it) compared with 'usual care', rather than the effect of different approaches to implementation. Within the literature there are also many observational studies that compare differences in practices that have attained PCMH recognition. These studies, whether cross sectional or longitudinal, often say little about the process of implementation. As one author commented: *"Despite the hundreds of published articles about* [PCMH]*, there is a surprising dearth of even descriptive information about how anyone built one or recommendations about how to do so. There are plenty of articles about the multiple visions of what a medical home should look like, about what is needed to foster the change from the outside, and even a few preliminary studies of effects."* (p. 456)[6]

Discussion of key findings

This rapid review has focussed on barriers and challenges to the implementation of a PCMH approach, and enablers that address these. It includes studies using a broad range of methodologies, from qualitative to quasi-experimental designs. The literature on the implementation of the PCMH has significantly expanded in recent years, reflecting publications related to implementations of PCMH models in various health systems within the United States (US), including Medicare, commercial health plans, Medicaid, federally funded community health centres and the Veterans Health Administration, and other implementations in England, Canada and New Zealand (NZ).

The rapid review identified a broad range of barriers and enablers for PCMH implementation listed in Table 1. These have been grouped into five main themes, as shown in Table 4 below. These largely align with those described by Janamian et al.[1], although a new broad category has been added ('care coordination beyond the practice'). Also, the category of 'insufficient practice resources and infrastructure' has been grouped with the 'time and resources' component of 'challenges with transformation and change management in adopting a PCMH model'.

Table 4 – High level summary of barriers and enablers for implementation of the PCMH

Barriers/challenges		Enablers	
1. Policy settings and funding incentives		1. Policy and funding reform	
2. Transformation and change management:		2. Strategies to support transformation and change management, including:	
General: Leadership Culture Staff experience Time and resources	**Specific:** Teamwork Substitution of face-to-face consultations Care plans/planning Continuity of care	**General strategies:** Education programs Practice facilitation/coaching Learning communities/collaboratives Learning resources/'toolkits'	**New/ enhanced roles:** Medical practice assistant Community health workers Embedded pharmacists Integrated community specialists
3. Care coordination beyond the practice		3. Care coordination beyond the practice • Partnerships with community providers • Linkages with specialty and hospital care • Information sharing and continuity of care	
4. Health information technology		4. Strategies to support more effective use of health information technology • Population health management tools • Risk stratification tools	
5. Data and performance measurement		5. Performance measurement and feedback	

The central challenge remains how to manage a process of change with the thin resources available in primary care settings. A conclusion to be drawn from this review is that these changes require multi-faceted strategies that are sustained over time, and are adjusted to reflect the context of particular primary care services and the nature of the primary care practices themselves. A balance between external supports and internal motivations for change from practice leaders is required. These findings align with conclusions drawn in a summative evaluation of PCMH pilots in the US which concluded[7]:

- A strong foundation is needed for successful redesign
- The process of transformation can be a long and difficult journey
- Successful approaches to transformation vary
- Visionary leadership and a supportive culture ease the way for change
- Contextual factors are inextricably linked to outcome.

The review also suggests that there is no 'magic bullet' implementation. As one author observes "... *there is no small group of strategies that, if implemented, will improve* [PCMH related] *performance measures...*[this is] *in keeping with other findings in the literature. For example, the extensive scientific literature on guideline implementation seems to be finally abandoning its long search for single change strategies in favor of multifaceted ones*" (p. 453).[6] Therefore, individual primary care practices need to "*assess carefully their own situation and identify those changes and strategies best suited to their situation and context. Perhaps we should all be more humble about our ability to know just what changes are needed in individual clinics and care systems and how others should go about making them.*" The National Demonstration Project evaluation

for the PCMH, concluded: *"developmental pathways to success vary by practice"* (p. S82)[8] and that there needs to be local variations in the development and implementation of the PCMH model.

From a Primary Health Network (PHN) perspective, the review suggests that the key areas in which primary care practices can be supported in transforming to a PCMH include:

- Strategies to support transformation and change management, in particular the general strategies identified in Table 4 above
- Strategies to improve care coordination beyond the practice
- Strategies to support more effective use of health information technologies, both within the practice and within the local health system. A specific area in which PHNs could play a role in assisting with systems that support practices would be in helping practices to undertake population health management activities and risk stratification of their practice population (which could include facilitation of linkage of practice data with hospital data from local health services)
- Development of systems to assist performance measurement and feedback for practices, with a particular focus on reporting back to practices regarding quality measures closely related with the PCMH model.

Applicability

This evidence check was limited to literature from Australia, Canada, NZ, the US and the United Kingdom (UK). These countries were selected due to the applicability of their systems to the Australian healthcare context. However, most of the literature was from the US, particularly relating to Veterans Health Administration, Medicaid and Medicare initiatives. These initiatives are limited to coverage of veterans (of which more than 90% are male), low income populations, and people aged 65 and over respectively. Also, all the countries listed above organise primary care in a different way to Australia, tend to service much larger populations and have different funding/payment mechanisms for primary care from Australia. Therefore, in this rapid review, reference is made to specific contexts where relevant (including practice size), and findings in relation to funding/payment are limited to those that are applicable to the Australian healthcare context (e.g. effects of payment incentives).

It is also important to note that the PCMH has multiple components, some of which may not be present in some models and, when present, organised in different ways. In this evidence check, 'PCMH' was assumed when studies described at least the foundational building blocks of the model as outlined by Bodenheimer et. al.[5] The implementations featured in the studies were also at various phases, some having achieved the full suite of components planned, while others were still implementing. Also, the paths to getting what the studies referred to as full implementation were different for different initiatives.

Conclusion

The PCMH model has the potential to improve quality of care, and enhance the experiences of primary care of patients and staff. However, it requires a major change effort for most practices, involving changes to work roles, processes, and implementation of new technology. There are many potential barriers that can impact the success of implementation. However, lessons have been reported in the literature, many of which can be implemented as strategies to overcome these challenges.

Background

The Sax Institute commissioned Health Policy Analysis to undertake an Evidence Check for COORDINARE (South Eastern NSW Primary Health Network) on the barriers and enablers of implementing a patient centred medical home (PCMH) model of care.

COORDINARE is a Primary Health Network (PHN) with responsibilities for supporting and strengthening general practice and primary health care services in South Eastern NSW, a region that has approximately 600,000 residents. COORDINARE has a vision to achieve a coordinated regional health system which provides exceptional care, promotes healthy choices and supports resilient communities. The organisation is pursuing this vision through supporting primary care services to be comprehensive, person-centred, population oriented, coordinated across all parts of the health system, accessible, safe and high quality.

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The Evidence Check will provide an evidence basis to assist implementation of the PCMH model of care. It will be used to identify the support required by practices in the transition towards a PCMH model, and facilitate discussions on the topic between COORDINARE and stakeholders.

Two questions have been articulated for the review:

1. What barriers or challenges have been identified in the implementation of a PCMH approach?
2. What enablers have been identified that address these barriers and challenges in supporting the implementation of the PCMH?

Methods

Peer review literature

PubMed was searched in August 2017 using the following terms:

pcmh[tiab] OR "medical home" OR "medical homes" OR patient centred medical home*[tiab] OR patient centered medical home*[tiab] OR "health care home*" OR "health home*"

Studies relating to primary care settings and addressing PCMH implementation, or implementation of a combination of specific PCMH elements were selected.

Searches were limited to literature published from 1 January 2013 to 30 June 2017, from Australia, Canada, New Zealand (NZ), the United Kingdom (UK), and the United States (US).

The following were excluded:

- Not an empirical study or literature review (e.g. author's perspective only)
- Not in English
- No abstract available
- Conference paper.

The search was conducted using PubMed with 1,459 titles identified. A further four titles were identified through a grey literature search.

A flowchart of the literature selection process is included as Appendix 1.

Evidence grading

The quality of each study was assessed using criteria described by Janamian et al.[1], which were based on criteria derived from Harden et al.[2], Kmet et al.[3], Pawson et al.[4] (See Appendix B). This yields a score for each title of between one and ten. Of the included titles 26 (15%) were assessed as low quality (score below five), 102 (60%) were assessed as moderate quality (score of five to seven) and 42 (25%) were assessed as high quality (score of eight to ten).

Included studies

Following a review of titles and abstracts, 238 titles were selected for full text review. Following the full text review, 68 titles were excluded based on three criteria (did not relate to a primary care setting, did not address PCMH implementation, not an empirical study or literature review), leaving 170 titles that have been included in the review.

Grey literature

Grey literature was searched using the same search terms as for the peer reviewed literature, using Google. Four relevant reports were found from:

- England — *Primary Care Home: Evaluating a new model of primary care research report*[9]
- NZ — *Evaluation of the New Zealand Health Care Home, 2010-2016*[10]
- US — *Evaluation of Centers for Medicare and Medicaid Services federally qualified health centres advanced primary care practices demonstration*[11, 12]
- US — *Evaluation of the State of Minnesota's Health Care Homes Initiative: evaluation report for years 2010-2014.*[13]

Findings

Q1: What barriers or challenges have been identified in the implementation of a PCMH approach?

Q2: What enablers have been identified that address these barriers and challenges in supporting the implementation of the PCMH?

Due to the close relationship between the two questions put forward for the Evidence Check, the findings for the two questions are presented jointly.

The Evidence Check identified a range of barriers. Enablers were sometimes identified in the same studies that documented the barriers, and sometimes in separate studies. Key barriers, and enablers addressing them, are described below.

Policy context

The policy environment, which includes regulation, reimbursement, labour supply, and/or alignment of incentives at the national, state or local levels, can either provide support for or inhibit practices' motivation to uptake PCMH. In one qualitative study of providers' perceptions of the policy environment and the impact of this on PCMH uptake, the authors identified the following key barriers: misalignment of current reimbursement schemes (i.e. physician payment being tied to procedures and volume of face-to-face patient visits under current reimbursement systems); administrative burden (i.e. proving to payers that components of the PCMH are in place); conflicting criteria for PCMH designation; workforce policy issues; and, uncertainty of health care reform.[14] The authors argue for policies that appropriately incentivise PCMH implementation and sustain it over time.

In a correlational study of characteristics of practices with high PCMH capability, legislation requiring insurers to pay larger payments to practices to increase their PCMH activities was associated with greater capability.[15]

While the policy environment is outside of the control of individual practices, an external coach or facilitator can assist practices considering PCMH implementation to interpret the policy landscape and build a case for change.[16]

In its evaluation of 15 rapid test sites implementing PCMH in England (sites chosen for initial testing of the model), the Nuffield Trust identified supports that can be provided by national policy-makers and the wider National Health Service (NHS) for the implementation of PCMH.[9] These include:

- Recognising that external contexts may help or hinder PCMH formation
- Balancing additional general practice funding for individual practices with investment in resources to support multidisciplinary work
- Investing in an organisational development role in local health economies to support and develop the organisational capabilities needed for large-scale primary care initiatives and the development of the PCMH model to emerge
- Supporting local areas in solving problems with accessing the necessary population health and cost data and integrated information technology. This will provide the infrastructure enabling local health and care economies to identify population health priorities, segment patient populations, develop appropriate integrated services, undertake financial planning and monitor progress against objectives.

Payment arrangements/ incentives

Three fundamental ways in which payment arrangements may impact the implementation of the PCMH were identified within the literature:

- Creating *payment incentives* related to the quality of care delivered (which may operate in addition to base levels of payment). These may be tied to structural features of a practice (e.g. achieving accreditation as a PCMH), quality processes, or quality outcomes (e.g. based on patient reported experiences)
- Changing the fundamental focus of payment from units of service delivery (mostly associated with *fee-for-service payment*) to a patient level (e.g. through a bundled payment or risk-adjusted capitation payment). Bundled/capitation payment is often described as having an inherent effect on incentives in and of itself, providing a focus on the patient and providing flexibility for practices in the way services can be delivered. The shift from a fee-for-service arrangement to a more bundled payment arrangement is also frequently linked with various additional quality related incentives (in addition to the bundled payment). Reform of the fee-for-service system to create items related to patient centred care (e.g. for care planning) is also an option described in some PCMH implementations. Quality related incentives can also operate on top of a fee-for-service system to encourage PCMH implementation
- Explicit coverage of the transitional *costs of implementing the model*. The section that follows provides a discussion of evidence around the costs of implementation. Various implementations of the PCMH have incorporated time limited transitional payments to assist practices in the implementation.

These are described below.

Incentive payments

Several studies have identified funding and payment as major barriers to implementation of the PCMH.[1, 17-21] In many of these instances, lack of resources and reimbursement mechanisms that reward PCMH activities was cited as the main barrier and, correspondingly, payment incentives acted as a facilitator for implementation. For example:

- Payment incentives for PCMH emerged as one of the key facilitators for PCMH implementation in a study of small and medium practices[17]
- In New Orleans, 62% of primary care safety net clinics responded to payment incentives linked to receiving recognition from the National Committee for Quality Assurance as a PCMH[19]
- A correlational study identified that the more types of financial performance incentives that are made available to clinics and providers, the higher the PCMH capability[15]
- In one PCMH implementation, an incentive payment was implemented on top of a fee-for-service payment, in which a large retrospective bonus was paid if annual cost and quality targets were exceeded, including costs associated with emergency department visits and hospitalisations.[22] The intervention also involved information feedback and care coordination support. The program reduced costs by 2.8% per participating member, largely due to lower inpatient care utilisation, emergency care utilisation and prescription drug spending.

However, there are some studies that suggest that practice leaders and/or general practitioners (GPs) are not always swayed by financial incentives and that other factors are more important in motivating PCMH implementation (see section 'Change management').[23]

- An analysis of a representative sample of primary care physicians in the US found that financial incentives were positively correlated with primary care physicians' provision of high-quality care, over and above quality achieved through PCMH implementation. However, it was also found that

productivity-linked financial incentives (i.e. payment for achieving minimum service/coverage, as opposed to incentives for continuous quality improvement) were negatively associated with the ability to provide quality care, but that these negative effects were mitigated by being a PCMH. The authors conclude that "*financial incentives targeted to care quality or content indicators may facilitate rapid transformation of the health system to a primary care-driven system*" (p. 182)[24]

- One study found that for GPs the impact of financial incentives was moderate, due to focus by GPs on clinical activities, with little exposure to administrative and financial matters and/or perceiving finances as someone else's responsibility within the practice[25]

- Another study involving interviews with representatives of 45 successful programs to determine attributes for the effective treatment of high-need, high-cost patients, found that financial incentives for physicians tend to be modest and may represent a relatively small proportion of the physicians' total patients.[26] The authors suggest that "*Instead of dollars, an appeal to the physician's work-life balance is often more effective*" (p. e600).[26]

Move from fee-for-service

Several studies have involved PCMH implementations that have moved away from a fee-for-service system. A study of the Blue Cross Blue Shield of Michigan to designate primary care physician practices as PCMHs found that payment reform was essential in this process. The authors remarked that "*the PCMH program represents incremental payment reform to shift from fee-for-service to 'fee-for-value'*" (p. 852).[21]

In the transformation of primary care in British Columbia, Canada, to operate according to PCMH-principles, a system of "*paying for what one wants and improving patient care*" (p. 45) was implemented.[27] The authors comment that "*Although there are many legitimate criticisms of fee-for-service medicine, the fee schedule is, nevertheless, an excellent incentive mechanism that can be used to shape behavior and track activities*", and was thus used to "*allow GPs to spend more time with their patients and to practice guidelines-based care… to shift the focus of care to a greater emphasis on patient-focused holistic care and healing*" (p. 45).

One study concluded that tying physician payment to procedures and volume of face-to-face patient visits conflicts with PCMH principles, and deters PCMH implementation due to the focus on billable hours.[14] In another study, productivity-based (fee-for-service) compensation was replaced with a salary and bonus scheme.[28] The scheme did not penalise low productivity, but included performance metrics for responsiveness to patient communication (via telephone or secure message). Post intervention, patients in the intervention practice consistently rated indicators of patient-centred care higher than patients in the control practice, particularly in the personal physician and communication domain. In this domain, intervention patients reported superior provider explanations, time spent, provider concern and follow-up, whereas control group ratings fell during the same period. The researchers conclude that "*practices interested in transforming toward a medical home model may want to consider physician payment reform in the early phases of implementation in order to potentially enhance patients' relationships with their provider*" (p. 32).[28]

One study set out to describe the primary care clinic experience with a new payment method under trial in the Washington State Multi-Payer Medical Home Reimbursement Pilot.[29] In this payment approach, health insurers added an up-front per member per month payment to support PCMH clinics' efforts to reduce avoidable emergency department and hospital utilisation during a 32-month period. The study found that the incremental changes to the fee-for-service payments for a limited number of patients was inadequate to change outcomes for a larger population.

A similar outcome was found in the three-year demonstration project to transform federally qualified health centres into advanced primary care practices in support of US Medicare beneficiaries.[12] The care

management fee payments that a practice received for participation in the demonstration ($18[a] per quarter for each eligible Medicare beneficiary, an average of approximately $6,500 for each site each quarter), were insufficient to make up for the costs of transforming to a PCMH given that Medicare beneficiaries only represented a small number of practices' populations. Practices also received a range of additional financial and infrastructure support to cover the cost of applying for formal recognition as a PCMH, and some start-up funds from the Health Resources and Services Administration (a federal agency providing financial support to health care providers) to cover the costs associated with transforming into a PCMH. The evaluation also found that those sites receiving incentive payments from one or more health plans beyond the demonstration were more likely to be more active in using resources provided through the demonstration (such as uptake of training).[11, 12]

Implementation costs

Whether payment incentives are a barrier or facilitator to PCMH transformation, practices face costs in implementing the model. These costs may be transitional or reflect an ongoing increase in costs of primary care delivery.

One study set out to estimate these costs.[30] The researchers interviewed practice leaders from 12 practices in a state wide medical home pilot project in Pennsylvania to determine what changes a practice needs to undergo to achieve this transformation and then used activity based costing to estimate the costs of the additional personnel and other requirements. They found that practices incurred median one-time transformation-associated costs of $30,991[a] per practice, equivalent to $9,814 per clinician and $8 per patient. Median ongoing yearly costs associated with transformation were $147,573 per practice, equivalent to $64,768 per clinician and $30 per patient. Care management activities accounted for over 60% of practices' transformation costs. Per clinician and per patient transformation costs were greater for small and independent practices than for large and system-affiliated practices. Specific one-time activities included setting up and verifying the accuracy of patient registries, training employees to use quality reporting systems, preparing internal policies and procedures for medical home transformation, and completing medical home recognition applications.

Another study estimated the costs involved in a practice's successful application for PCMH recognition.[31] Focusing on four practices in North Carolina (three paediatric and one family medicine practice) that received level 3 recognition from the National Committee for Quality Assurance in 2011, the researchers conducted two to three-hour interviews with clinical, informatics and administrative staff to determine the time required to develop, implement and maintain required activities. They categorised costs as non-personnel, developmental, those used to implement activities, those used to maintain activities, those to document the work and consultant costs. To estimate costs, they converted time estimates from minutes to hours and multiplied these estimates by 2012 mean US hourly salaries. Only incremental costs were included and are presented as costs per full-time equivalent (FTE) provider. In practices that varied in size from 2.5 to 10.5 FTE providers, and with payer mixes that ranged from 7% to 43% Medicaid, they found that the costs of successful applications were very similar, ranging from $11,453 to $15,977[a] per FTE provider. One cost driver that was consistent across all practices was creating screenshots to document the practice's compliance with a specific element of PCMH. Interviewees from all four practices reported that each screen shot took between 15 and 30 minutes to complete and each practice created anywhere from 78 to just over 100 of these documents. The researchers note that work involving enhancement of care coordination and to close loops was highly valued in terms of costs, and that financial incentives were key motivators. They suggest that future efforts to minimise the burden of low-value activities could benefit practices.

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[a] All costs are in US dollars (USD).

Recognising the additional costs of setting up a PCMH, rapid test sites implementing PCMH in England channelled additional resources into transformation. The amounts were upwards of £40,000, some in staff time.[9] In the Minnesota Health Care Homes Initiative, sites received care coordination payments to help clinics cover the costs associated with becoming certified, such as recruiting care coordinators or strengthening electronic medical records (EMRs).[13]

There are also costs of sustaining PCMH functions. In the Minnesota Health Care Homes Initiative, less than half (40%) of survey respondents reported cost increases related to operating a PCMH model.[13] Where they did, increased costs appeared to be primarily related to increased staff and billing expenses. Researchers in one study developed a 'PCMH cost dimensions tool' and, guided by the tool, interviewed practice managers, nurse supervisors and medical directors in 20 primary care practices to measure costs uniquely required to maintain the functions of a PCMH.[32] They found that costs per full-time equivalent primary care clinician associated with PCMH functions varied across practices with an average of $7,691[b] per month in Utah practices and $9,658 in Colorado practices. PCMH incremental costs per encounter were $32.71 in Utah and $36.68 in Colorado. The average estimated cost per member per month for an assumed panel of 2,000 patients was $3.85 in Utah and $4.83 in Colorado. The authors suggest that their research provides a basis for pay reform and for sustained practice transformation, and argue that "*adequate compensation for ongoing and substantial incremental costs is critical for practices to sustain PCMH functions*" (p. 429).[32] Another study comments that: "*Implementing PCMH capabilities presents a considerable challenge for many primary care practices, with significant investment of time and expense. Requiring primary care practices to shoulder this investment alone may severely limit PCMH implementation. Payers, purchasers, and providers should consider methods for sharing cost savings derived from PCMH implementation to provide further incentives to support ongoing efforts to implement the PCMH model.*" (p. 70)[33]

Change management

Transitioning to a PCMH model requires major change that is not just a matter of improving processes but making fundamental changes to the organisation and delivery of care.[1, 34]

Sequencing change

In a study to develop an evidence-based curriculum for coaches to assist practices in transforming to a PCMH, sequencing of changes was found to be important.[16] The sequence advocated by practice leaders and coaches interviewed was as follows:

1. Laying the foundation: engaged leadership and quality-improvement strategy
2. Building relationships: empanelment and continuous, team-based healing relationships
3. Changing care delivery: organised, evidence-based care and patient-centred interactions
4. Reducing barriers to care: enhanced access and care coordination.

The importance of sequencing the change process has also been emphasised elsewhere.[23, 35] Quality improvement strategies have been identified as a foundational step by other studies, with prior experience in such strategies being identified as a key facilitator for PCMH implementation (and a barrier where practices do not have this).[11, 12, 20]

In a paper describing the processes and findings of a three-year demonstration project implementing population health management and the PCMH model in three community health centres in California, lessons for successful transition identified were[36]:

- Involve the leadership of the broader organisation at an early stage in the transformation process and keep them engaged

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[b] All costs are in US dollars (USD).

- Expect setbacks and the need to revise and adjust plans and processes in the path towards PCMH adoption
- Offer ongoing training and technical assistance based on individual and collective needs
- Ensure that every person in the clinic, including those who hold leadership positions, receives adequate training on the PCMH model.

The Nuffield Trust recommends the following points for implementing PCMH, following an evaluation of 15 sites chosen for initial testing of the PCMH model in England[9]:

- Be clear about your 'theory of change'. Each initiative should be underpinned by an explanation of how the planned changes will lead to the outcomes that the initiative is striving for. The theory should in turn be based on published evidence and local knowledge
- Communicate the PCMH vision. Initiatives should be clearly linked with how they will address local needs, and benefit patients and staff
- Ensure local initiatives are aligned to the aims of the PCMH model. Initiatives should have local support but also align to the PCMH model
- Support iterative development. Use tools such as action research and plan-do-study-act cycles to learn quickly and adapt interventions accordingly
- Ensure PCMH planning and evaluation develop hand in hand. Build in evaluation at the implementation stage, to ensure that suitable data is available, and that there is capacity to extract and analyse it
- Involve patients and the community, including explicit involvement of patients and their representatives in feedback and decision making
- Develop robust governance arrangements to assist the organisation and its partnerships as the PCMH model matures
- Begin to build knowledge and capability to align clinical and financial drivers. Develop systems to monitor resource use and track outputs and outcomes.

As reflected in the fifth dot point above, the Nuffield Trust stressed the importance of evaluation and identified a series of learnings in relation to this. These included: linking local indicators to the aims of PCMH; identifying appropriate data to capture progress; choosing an appropriate baseline; ensuring that observed changes are not due to chance; using statistical power calculations to find out how easy it is to spot a change that has occurred (i.e. ensuring that the sample size is sufficient for a measure); thinking about whether changes in outcomes can be attributed to the intervention; and, ensuring appropriate analytical resources are available.

The authors of the evaluation of the implementation of the PCMH model amongst Pinnacle Midlands Health Network (PMHN) practices in NZ noted that "*Implementation of the* [PCMH] *model is a journey rather than a point in time transition*" (p. 29).[10]

Motivation for change

Getting started is a key step, and for this, practices need motivation to change. This may come from within, or be stimulated by external factors/incentives.[23] Altruistic factors[37], community recognition[38], peer pressure[38], the opportunity to improve the quality of care for patients (including patients' experience of care, sometimes focusing on a specific group such as high-need, high-cost or frail elderly patients, and sometimes with a focus on reduced hospitalisation and/or emergency department attendances),[9, 10, 12, 18, 37, 39-41] improved staff experience (including through developing new workforce skills),[9, 18] recognition (e.g. by an external accrediting agency),[12, 37] ageing workforce and/or predicted shortages of GPs,[10] cost reduction/ continuing to be competitive economically and thus sustainable,[9, 40, 41] additional payment[12, 38] and/or access

to supports (such as training, learning collaboratives, and practice coaches),[12, 37] have been cited as factors motivating practices to adopt PCMH models of care.

Whether motivation to change is internal or external, decision-makers within the practice need to understand what is involved and what the expected benefits are.[16] Field trips have been found to be particularly helpful for practices getting started (in one study, they were described as a 'turning point' for some sites when they were able to see the 'PCMH in action').[42] Practice facilitation/coaching[34] and learning collaboratives are also enablers.[34, 42, 43] Although, practice facilitation needs to be of a sufficient length to produce sustained comprehensive change (e.g. one study found 18 months to be more effective than six).[34]

In addition to understanding the perspectives of patients, understanding key concerns or challenges that leaders have in implementing PCMH is important to the rollout of PCMH within a specific environment. For example, in a study of primary care leaders in the US Veterans Health Administration, at least one challenge from each PCMH-related domain was included in the top 20 challenges identified.[44]

A three-year project to transform federally qualified health centres into advanced primary care practices in support of US Medicare beneficiaries warns of multiple competing priorities for sites implementing PCMH.[11] The range of activities meant that sites had a limited ability to focus sufficient attention on the PCMH demonstration.

Assessing readiness

An assessment of PCMH readiness is important.[12, 16] It assists in gauging where a practice is at in terms of organisation stability, and willingness and ability to change. It also assists in measuring the practice's progress towards implementing specific components of the PCMH model. For example, an assessment of 'structural' capabilities (such as having technology that can assist PCMH functions and the level of non-medical staff assisting with patient care), and organisational/process capabilities that are foundational to PCMH (such as leadership and teamwork), can help to determine the work required for the practice to transform to a PCMH care model. In a study of PCMH practices that achieved the greatest performance on patient clinical measures over an 18-month period, the highest-performing practices tended to have greater structural capabilities at baseline (e.g. electronic medical records) than the poorest-performing practices.[45] They also reported a stronger sense of working in a team, and appeared to have better processes for monitoring progress and obtaining feedback.

There are tools that can be used to measure structural and organisational capabilities of a practice. One tool is the Patient-Centered Medical Home Assessment (PCMH-A). This has been found to have face and construct validity, and to be sensitive to change over time, thereby providing an accurate reflection of a practice's transformation.[46] The tool has been modelled on the change concepts for practice transformation developed for the Safety Net Medical Home Initiative, which include: empanelment; continuous and team-based healing relationships; patient-centred interaction; engaged leadership; quality improvement strategy; enhanced access; care coordination; and, organised, evidence-based care.

Another is a tool developed for the Patient-Centered Primary Care Home Program (PCPCH) in Oregon.[47] Building on a scoring method developed by the lead researcher in an earlier project, the research team developed an attribute-based scoring method drawing on the practices' recognition applications and using the following six core attributes of the PCPCH program: access to care; accountability; comprehensive whole-person care; continuity; coordination and integration; and, person- and family-centred care. The attribute-based scoring method was pilot-tested in early 2014 with a sample of 30 recognised PCPCH practices. Initial results demonstrated that the scores are effective for reporting performance to key program stakeholders, enabling stakeholders to compare results across similar practices and across the model's core attributes. On an ongoing basis, regular team discussion and action around progress is important.[16]

Different structural aspects of organisations enable or constrain a practice's ability to adopt and implement different components of the PCMH model. A longitudinal study set out to document practices' PCMH capacity — defined as the ability to offer a service identified as a component part of the PCMH — across 12 different domains (e.g. extended access, specialist referral, use of patient registry).[48] The purpose of the study, which extended over a 26-month period (October 2008 to December 2010), was to shed light on whether practices found certain aspects of the PCMH easier or more difficult to implement. The study also examined the degree to which variation in PCMH capacity is due to differences between practices (e.g. size). Data was collected using an electronic survey of 831 practices belonging to a consortium of practices in Michigan. The findings suggested differences in the baseline level and growth of PCMH capabilities for the different domains over the study period, with practices having the most success at implementing capabilities related to test tracking and follow up, extended access, and preventive services. Less change was found for technology-based domains (e.g. patient portal, patient registry, performance reporting). The study found high levels of variation in PCMH capacity between practices.

One study examined the association between primary care providers' perceptions of 'organisational climate' and PCMH implementation in the US Veterans Health Administration.[49] By 'organisational climate' the authors mean "*the social context which links and mediates organizational characteristics to the attitudes and behaviors of an organization*" (p. 309). Using data from a 2010 survey administered to all primary care providers within a regional Veterans Health Administration network, the researchers analysed 191 primary care providers by looking at provider perceptions of four elements of organisational climate at the start of the PCMH implementation to see if they predicted successful PCMH implementation over the subsequent two years. They found that higher scores in two domains of organisational climate, communication/ cooperation and orientation to quality improvement, were associated with a higher percentage of primary care providers implementing structural changes to support the PCMH. They also found that a better organisational climate was associated with improved organisational processes of care (e.g. a higher percentage of patients contacted within two days of hospital discharge and appointments made within three days of a patient request).

Supports for change

One study sought to identify the resources most desired by primary care practices seeking to implement PCMH, and the support and assistance that might be offered by the primary care extension service (PCES).[50] PCES is an initiative under the Affordable Care Act 2010 authorising the Agency for Healthcare Research and Quality (AHRQ) to use community-based health extension agents to provide support and assistance to primary care providers through education and disseminating innovations. The researchers in this study administered a 70-question survey to 556 primary care providers in Pennsylvania. The most desired services were (1) identifying and coordinating mental health services, (2) improving office efficiency, (3) increasing overall revenues and (4) strategies to help implement evidence-based clinical guidelines. The least desired services included (1) implementing e-prescribing, (2) implementing an electronic medical record system, (3) implementing group visits, (4) recruiting new patients and (5) implementing open or advanced access scheduling. The researchers see the results as helpful in guiding further development of the PCES in responding to the needs of the primary care community, particularly in terms of behavioural health coordination, practice management and quality improvement services.

Piloting

In a case study of the Greater New Orleans healthcare system following Hurricane Katrina, the authors describe that in implementing chronic care management health information technology-enabled evidence-based interventions, most practices found it overwhelming to implement new interventions that required changes in workflow.[38] Practices that were willing to pilot the interventions did so first up with further practices coming on board at approximately six-month intervals. Practices were allowed to adapt systems to

fit in with local operations which reduced the impact on workflow and potential resistance from staff. Establishment of a governance group that engendered trust between the various partner organisations impacted by the changes was also a key factor in transforming the healthcare system.

Piloting initiatives prior to implementing them more widely has also been found to be helpful by others, as has flexibility to modify an initiative to suit the local environment.[16] In one paper, researchers specifically studied adaptations used by practices to fit their local contexts when transforming to the PCMH model.[51] They analysed interviews conducted with 27 practices and further data were collected using a separate assessment tool, the PCMH Practice Monitor. They found that practices most commonly focused on the development and use of disease registries and enhancements to team-based care, and that adaptations were common; most often involving pragmatic changes to format or personnel. The most common reason for making an adaptation was to improve effectiveness and implementation. Most of the adaptations took place in the early or middle stages of the implementation program.

PCMH transformation vs. recognition

It is important to emphasise the difference between the change process required for transformation to a PCMH model versus recognition as a PCMH practice (such as for accreditation purposes). One study found that amongst practices aiming to achieve recognition as a PCMH, some "*may have gone through the motions of documentation but did not plan on operating any differently*" (p. 29).[52] The report of the three-year demonstration project to transform federally qualified health centres into advanced primary care practices in support of US Medicare beneficiaries also talks about 'unintended consequences' of the PCMH recognition process.[11] These were that practices became consumed by the recognition process rather than making true transformative change. The final evaluation report noted that "*Achieving PCMH recognition, though critical, did not represent the end of a site's transformation into a medical home*" (p. xiv).[12] However, in another study of a medical group that initially had formal recognition as a PCMH and then let it lapse after three years, it was found that "*transformation and recognition followed separate and parallel tracks. The group committed to patient-centered principles before PCMH became popular, and that commitment persisted after recognition lapsed*" (p. S17).[40]

Therefore, practices need to assess their needs and goals prior to entering into arrangements, such as education, to help them achieve PCMH status. Much more comprehensive supports are required for practices undergoing transformation than those seeking acknowledgment for the way that they already largely operate. Also, in some instances, the process of recognition as a PCMH may take resources away from transformation, and thus resources need to be understood upfront.[35] Despite these issues, undergoing PCMH recognition at the same time as transformation may be a catalyst for more substantial changes for some practices.[37]

In a paper reporting on the Blue Cross Blue Shield of Michigan (BCBSM) to designate primary care practices as PCMHs, the authors draw out what is perceived to be a narrow focus of accreditation programs. This is that they tend to focus on specific capabilities of practices, and not on outcomes, which are usually reserved for program evaluations.[21] BCBSM took an alternate approach. To be designated as a PCMH, in addition to implementing PCMH-related capabilities, practices' performance on quality and utilisation measures during the past year was considered. Therefore, these outcome measures became inputs to designation, taken as a signal of a practice's commitment to improving patients' experiences of care. The other unique approach by BCBSM was that a specific score was not required by practices for designation as a PCMH. Instead, the top portion of the continuum of capability and outcome metrics amongst practices represented an achievable level of performance. This means that practices could not remain stagnant. As other practices implemented PCMH capabilities, practices had to continually improve to maintain their designation.

Nevertheless, PCMH recognition programs tend not to be aligned with the degree of change that practices undergo. One study aimed to identify the chief structural changes a practice must undergo in the process of

transformation to a PCMH.[53] They conducted an initial survey of 81 participating practices, with a follow-up survey carried out three years later. The researchers measured associations between observed structural changes and structural capabilities, and National Committee for Quality Assurance medical home recognition levels to determine distinct classes of structural transformation, of which there were four: practices that underwent minimal transformation (27%); those that underwent 'provider-facing' transformation (adopting electronic health records, patient registries, and care reminders; 20%); those that underwent 'patient-facing' transformation (such as adopting shared systems for communicating with patients and the use of care managers; 27%); and those that underwent 'broad' transformation (26%). They found no association between National Committee for Quality Assurance recognition levels and changes in structural capability scores.

Most studies documenting transformation of practices tend to focus on what one author has termed 'hard' PCMH implementation practices, differentiating them from 'soft' practices.[54] These 'taxonomies' were identified using a multicase, comparative study that relied on 'sensemaking' of primary care staff delivering PCMH. 'Hard' practices tend to be more standardised in their execution by staff (and are therefore more reproducible across settings and staff) and are more clearly measurable or assessed. They also tend to be acknowledged by external stakeholders (such as accrediting bodies) and are usually found within formal policies or routines. 'Soft' practices involve relational aspects of care (e.g. between staff and patients), that are less easily measured or assessed (e.g. quantified). They tend to be hidden from view because they are embedded within the practice's social structure and produce intangible benefits that are best understood by those delivering the care. The author points out that it is hard practices that are recognised and encouraged (including through payment incentives) in PCMH implementation. However, it is the softer practices that are "*critical to not just effective* [PCMH] *care but also good primary care generally*" (p. 803).[54] It is recommended that PCMH recognition programs and reward systems include implementation practices that contain heavy social and relational components of care and that the importance of these components not be overlooked in any local implementation of PCMH.

Staff buy-in

Achieving buy-in from staff is a major challenge for transformation to a PCMH. This is illustrated by a qualitative study analysing interviews with personnel from 20 medical practices in a mid-Atlantic state in the US in an attempt to establish "*internal messages of buy-in as communicated by practices transitioning to* [the PCMH model] *of care*" (p. 1).[55] The study identified a number of communication strategies with a positive effect on buy-in under three themes:

- Effective communication and feedback. This was underpinned by the following:
  - Open and consistent communication amongst staff, with inclusive leadership that promoted conversation and reflection and encouraged different practice members to speak up, thus facilitating an exchange of ideas
  - Answering the 'what,' 'how,' and 'why' questions of PCMH allowed staff to learn about the benefits of adoption of the model
  - Emphasising varying work rather than harder work; properly preparing staff for the new ways of working was essential for buy-in
- Implementation of reinforcement techniques. For example, positive efforts by team members were noted and commended, and public displays of outcomes were used to promote positive competition amongst staff
- The use of a change implementer (PCMH 'champion' or leader). Having a PCMH champion to interact with increased buy-in. It was also necessary for practice leaders to communicate transformation transparently and in a realistic way (such as the requirements for implementing new technology).

In a similar study on buy-in, researchers conducted semi-structured interviews with 136 individuals and seven focus groups involving 48 individuals in 20 small to medium-sized medical practices in Pennsylvania during the first regional rollout of a state-wide PCMH initiative.[56] They identified 13 distinct strategies for obtaining buy-in that reflected three broader themes that they summarise as:

- Effective communication and internal campaigning for PCMH. This was similar to that reported in the study cited above and included frequent meetings, communicating to staff how their input was used (and why, when it wasn't), educating staff about PCMH (especially the 'why', not just what it is or how to achieve it), providing feedback, using data and using a change champion
- Effective resource utilisation, such as appropriately managing and organising staff, securing sufficient funding for PCMH changes, and participating in learning collaboratives
- Creation of a team environment, including seeking everyone's input and respecting their input, and fostering a culture of creativity and innovation.

The researchers note that "*Whether through e-mails, bulletins, newsletters, or informal discussions, participants agreed on the importance of integrating the language of PCMH values into everyday communication, as other studies have found*" (p. 43).[56]

The three-year demonstration project to transform federally qualified health centres into advanced primary care practices in support of US Medicare beneficiaries also reported buy-in of staff as a common challenge.[11, 12] Buy-in was addressed through involving all staff in change processes. However, it was noted that "*In one practice, they reported that the 'full turnover of all practice staff except the physicians was needed to change the culture and allow for the changes necessary to become a PCMH'*" (p. 35).[11]

Incorporating patient perspectives

Understanding patient perspective is also critical to help inform and promote patients' participation in the PCMH. One study used a community based participatory research approach to do this.[57] The researchers conducted a 'boot-camp translation' ("*a process to translate evidence-based medical research into locally relevant, patient-friendly concepts and language*" (p. 125)), to address two main questions:

1. What is the message to our community? (or, What health-related information does our community need to hear?); and
2. How do we effectively share that information with our community?

The consultation with community members involved an initial 'kick-off' meeting, comprehensive education about the PCMH from a local expert (including the forces driving PCMH program development and policies, the model's components and the intended impact on patient care), a facilitated problem-solving session with community advisory council members to begin the process for developing messages that would make the PCMH model more accessible and meaningful for patients and members in their communities. This was then followed by conference calls over the next three months to further develop the key messages. However, members struggled, and instead, an 'appreciative inquiry' was undertaken into the meaning of 'patient centred', whereby members were asked to reflect on interactions that they or their friends/families had that represented the positive ideas they had heard about the PCMH model. The stories were shared with each other and transcribed. Elements were pulled from the stories as the key messages for the community about PCMH. Fundamentally, for community members, the PCMH was about the relationship between the patient and their physician, and thus, what was important about the PCMH was how it helped enhance this relationship. Ideal patient experiences of the model were ones where:

- The physician knows the patient's social situations that may be affecting their health
- The physician knows the whole family
- The model emphasises coordination and a team-based approach to patients' care
- The model leads to efficient and evidence-based medicine

- The model is concerned with patient education and patients' role in the management of their condition.

The researchers conclude that: *"Simply translating the current PCMH components into more common language was insufficient. The need for different messages about the PCMH for patients and providers became clear – for example, although the PCMH components of physician-directed medical practice, team care, quality and safety were considered vital, community members felt that they should exist behind the scenes and should not be an explicit part of the patient experience. These components should be in service to the most essential element of the PCMH – the relationship between the patient and their provider."* (p. 127).[57]

The need for non-technical language in promoting the PCMH model is reiterated by an evaluation undertaken by the Nuffield Trust of rapid test sites implementing it in England. The researchers point out that *"staff and patients were more easily engaged by describing anticipated benefits of individual interventions than by describing the end vision of a* [PCMH] *itself"* (p. 8).[9]

Patient involvement and input generally has been found to be an enabler of PCMH implementation.[20] Amongst the positive effects of involving patients is increased job satisfaction for practice staff, which increases their trust in the process, and is thus more likely to lead to further positive changes. One study investigating the implementation of a PCMH model in a nurse-led primary care practice found a primary facilitator to be patients' role in their care.[58] This included one-to-one face time between the patient and the care team member to encourage the patient to take an active role in their health, using outcome reports to show patients where they had made improvements (where there was potential for further improvement), and establishing horizontal responsibility within the practice. That is, *"everyone from the front to the back of the clinic feel*[ing] *as though their role was vital to the overall functioning of the practice and patient care experience"* (p. 36).[58]

However, involving patients does not come easy to many practices. This was found in a study investigating the extent to which PCMH practices directly involve patients and families in care improvement.[59] The researchers argue that *"a cultural shift is needed in how practices view patients as partners, not just in areas such as personal responsibility and self-management, but also in quality improvement and governance"* (p. 368).[59] They urge practices to seek to gain more experience and see more examples of the benefits of engaging patients, and that this may require more incentives and support for patient engagement. The researchers found that most patient and family involvement was through surveys. Many practices also obtained qualitative input from patients through interviews, group meetings, patient 'walkthroughs' or by requesting input in writing. Suggestion boxes or other ad hoc methods of gathering input were used by many practices. Only 32% formally involved patients in ongoing teams or councils, including quality improvement teams and patient and family advisory groups. Overall, 29% had high patient involvement as evidenced by the use of patient surveys and patient advisers. Practices serving low-income people were more likely than others to use both surveys and patient advisers. The researchers found that practices that value patient involvement highly find ways of overcoming barriers to ongoing patient participation.

Leadership

Engaged, visible leaders are crucial to achieving the scale of change required of practices moving to a PCMH. Since the literature has predominantly reported instances of successful PCMH transformation, extensive examples of strong leadership have been given:

- In a successful implementation of the Diabetes Care Collaborative Model (based on Wagner's Chronic Care Model) in a PCMH setting (achieving a >1% reduction in the proportion of the population of patients with HbA1c >9% over a two-year period), leadership at all levels was identified as a key success factor[60]

- A study of the barriers and facilitators to establishing high functioning teams in the PCMH transformation process found *"strong leadership and change management at the clinic level were critical to promoting team-based care"* (p. 128)[61]
- In a qualitative study of practices successful at transforming to a PCMH, leadership was a key common factor.[23] Internal factors such as wanting to raise the practice's quality of care or stabilise the organisation motivated the leaders to adopt PCMH
- A description and critique of the education efforts of primary care practices aiming to achieve the highest-level recognition as a PCMH (Level 3) by the National Committee for Quality Assurance in the US, found that the practices that consistently engaged physician leaders were more likely to achieve PCMH recognition than practices lacking such leadership support[52]
- A formative evaluation of PCMH implementation among 22 newly formed teams working in the US Veterans Health Administration found skilled leadership was critical to keep focus on the transformation process[62]
- Using a positive deviance approach to investigate better ways of treating diabetes care, one study examined the care models in 25 primary care practices in Pennsylvania.[45] They ranked the practices on the basis of average absolute percentage point improvement from baseline to 18 months using three registry-based measures of performance in diabetes care: glycated haemoglobin concentration, blood pressure and low-density lipoprotein cholesterol level. They then conducted surveys and interviews with leaders and staff at the five best-performing and five worst-performing practices to see which differences in treatment approaches at these practices might account for the differences in their treatment outcomes. The interviews revealed striking differences between the groups in terms of leadership styles and shared vision: "*Leaders in the higher-performing practices were described as better able to communicate a vision of the medical home with the goal of getting practice-wide buy-in*" (p. S104).

Many other studies identify the commitment of practice leadership and, in some instances, the stability of leadership as key ingredients for successful change.[6, 11, 12, 20, 26, 35, 63-65] Common amongst all examples is that PCMH requires leadership at all levels of an organisation/practice. Leadership 'at the top' only is insufficient to drive or sustain change. Some studies differentiated between leadership at an organisational level from that at a practice level, that is, where a practice is part of a larger organisation. Both are important, but may be enabling in different ways. For example, the Nuffield Trust's evaluation of rapid test sites implementing PCMH models in England observed that clinical commissioning group-ed (CCG)[c] initiatives were better resourced (e.g. access to data, allocation of staff and other resources), while practices that led their own initiatives could make decisions more quickly.[9]

In addition, leaders who have the 'power of the purse strings' can facilitate PCMH implementation by directing resources towards change efforts, including protecting the time of key roles driving implementation.[20]

Some studies identify specific types of leadership. Using an ethnographic approach, one study described emergent leadership themes in an implementation of PCMH in amongst the state's safety net primary care clinics in Oregon.[66] The study distinguishes between three types of engaged leadership skills — modelling, facilitative, and adaptive — which it found were useful at different points of implementation: "*Facilitative and modeling aspects of engaged leadership were most important for code signing a vision and plan for change. Adaptive leadership skills became more important during the implementation phase, when specific*

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[c] Clinically-led groups that include all the GP groups in their geographical area responsible for commissioning services for their patients and population.

operational and management skills were needed to foster standardization and spread of the … initiative throughout participating clinics." (p. S34)[66]

The authors conclude that: "*Reflecting on the … initiative, it may be a mistake to approach primary care transformation as an essentially technical task… a stepwise approach that cultivates facilitative and modelling aspects of leadership before technical expertise may be a scalable model for dissemination of the medical home.*" (p. S40)[66]

Similarly, a study of PCMH practices that achieved the greatest performance on patient clinical measures over an 18-month period found that the characteristics that distinguished these practices from those with the lowest performance related to 'facilitative leadership'. This was defined as the "*ability to inspire employees to look beyond self-interest and focus on organizational goals and improved performance*" (p. S106).[45] Facilitative leadership may be aided by the lead implementer "*view*[ing] *his or her self as enabling the organization to achieve its own objectives*" (p. 25).[55]

Another study calls for 'meta-leadership' skills in leaders of PCMHs operating in a medical neighbourhood, asserting that "*Leading the development of medical neighborhoods is very different from leading self-contained units*" (p. 111).[67] The authors borrow the definition of meta-leadership from another source: "*an overarching leadership that intentionally connects the purposes and work of different organizations or organizational units*" (p.128).[68]

One study described primary care quality councils which were introduced at six Veterans Health Administration sites as an organisational intervention to facilitate the development of PCMHs according to Patient Aligned Care Team principles.[69] The researchers defined a 'quality council' as "*a structure that fosters employee participation and clearly defines the leadership roles needed to evaluate and implement improved processes*" (p. 2).[69] The researchers analysed data from 105 key stakeholder interviews and reviewed administrative records. They found all the quality councils implemented interdisciplinary leadership and a structured quality improvement process, and all but one completed at least one quality improvement project. Quality councils were perceived as most effective when service line leaders had well-functioning interdisciplinary communication. Two key resources were (a) a dedicated internal facilitator with project management, data collection and presentation skills, and (b), support for preparing customized data reports for identifying and addressing practice level quality issues. The researchers concluded that quality councils successfully cultivated primary care quality improvement. Barriers that emerged were lack of information about resources, support and training, and lack of interdisciplinary leadership engagement. Facilitators were the availability of data for quality improvement and a stable and a well-functioning primary care interdisciplinary leadership group.

Culture

The magnitude of change demanded by transformation to a PCMH cannot be achieved without a corresponding change in culture.[17, 70] As one paper describing a specific instance of implementation of a PCMH puts it, the model "*require*[s] *providers to sacrifice their autonomy, integrate with other health care professionals, and leverage both health technology and up-to-date clinical evidence*" (p. 150).[41]

Alignment between a practice's own 'mission' and the goals of a PCMH implementation can assist a smoother transition to a PCMH.[20] Changes in practice culture and mental models necessary for PCMH transformation identified by one study include[70]:

- Shifting practice perspectives towards proactive, population-oriented care based in practice–patient partnerships
- Creating a culture of self-examination
- Developing new roles within the practice through distribution of responsibilities and team-based care.

Cultural values that align with the PCMH mission include high-quality care — which is often equated with patient-centred care — and innovation.[20] Barriers include resistance to cultural change, such as "*physicians who think, 'I'm already doing* [care coordination] *for my patients'*" (p. 902) and thus oppose the role of care coordinators.[20]

In addition to practice culture, one paper recommends that occupation-specific subcultures also be understood and addressed in PCMH implementation.[41] For practices that are part of a larger organisation, the overall organisational culture is also important.

A study of practices that transformed to a PCMH model suggested that those "*that made the greatest changes in their systems were those that paid a lot of attention to the change process, especially regarding their culture and patient-centeredness*" (p. 453).[6]

The 'adaptive reserve' of practices is identified by several studies as a factor impacting their capacity to engage in transformative change.[10, 12, 71, 72] Training and support are offered as methods to increase the adaptive reserve of practices and achieve successful change in roles and mental models associated with transforming to a PCMH model.[70]

However, one study suggests culture may be less important than traditional continuous quality improvement interventions in effecting patient clinical outcomes. This study (a cluster-randomised trial) compared three approaches for implementing Wagner's Chronic Care Model amongst PCMH practices to improve diabetes care.[34] The model that focussed on improving practice culture had significantly less improvement in diabetes measures than the models focussing on more traditional continuous quality improvement (i.e. using a series of incremental plan-do-study-act cycles focused on quality measures to implement practice improvements).

Teamwork

Teamwork is one of the key attributes of the PCMH model. In the PCMH model, care of patients is shared amongst team members, each working at their highest skill levels.[73] A key benefit of teamwork is that it results in better use of a GP's time, which is a key constraint on improving access to care for patients. One of the advantages of a team approach is the capacity to undertake lateral and downward delegation of work with the aim of reducing the time clinical staff are performing tasks that could be effectively undertaken by someone with less clinical training, freeing more clinical staff time for complex patient care work.[65, 74]

The PCMH is a move away from profession-specific 'silos' to interprofessional, team-based care. In particular, it shifts clinical responsibility for patients' care from the physician to other team members.[75, 76] These other team members increasingly include nurse practitioners[77] and a range of unlicensed roles such as medical assistants.[77]

High-functioning teams are ones in which "*members who hold shared goals and shared knowledge and demonstrate mutual respect plus demonstrate high-quality communication that is timely, frequent, accurate, and focused on problem-solving*" (p. 126).[61]

Barriers to the development of efficient and effective teams include:

- Lack of buy-in/ ownership from all members of the team around common goals for patient care[62, 78, 79]
- Lack of intentional focus on team building, including lack of understanding about how team members work together in the new PCMH model[61]
- Standardised work flows which may not allow room for the use of individual staff members' experience, knowledge, and problem-solving skills, thereby limiting participation in the care team[61, 62]
- Time constraints impacting regular team/ teamlet meetings (including conflicting team member schedules, limited time, lack of protected time and no unscheduled time available in the clinician schedules)[80]

- The structure of teams and teamlets. Structure may impact 'cross-coverage'. For example, in situations where a team member may be involved in multiple teams/ teamlets they may not always be available to the team. Another coverage issues occurs where a team/ teamlet is not available when a patient assigned to the team attends or requires services[80]
- Poor quality communication within teams and teamlets[80]
- An absence of clear roles and responsibilities for team members.[58, 80-82] This can lead to inadequate division of labour (e.g. physician reluctance to delegate)[78] and some team members not accepting work delegated to them by other team members[82]
- Insufficient data for implementing goals[61, 62]; measures may not be meaningful to clinicians' everyday work, or have a negative effect on staff (e.g. perception that they will 'get into trouble' for not meeting goals)[61]
- Staffing issues, such as availability of staff (due to high turnover), and a large proportion of part-time staff making achievement of desired mix of staff and dissemination of information on the PCMH principles difficult.[83]

The following were identified as facilitators for teamwork[61]:

- Leadership[61, 62, 78, 80, 84]
- Creation of a supportive culture[74, 78]
- Engaging staff in making changes[78]
- Engaging patients in goal identification and achievement[78]
- Change management, including coaching for team development[61, 62, 78, 82]
- Physical colocation of team members which can enhance workflow and communication between team members and improve efficiency[41, 61, 78, 83]
- Technology (e.g. use of electronic systems to check task completion)[78]
- Sanctioned time for team communications (e.g. huddles)[61, 62] and adoption of structured team communication approaches[80]
- Mature and open communication characterised by psychological safety[74]
- Ensuring that team members are consistently available[85]
- Team members flexibility in redistributing work[82]
- Standardised roles and job expectations; a better understanding of team members' individual roles capitalising on the skills of individual team members[45, 61, 62, 81, 82]
- Demarcated boundaries and collective identity for team (staff to identify themselves as belonging to a discrete team with identifiable members; stable, consistent team membership, with plans to ensure coverage during absences of a team member)[74]
- Attention to interpersonal dynamics within teams[62]
- Training (internal and by external practice coaches/ facilitators)[78, 86]
- Use of data/measures (e.g. to measure progress and show merits of changes to the care process)[45, 78]
- Implementing changes incrementally[78]
- Time investment by staff in creating templates for roles that they delegate (so as to have confidence that tasks are carried out safely and in an evidence-based manner).[78]

In one study, researchers conducted an online workforce survey with all staff at 12 primary care sites of the Cambridge Health Alliance, Massachusetts, at different stages of PCMH transformation.[84] They analysed the results with a view to identifying factors associated with teamwork perceptions. Having effective leadership was the main factor associated with practice teamwork perceptions. A further factor, practicing at a site in an intermediate stage of PCMH transformation, was also associated with enhanced team perceptions. The study highlighted a strong association between effective leadership, care team behaviour (such as huddles and regular meetings) and job satisfaction, with perceptions that practices operate as real teams. The

researchers suggest that providing attention to these factors may be important in augmenting practice teamwork perceptions.

Team member roles

A systematic literature review examined the extent to which PCMH implementations use associate care providers (including registered and licensed practical nurses, nursing and medical assistants, clerks, pharmacists, social workers and dietitians).[87] The review included 42 studies looking at access to care and care coordination — two aspects of a PCMH implementation that are likely to be sensitive to associate care provider activities. The authors found that few measures specified associate care provider roles or linked care provided by these roles to patient outcomes. For example, no study measured patient visits to an associate care provider as an indicator of access. The review concluded that there is a vital need for more attention to be given to these roles — and to team-based care more generally — to achieve patient outcomes

A review of published literature on the personnel roles within a PCMH implementation found that a primary care practice that has successfully converted to a PCMH model will typically have incorporated a range of new staff and roles.[88] A care manager, often a registered nurse, was the most consistent addition to staff in the practices featured in this study. The researchers concluded that 4.25 full-time equivalents (FTEs) should be allocated to staffing personnel per 1 physician FTE. Compared with current staffing in the US of 2.68 FTEs per physician FTE, this is a 59% increase.

One study explored the effects of unclear roles amongst members of interdisciplinary primary care teams.[73] The study assessed perceived task allocation amongst team members by asking them each whether the physicians performed each of 14 common primary care tasks alone or relied upon staff for help. Most primary care providers (physicians, nurse practitioners and physician assistants) perceived they were solely responsible for most clinical tasks but registered nurses and licensed/practical vocational nurses also felt they were relied upon for most of the same tasks. Medical assistants, health technicians and medical technicians reported they are not relied upon for most tasks, suggesting potential underuse of these roles. The authors conclude that there is a need for a better understanding of the roles performed by staff members, noting that "*unclear roles in interdisciplinary primary care teams can impede optimal team-based care*" (p. 142) and that "*future efforts to implement team-based models of primary care must address not only who can do which tasks, but how team members' time can best be allocated among tasks and how task allocation principles can best be communicated to and among team members*" (p. 148). Another finding was that training in PCMH was associated with increased perceived reliance on other roles within the practice. Participating in huddles was also found to have this effect.

In another study, the researchers video recorded 121 primary care provider office visits to investigate the percentage of time taken up by these visits that could suitably be reassigned to another PCMH team member to optimise face-to-face visit time.[89] Each visit was reviewed by a physician to assess the amount of time that was re-assignable. The physicians judged that, on average, 53% of the videotaped visit time could suitably have been re-assigned. The percentage of time that was judged to require a primary care provider varied greatly by activity category, from 73.9% for examining patients to 16.2% for a medication review. Agreement regarding the tasks suitable for re-assignment varied across activity categories. The authors point out that there were variations in assessments from physician to physician and that efforts to redesign the approach to office visits would require consultation with a range of stakeholders.

Implementation approaches and studies have tended to focus on clinical roles within PCMH teams with little attention to the roles of receptionists/clerical workers. One study examined the issues for team-based arrangements for this group.[90, 91] The study noted that these workers often "*experienced social marginalization and expressed the belief that others failed to recognize the complexity of clerical work*" (p. 109).[91] The authors found that these staff "*articulated their care work through the emotional labor embedded*

in administrative tasks. Through this lens, care coordination, enacted through appointment scheduling, emerges as a complex, socially located negotiation between patients and clerks that requires clerks to responsively synthesize health information, organizational data regarding appointment availability, and professional judgment of the appropriate clinical staff person to address patients' perceived needs" (p. 109).[91] The study highlights the need to give attention to these roles in the PCMH transformation. The authors recommend that the "*definition of high-quality primary care encompasses all patient interactions with the health care organization and not simply those between patients and clinically trained staff"* and "*investment in high-quality care coordination can leverage clerks' contribution to individually tailored, patient-centered care"* (p. 378).[90]

Another study explored opportunities for social workers in a PCMH implementation.[90] The authors found that barriers to implementation included small practice size, payer-driven care, not having a strong physician champion, variability within patient populations and high implementation costs. Facilitators included having a social worker to coordinate behavioural health services and having a clinical nurse case manager in place. Other facilitators were the use of pre-existing models of outcomes-driven care, and being part of an integrated health delivery and financing system. The study generated recommendations for strengthening the role of medical social workers in primary care practices. Among these were that the team approach to outcomes-based care should continue to be emphasised. It is apparent, the researchers argue, that buy-in across all practice levels is important for improved patient outcomes, and that the medical social worker can play a unique and important role in bringing information about patient needs and challenges to the team, and in generally addressing barriers to care. Similarly, the role of the clinical nurse practitioner offers opportunities for improved patient outcomes, as they can effectively address a majority of patient care issues using a patient-centred approach.

Team characteristics

One study reported substantial variation in the implementation of PCMH amongst sites but commented that, "*Regardless of care team size and staffing mix, most sites reported role expansions for* [medical assistants] *and, in some cases, administrative staff"* (p. 266).[75] Another author attempted to identify the facilitators and barriers of 'occupational role self-efficacy' which, it is argued, is necessary for a team to function effectively.[76] Occupational role self-efficacy is a belief in possessing the capacity to execute a new team-based role effectively. The enablers were: training, time to perform the new role and agreement within the team of the role boundaries. The main barrier was insufficient training.

Development of teamwork skills

Skills for effective team-based care are distinct from clinical skills and need to be taught. Positive attributes of team-based care reported by employees in one study were regular and frequent communication, talking openly and honestly with each other, knowing and trusting each other's abilities, having clear roles, being comfortable with delegation and task-sharing, and being able to rely on each other's regular physical presence on a day-to-day basis.[92] Adopting structured communications for huddles and training staff in these has been proposed as a strategy towards this.[80] Importantly, the building of team relationships is not a static process, and ways of working together and building over time should be seen as a continuous cycle of quality improvement.[82]

Interprofessional training can assist with team based care. In 2011 the US-based Interprofessional Education Collaborative sponsored an expert panel of their members to identify and develop four domains of core competencies needed for a successful interprofessional collaborative practice on the model of a PCMH.[93] These were: (1) values/ethics for interprofessional practice; (2) roles/responsibilities; (3) interprofessional communication; and (4), teams and teamwork.

A model employed by the US Veterans Health Administration jointly trains medical residents, nurse practitioners, pharmacists and health psychologists.[94] Approximately 50% of a team's time is spent in interactive educational sessions and the remainder providing care to assigned panels of patients, reinforcing newly acquired skills in a PCMH setting. The core curriculum includes:

- Shared decision-making
- Sustained relationships
- Interprofessional collaboration
- Performance improvement.

The model doubled the amount of time that providers spent on clinical work in the first year.

A study compared 25 PCMH practices in which members had received a 12-week intervention to develop team skills, with 25 practices in which the intervention was not applied.[86] The purpose of the study was to test whether the intervention had a positive effect on team members' perceptions of interprofessional collaboration. At the close of the 12-week intervention, the participants completed a test known as the Assessment of Interprofessional Team Collaboration Scale. The intervention group scored higher on positive interprofessional perceptions than the control group. The researchers concluded that an educational intervention in a PCMH may facilitate an inclusive culture of practice, improved team member satisfaction and better patient care.

One study recognised that "*advanced practice nursing education programs are challenged to prepare graduates who are qualified for practice in the new reality of health care reform*" (p. 139).[95] The study describes a program in which 47 students were placed in seven sites in their second year of implementing PCMH. During the initiative, the authors learned that students are conventionally conditioned to follow one preceptor (teacher) exclusively rather than function as part of a team. In contrast, students in PCMH practices were expected to care for an identified panel of patients that may or may not have the same primary care provider. They were expected to work and collaborate with all the providers in the practice in a team-based approach. Familiarity with and utilisation of a practice registry is an important part of care coordination and team-based practice, and is another skill the students had to acquire. The PCMH competencies identified as demonstrating an understanding of the PCMH model on the part of the student nurse included the following: provision of continuous care to a specific roster of patients; provision and documentation of regular patient follow-up; contributing knowledge about the patient to an interprofessional team care plan; routinely consulting interprofessional team members; utilising electronic and telephonic technology effectively, including an electronic registry for ongoing clinical management; and, identifying more effective and efficient ways for the practice to enhance access and reduce cost.

Training for expansion of key roles such as medical assistants and registered nurses is not available in many instances.[96, 97] Therefore, in one study of practices considered as innovators in team care across the US, practices developed in-house training activities to prepare staff for these expanded roles.[96] Another study also reported this and noted that some practices had also sent their medical assistants to regional collaborative sessions so that they could hear what was happening in other practices.[97]

Other supports for teamwork

Health information technology can support effective teamwork through enhanced communication and enabling greater task sharing amongst team members.[78, 98, 99] An example of the former is functionality that enables team members to input within-chart notes to communicate specific needs of a patient to other team members. An example of the latter is incorporation of protocols into patients' electronic notes, allowing various team members to follow through with tasks assigned to them, such as gathering information about a patient's presenting problem by a medical assistant (following a complaint-specific template), pharmacy review by a pharmacist or tobacco cessation counselling by a care manager. Another

study identified the "*regular use of electronic communication with teamlet members, including using electronic health record system-generated patient specific alerts ("view alerts"), instant messaging (IM), and e-mail to communicate with teamlet members*" (p. 11) as the teamlet's form of 'huddling'.[80] A barrier is that tools are not sufficiently evolved to support practices in these activities (see section 'Health information technology').

Staff experience

The experiences of staff are important in practices transforming to a PCMH model and sustaining it. The pace and complexity of change involved in transformation to a PCMH model is sometimes associated with 'change fatigue' which can in turn lead to resistance from staff in implementing the model.[1, 17, 18, 35, 62, 100] Often resistance presents as 'foot-dragging' or 'hesitancy to change' rather than outright opposition.[11] However it presents, it needs to be addressed. Strategies include setting appropriate and attainable goals for change, involving staff early, an incremental approach to change (taking 'baby steps') and standardising change processes so that they are more predictable.[11, 18] In addition, practice leaders can buffer stresses through cultivating practice-wide buy-in.[45] The improvements possible through the PCMH model may also improve staff experience and should be framed as solutions to common frustrations that practice staff face.[11, 18]

Change fatigue and/or resistance from staff can also result in staff turnover[18, 101] which presents additional challenges to PCMH implementation, such as requiring additional time to bring new staff up to speed.[35] Although it may not be a direct result of PCMH implementation, turnover of leaders and clinical champions is particularly problematic as it affects staff morale and leads to a loss of momentum as resources are redirected to recruit and train new leaders/ champions.[35]

The three-year project to transform federally qualified health centres into advanced primary care practices in support of US Medicare beneficiaries found that participating practices experienced significant stress in the changeover process.[12] This resulted in worsening survey results on multiple dimensions of practice culture (e.g. adaptive reserve; communication openness and organisational learning; and team structure, situation monitoring and mutual support) and professional satisfaction (e.g. stress, burnout, chaos and likelihood of leaving their practices). The degree of worsening was significantly greater among sites with high baseline Readiness Assessment Survey scores. The evaluation concluded that "*sites with high levels of medical home structures and processes at baseline were less able to withstand any additional stress associated with participation in the* [demonstration] *than were sites with comparatively fewer medical home attributes at baseline. That is, having medical home structures at baseline might itself have been stressful, eroding sites' capacity to withstand further stress*" (p. xxi)[12]

Similarly, a study of job satisfaction amongst staff working in paediatric PCMH practices in Florida did not find that job satisfaction was higher when practices had more of the characteristics of a PCMH implementation (as measured by the Medical Home Index).[102] In fact, more PCMH characteristics increased the odds of staff burnout. Specific PCMH features associated with job satisfaction and burnout were as follows:

- Care coordination was positively associated with job satisfaction. The authors conclude that this is due to the positive outcomes that care coordination has for patients, and improved family-provider relationships
- Community outreach was negatively associated with job satisfaction. Community outreach involved practices' linkages with schools and other community supports. The authors hypothesised that staff may be uncomfortable or frustrated with these tasks or view them beyond the scope of their duties
- Quality improvement and organisational capacity were both associated with increased exhaustion which has the capacity to lead to burnout

- Chronic condition management and data management were associated with lower burnout. The authors attribute this to the systematised approaches used by PCMH practices for chronic disease management, use of tools (such as registries, referral tracking and care plans), and improved quality and efficiency achieved with better data management.

A study based on a survey and interviews with members of Patient Aligned Health Care Teams within the US Veterans Health Administration found that the role of the primary care provider did not become easier in the first year of transition to a PCMH model.[91] Unexpectedly, in this first year nurse care managers reported a decrease in their perceptions of empowerment, while clerical staff felt they were using less skill variety. They also found that better skilled staff were reluctant to allocate tasks to other less able team members. The researchers call this an "*empowerment paradox*" (p. 31) where team members find it difficult to share tasks in ways that go against traditional role hierarchies. They recommend that those seeking to implement PCMHs should use resources to facilitate teamwork and a sound understanding of the interplay of roles within health care teams.

Another study examined the relationship between elements of PCMH and employee burnout.[103] Participatory decision making and having the right number of staff were associated with lower risk of burnout. Being assigned to a care team (in this instance, the US Veterans Health Administration Patient Aligned Care Team, PACT), spending time on work that someone with less training could do and having a stressful, fast-moving work environment, were associated with a higher risk of burnout. The finding of higher odds of burnout with assignment to a care team was put down to the destructive effect of a large-scale, organisational change (i.e. the implementation of the PACT amongst veterans' health services) and/ or unobserved confounding (i.e. the nature of the survey respondents who had not yet been assigned to a care team two years into the implementation of the initiative).

Employees interviewed by one author reported enthusiasm for a PCMH model but stressed that a good implementation required increased staff in line with the model, team development training and leadership that showed commitment to the model.[92] Interviewees' stressed the need for team development training, with one primary care provider stating "*What I would prioritize for my team—...[and] can't believe I would ever say I would want to do, because it sounds like middle management hooey—but actually, trust-building exercises. Because...the biggest barrier in implementing a lot of those things is resistance to change*" (p. S618).[92]

One author and colleagues reported on a 2012 survey of over 4,500 employees of the US Veterans Health Administration in a series of articles.[103-106] Barriers to the implementation of PCMH reported by staff included:

- A stressful/chaotic work environment
- Completing tasks someone with less skills could do (i.e. not working to top of scope)
- Reluctance to delegate
- Recruiting and retaining staff
- Lack of support from clinical leaders.

Enablers were:

- Team effectiveness (including spending at least 30 mins per day in team meetings/ huddles)
- IT systems
- Disease registers
- Education sessions.

One of the papers examined the association between the extent to which components of PCMH model had been implemented and the teams' ability to deliver patient-centred care.[104] A stressful work environment

and delegation of patient care were associated with lower perceived improvement in patient-centred care. Higher levels of participatory decision making, a history of change in the clinic, delegation of patient assessment activities and team effectiveness, were associated with higher perceived improvements in patient-centred care. Yet another manuscript examined the barriers and enablers of a PCHM implementation using a validated tool.[105] They found that huddles, measurement tools, regular team meetings, information systems and disease registers were enablers of delivering patient-centred care, and difficulty recruiting and retaining staff, lack of support from clinical leaders, lack of control of one's schedule and inadequate support for patient behavioural change to be barriers. Of the resources that were most widely used and found to be helpful, team huddles were ranked the highest.[106] Other resources found to be helpful by more than 50% of respondents were team meetings, local education sessions about PCMH, measurement tools to assess the team's performance, and information systems to provide timely data and feedback.

A separate manuscript reporting on the Veterans Health Administration PCMH implementation highlighted the effect on 'emotional exhaustion' among the staff involved.[107] 'Emotional exhaustion' is defined as "*the sense of feeling overwhelmed and exhausted,* [and] *is an essential component of the multidimensional psychological syndrome of burnout in response to job stress. This syndrome is also conceptualized with 2 additional components: cynicism, or feeling depersonalized and detached from the job, and professional efficacy, or lack of a sense of personal accomplishment related to work goals*" (p. 253). The researchers used cross-sectional online surveys of 191 primary care clinicians and 324 staff members in 23 primary care Veterans Health Administration clinics to investigate emotional exhaustion during the initial phase of a national primary care transformation. They found that 53% of primary care clinicians and 43% of staff had high emotional exhaustion. Primary care clinicians, female and non-Latino respondents reported higher emotional exhaustion. The researchers concluded that recognition by healthcare organisations of the potential for clinician and staff emotional exhaustion during primary care transformation is critical, and recommended that increased staff opportunities to participate in decision making could be helpful in reducing emotional exhaustion.

Time

Time is mentioned as an important consideration in practices' transformation to a PCMH. Time for implementation and impact on service delivery have been identified as the main constraints.

Time for implementation

One theme in the literature is the time to transition to a PCMH model.[9, 18] In a formative evaluation of implementation of PCMH model amongst rapid test sites in England, the authors suggest that national policy-makers and the wider NHS (England) may need to "*acknowledge the time needed to build the relationships that underpin a* [PCMH] *and recognise that external contexts (particularly* [sustainability and transformation partnership] *development) may help or hinder their formation*" (p. 13).[9] They advise that practices cannot be expected to deliver significant changes across a wide range of services within only a few years. Similarly, the authors of the evaluation of the implementation of PCMH amongst Pinnacle Midlands Health Network (PMHN) practices in NZ noted that "*There is a significant investment of time and resources required to reach the point where noticeable change occurs in a practice. This investment should not be under-rated. It is a prerequisite for a sustainable change strategy*", and that "*While future practices will benefit from the lessons learnt by 'early adopter' practices, it is likely that the level of investment in time and effort experienced by the early adopters will still be necessary for sustainable implementation*" (p. 2).[10]

Another study aiming to develop a replicable approach to implementing PCMH amongst practices in the US serving vulnerable populations found that "*although results from the* [tool measuring PCMH implementation] *reflected significant progress even in the short term, two thirds of practices that ultimately*

accomplished substantial implementation of the medical home changes did not achieve that level of success until the second half of the 4-year ... period." (p. S9).[35]

Time taken to implement PCMH needs to be recognised by organisations providing grants. Often the grant is provided for a time frame that is insufficient to implement an initiative as complex as a PCMH, especially when the changes involve implementation of new technology.[42]

Time impacts on service delivery

A second theme in the literature is that the PCMH model changes the way services are delivered which will have impacts on the time taken to undertake various clinical and related tasks.

A study investigating the implementation of a PCMH model in a nurse-led primary care practice found time to be a major barrier.[58] Data entry and EMR systems were identified as requiring a time commitment which respondents acknowledged would be resolved as individuals became more adept at using these systems. Other studies found that time is needed to implement specific elements of the model, such as building an effective team, which requires regular protected time for staff meetings, group training, other team-building exercises and huddles.[12, 61]

While PCMH can save time through improved patient triaging, reduced face-to-face visits and improved patient engagement through tools such as patient portals[10], insufficient time to deliver services according to the aims of the PCMH model has been identified as an issue.[100] This includes the additional time involved in undertaking comprehensive assessments and/or care required under the PCMH model, such as developing and documenting care plans.[12] For example, in a qualitative study of clinical staff at practices serving a predominantly low-income Hispanic population, interviewees pointed to the brevity of clinic visits as a barrier to comprehensive care. In many practices, visits were limited to 20 minutes, making it difficult to deal with more than just the acute problem at hand.[108] Staff complained that preventative programs need to be supported by outreach activities, such as information distribution at health fairs or via community radio, but that such activities are time-consuming. Separate visits for preventive care and electronic medical records (provided they have a user-friendly interface) were mentioned as helpful in relieving some of these problems. Also, in the project to transform federally qualified health centres into advanced primary care practices in support of US Medicare beneficiaries, providers and staff were concerned about not having enough time to spend with patients, many with complex needs.[12] The study mentioned above investigating the implementation of a PCMH model in a nurse-led primary care practice also found time constraints for one-on-one patient education to be a barrier.[58]

Health information technology

In many studies, health information technology is presented as an essential component of PCMH implementations. Benefits of health information technology identified in studies include[11, 98, 109-111]:

- Reduction in medication errors
- Improvement in health outcomes, for example, identifying gaps in care
- Support for new models of care
- Support for team-based care
- Support for care co-ordination
- Support for population health initiatives
- Meaningful engagement of patients.

A literature review suggested that health information systems and tools to support patient centred care and care coordination have grown in recent years, as have studies evaluating these technologies.[99] Systems and tools identified include clinical decision support systems (systems that aim to improve decision making around diagnosis), registries, team care, care transitions (among levels of care either within an organisation

or between organisations), personal health records, telehealth (for bridging the gap between a patient's medical care team and self-care routines) and measurement (creating and evaluating measurement frameworks to assess patient centred care measures).

Adoption of electronic medical records (EMRs)[d] and other health information technologies is frequently documented as an issue for transformation to a PCMH model. Some studies have found that for smaller practices the time, effort and other resources, including the implementation of health information technology, have been major barriers to adopting the model.[1,112] Several studies have suggested that health information technology tools may not be sufficiently evolved to support practices in activities that lead to high quality, low cost care.[110, 111, 113] For example, the lack of input fields to support PCMH functions, such as care planning, has been found to be frustrating and burdensome to practices.[11, 20] In recent years, federal support and incentives towards 'meaningful-use' criteria for EMRs, specifying minimum interoperability and reporting features that must be met by vendors have helped improved the capacity of various health information technologies to support the PCMH implementation.[45, 114, 20]

Several studies illustrate these challenges. One study surveyed 350 clinicians at physician-owned and hospital/health system–affiliated primary care practices that had PCMH recognition, with the purpose of investigating whether health information technology offered helpful tools for improving care coordination.[115] The study focused on care coordination objectives related to referrals, notification of care from other facilities, patient clinical summaries, and patient dashboards. It was found that although 78% of the respondents viewed timely notification of hospital discharges as very important, only 48.7% used health information technology to accomplish this task and that the activity most frequently supported by health information technologies was providing clinical summaries to patients, though only 47.7% considered this activity very important. Greater use of health information technologies to support care coordination was positively associated with the presence of a specialist non-clinician care coordinator and the practice's capacity for systematic change. The researchers conclude that "*even among practices having a strong commitment to the* [PCMH] *model, the use of health IT to support care coordination objectives is not consistent. Health IT capabilities are not currently aligned with clinicians' priorities. Many practices will need financial and technical assistance for health IT to enhance care coordination*" (p. 250).[115]

Another study investigated ways that health information technology for care coordination is currently being used in PCMH models of care and what kinds of technologies are needed to improve care coordination.[116] Interviewees included administrators and clinicians from PCMH implementations, EMR and health information exchange representatives, and policy makers. The researchers identified five areas in which health information technology can improve care coordination in PCMH implementations — namely, monitoring patient populations, notifying clinicians and other staff when specific patients move across care settings, collaborating around patients, reporting activities, and interoperability. To accomplish these tasks, many interviewees described using home grown care coordination systems separate from EMRs. Although they had the resources as well as experience and expertise with using health information technology for care coordination, they identified multiple barriers to care coordination using current health information technology tools and many areas where they saw room for improvement. The researchers hypothesize that focusing health information technology development on monitoring, notifying, collaborating, reporting and interoperability would enhance care coordination within PCMH implementations beyond the capacity of current technology.

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[d] In this document, the term 'electronic medical record' (EMR) is used to refer to patients' practice records in an electronic form. Sometimes the term 'electronic health record' (EHR) is used to refer to this same concept. However, EMR is used here to differentiate between systems that are used within a practice (EMRs), versus those aimed at sharing information between the range of providers with which the patient has a relationship (e.g. specialists and hospitals) (EHRs). EHRs tend to be referred to as 'personal health records' in the US-based literature.

In a study of the adoption of health information technology tools of PCMH versus non-PCMH practices, PCMH practices had higher adoption rates across all types of health information technology tools studied compared to non-PCMH practices.[109] However, PCMH practices had significantly higher rates of adoption of 'clinically-focussed' health information technology tools (patient registries[e] and ePrescribing), as well as increased adoption of these as they matured (a two-year follow up period was used), compared with 'patient-facing' tools (patient portals[f] and personal health records[g]). The researchers conclude that the lower adoption of tools supporting patient engagement may be due to these tools not yet meeting the demands of the PCMH model of care delivery.

Alternatively, the lack of adoption of 'patient-facing' tools by patients may be due to different perspectives of different stakeholder groups about factors influencing the uptake of these tools and the role of the tools. For example, a study investigating barriers and facilitators of enrolment in a patient portal in a PCMH context found[117]:

- Differing perspectives on where barriers to enrolment exist. Patients were well-aware of the patient portal, having received an 'abundance' of marketing materials but were concerned about the enrolment process itself. Providers also felt there were administrative and logistical problems regarding enrolment. However, program leaders thought that patient awareness was an issue
- Divergence of opinion on the appropriateness of primary care for promoting enrolment in a patient portal. While program leaders thought that primary care was the most logical place to enrol patients, patients and providers did not agree. Patients and providers did not feel there was sufficient capacity in primary care — due to clinical demands — to manage enrolment
- Lack of consensus over appropriate patients to target for enrolment. Program leaders tended to want to focus on patients with computer access, while providers tended to focus on age when targeting enrolment
- Provider ambivalence about the value of the patient portal. Providers were concerned about what patients might learn by reading their medical record and, therefore, did not encourage enrolment. Program leaders felt that an important factor affecting enrolment was the amount of encouragement that patients received from their provider to enrol.

The researchers conclude that an important prerequisite for improved enrolment of patients in a portal is for stakeholders to find common ground as to the primary challenges facing patients using patient-facing technologies.

Other barriers to uptake of patient-facing tools have been reported, such as internet access, computer literacy, patient demographics (age, race, gender, health conditions), usability issues (e.g. 'impersonal'), and patient motivation.[99, 118] The barriers are different for different populations and are likely to intersect (such as patient age and computer literacy).

All the above studies point to the importance of patient involvement in the PCMH model. One paper concluded that: "*Patient involvement can be supported through technological means (such as portals or other tools to facilitate communication with providers and access to information), but does not rely solely on technology availability. Instead it is a desirable outcome that requires for all stakeholders and involved processes to be supportive of patients who want to be actively engaged in their own care. Technological*

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[e] Patient registries can be used to identify patients with specific conditions and/ or risk factors. They are used to ensure that patients get timely, proactive care.

[f] Patient portals are web-based systems that provide access to patients to their EMR, and may also be used for the patient to communicate with their provider.

[g] Often called electronic health records (EHRs) in other settings, personal health records are applications containing a patient's health information (that which they have agreed to upload into the system), which they can access, or their health providers can access, with their permission.

advances and legal initiatives can increase the likelihood of successful implementation of patient-centered care; however, this paradigm shift does not only depend on technical, legal, and infrastructural attributes. It also calls for a culture change in health care organizations and among health consumers." (p. 20).[99]

One study found no significant relationship between practices' adoption of a range of health information technologies (specifically, clinical registries, ePrescribing, personal health records/patient portals) and performance on key PCMH measures.[110] An exception was EMRs, which led to new adopters (i.e. those practices that had newly implemented the technology during the study period) performing worse on chronic disease management measures than practices that had never or had always adopted (the latter referring to practices that had the technology in place prior to the study period). The authors conclude that the impact of health information technology varies with time, with newly adopted health information technology leading to disruption of workflow and absorbing valuable clinical time. This was evidenced by the fact that no differences in chronic disease management were found amongst the always-adopters of EMRs. The study also found no significant relationship between practices' adoption of health information technology and cost. Over time, there was a slight, but non-significant increase in cost for health information technology adopters.

A qualitative study of medical assistants' roles in EMR processes found many challenges to EMR implementation which differed amongst the practices studied.[111] They included the system crashing, slowness and poor design leading to additional work for the user. In a three-year demonstration project to transform federally qualified health centres into advanced primary care practices in the US, similar problems with EMR systems surfaced: poor usability, time-consuming data entry, interference with face-to-face patient care, inability to exchange health information with systems of other facilities and providers, and degradation of clinical documentation.[11]

While training has been identified as one factor that could assist in improving the productivity of users of EMRs and other health information technologies[119], most systems have a steep learning curve and there are technical issues that cannot be addressed through training.[111, 113] These are the aspects where vendors need better approaches for developing systems' functionality (such as through working alongside practicing clinicians to understand their workflow and needs)[98], and governments can assist through policies such as the 'meaningful-use' criteria mentioned previously.

A study investigating the implementation of a PCMH model in a nurse-led primary care practice found the learning curve associated with adopting or changing EMR systems to be a major barrier.[58] The learning curve associated with EMR systems was high, and problematic when insufficient time was allocated to learning the new system, or to properly understanding its functions prior to implementation.

A study of training to support the use of EMRs in a PCMH implementation found the following features of training were required[119]:

- Case-based. That is, applying EMR to optimise patient care using real cases, rather than just teaching technical functions of the software
- Longitudinal. That is, delivered over a period, resulting in cumulative exposure.

Early exposure to EMRs by practice staff — for example, during residency training for GPs — may strongly influence the way that these individuals practice in the future and what they regard as important. For example, one study looked at organisations with varying rates of implementation of PCMH features to identify the influence of working with those features upon residents' perceptions of their importance.[120] The study found that residents with any exposure to EMR-based features had higher odds of rating the features more important compared to residents with no exposure.

Technologies such as electronic messaging that can facilitate alternative modes of delivery of care to patients have been touted as enabling additional capacity amongst providers. However, they are not necessarily effective in this. For example, they have been shown to result in additional face-to-face visits.[121] This could be because these technologies are not a substitute for all clinical tasks; some, such as foot or eye examinations, need to be done in-person. Also, the technologies may reduce barriers to access for some patients and thus stimulate demand, meeting needs that would have previously gone unmet.

Overall, it is potentially PCMH attributes that are associated with good quality practice more so than technology. For example, a study comparing quality of care provided by PCMH implementations with that provided by non-PCMH models of care using EMRs or paper records found the PCMH was associated with modest quality improvements on key clinical measures and that this was independent of EMR technology.[112] The authors acknowledge that such quality gains may be enabled by EMRs but that the PCMH approach *"is more than a health information technology intervention"* (p. 747). Another author notes that "*Many information technology and complex care redesign initiatives have failed to yield change in* [clinical measures] *at a population level; the most effective…have employed teams to apply care strategies, invariably supported by health informatics applications, but not relying on informatics alone*" (p. 403).[60] Similarly, a study of characteristics of practices with high PCMH capability found that while having an EMR was important to the development of PCMH capability and may enable some PCMH features, it was not essential.[15] Notably, 21% of clinics in the top quartile of total PCMH score did not have an EMR.

Time is a significant barrier to implementing health information technology. For example, the Beacon Community Program in Cincinnati, Ohio, seeking to leverage health information technology to improve care quality, spanned 31 months.[113] However, it was unable to meet the deadline for spending the grant funds. They point out that "*significant time and funding need to be allowed for integrating technology into quality improvement activities, in addition to what is needed to develop and implement the technology*" (p. 876). For example, it was not enough to implement alerts notifying practices that their patient presented to an emergency department or was admitted to hospital; "*quality improvement protocols, tool kits, and coaching were needed to support practices in identifying, prioritising, and reaching out to the patients with diabetes or paediatric asthma who were the subjects of the alerts*" (p. 876). This last point also demonstrates that implementation of health information technology does not automatically bring about change; practices need support to use the technology to bring about change.[42]

Often practices transforming to a PCMH model are implementing health information technologies at the same time. In a three-year demonstration project to transform federally qualified health centres into advanced primary care practices supporting US Medicare patients, it was found that EMR implementation typically took priority over PCMH efforts until the EMR system was functional.[11]

Substitution of face-to-face consultations
One potential avenue through which the PCMH implementation aims to provide more patient centred care is through offering alternatives to face-to-face consultations.

Several studies of the Patient Aligned Care Team (PACT) reform in the US Veterans Health Administration have examined this issue:

- A study conducted prior to the implementation of PACT, described different perspectives on the use of telephone consultations.[122] The study reported that most providers "*viewed telephone visits as potentially advantageous over in-person visits for certain but not all aspects of primary care. Cases in which telephone could substitute for in-person care included routine disease monitoring for patients who were not high-risk for complications. A perceived advantage was that scheduled telephone visits could strengthen patient-provider relationship by giving patients more agency over their visit. For patients and staff members, this meant more frequent phone calls to check in and allow patients to ask questions, and*

for providers this meant enabling patients to use their preferred mode" (p. 8).[122] Providers and staff were also cautious about the impact on workload. Concerns of patients included *"…the possibility of losing touch with their providers*" (p. 8)[122]

- Participating providers reported a 'mixed message' related to encouraging alternatives to face-to-face encounters.[123] Primary care providers generally had positive attitudes toward non-face-to-face mechanisms for providing care. However, some reported that when they "*created open access by utilizing encounterless encounters* [they] *found themselves scheduled for face-to-face visits with patients of other providers whose schedules were too full to accommodate more visits. Providers described this as a lack of 'protected' schedules and as a disconnect between organizational encouragement of non-face-to-face encounters and penalties for having unused appointments*" (p. 247)[123]
- Registered nurses reported mixed feelings over the change in their roles with less emphasis on face-to-face encounters and more on telephone based encounters.[124] Some nurses felt this "*created some distance between themselves and their patients",* while others felt that *"telephone care provided patients convenient and direct access to RNs while potentially opening appointment slots for other patients whose care required face-to-face visits*" (p. 4).[124]

As mentioned previously, technology does not necessarily facilitate substitution of face-to-face consultations and may result in additional face-to-face visits (see 'Health Information Technology').[121]

Care plans/planning

Care plans and care planning are central to a PCMH implementation, contributing to effective care coordination. They have been found to[125]:

- Focus the care of the patient
- Strengthen the information exchange and relationship between the patient and the provider.

A qualitative study of the usefulness of comprehensive care plans for children with medical complexity identified perceived benefits of plans along the following themes[125]:

- Safety
- Care coordination
- Continuity of care
- Caregiver health and wellbeing
- Patient and family-centred care
- Efficient and timely care.

For example, care plans were perceived to flatten the hierarchical relationships between parents and health care providers, which in turn was perceived to improve quality of care through enhanced information sharing and strengthening relationships.

However, they are sometimes perceived as time, labour and cost intensive. Effective care plans[125]:

- Are developed collaboratively between the patient (and/ or their carer) and the health care provider
- Updated on an ongoing basis (with regular opportunities for feedback by the patient and/ or carer)
- Provide timely access to the plan by all relevant providers
- Are contained in one document
- Have all the patient's needs organised in a succinct manner (i.e. health conditions and social aspects such as supports in the home)
- Have utility for the patient across the entire health continuum.

Care planning is increasingly done using electronic tools, but sometimes these tools fail to provide the necessary functionality.[98] A qualitative study aimed at identifying the essential functions of an electronic

primary care plan for coordinating the care of patients with complex needs identified the following as priorities[126]:

- Provide a real-time summary of a patient's comprehensive care needs and responsible team members
- Display a patient's most pertinent background information
- Facilitate task assignment and referrals among team members
- Help keep track of tasks, both by user and patient
- Minimise duplicative work or documentation.

An additional function is for patients to input into the plan.[98]

Care coordination within a practice

Care coordination has foundations in chronic care management and is emphasised in PCMH models.[5] Care coordination can be provided by a range of staff in the PCMH environment, but often, staff are appointed to dedicated care coordinator roles. These roles can be filled by licensed or unlicensed personnel (the latter referring to personnel without formal health training or certification). The role of 'community health workers', which is one type of unlicensed role, is described in another section of this report.

A literature review and semi-structured interviews with representatives of 45 successful programs for the effective treatment of high-need, high-cost patients identified care coordination as one of the key attributes.[26] However, the researchers pointed out that models whereby care coordinators work remotely, primarily using the telephone or e-mail, and without a close relationship with clinicians treating the patient, the patient themselves, and the family members, tended not to be successful. The authors point out that:

> In most successful programs, the care coordinator is located in the doctor's office and has a wide range of clinical and social service responsibilities. They often: 1) see the patient when he or she arrives to see the doctor and ask about their priorities for care, 2) make periodic home visits, 3) occasionally interact with the patient's family, and 4) to some extent, interact with the specialists caring for the patient. Interaction with patients is especially critical during and following the hospital stay... In general, more in-person interaction between the patient and the care coordinator results in better outcomes and lower overall spending... 1 contact per month with the care coordinator is the minimum necessary for a successful program. (p. e599).[26]

A case study of the lessons learned in the implementation of PCMH in the Military Health System in the US identified the value of care coordination.[41] It recommended that a care coordinator be embedded within each team with responsibilities to review the patient's care plan. In addition, the care coordinator would identify any social or economic factors impacting the patient's health and feedback to the physician any changes required to the care plan based on them. A study of 25 heterogeneous primary care practices in south-eastern Pennsylvania implementing a PCMH model focused on improving diabetes care found that those practices integrating the care manager into the care team had the greatest diabetes improvements.[127]

One study set out to understand care coordinators' perceptions about their roles in primary care practices and their experiences with barriers and facilitators to their work.[128] A five-month private, online discussion forum was used to gather qualitative data from 25 care coordinators from PCMH practices that were diverse in size, setting and type. Participants interacted with one another, creating an online social learning collaborative while allowing for data collection for research. A common core of activities amongst the coordinators was: identifying patients in need of care coordination; outreach to patients by phone or mail; conducting face-to-face patient encounters; providing social support for patients; collecting, managing and exchanging patient data; supporting physicians; and, backing up clinical and administrative staff. About half the group saw their role as serving all practice patients; working with any patient identified by a staff member as in need of assistance. Some focused on a specified disease or clinical target. At least five

coordinators worked with patients covered by particular insurers or those identified by an insurance-based 'chronic care risk score'.

In the same study, two factors the care coordinators perceived as important for their work were functioning information technology and the availability of community resources. Co-location and full integration into a practice was perceived as an important facilitator while perceived barriers were excessive caseloads and data management responsibilities. The factor perhaps perceived as most important of all was relationship building at all levels. For example, while lack of interoperability with specialists and hospital information technology systems was a barrier, some devised solutions through building relationships with staff members at other facilities and relying on other forms of communication, such as facsimile.

Care coordination beyond the practice

PCMH implementations require high quality relationships with external providers which may include other primary care providers, community organisations, specialists and hospitals. There are specific challenges associated with achieving and/or maintaining these relationships which are described in the sections below.

One study looked at a range of mechanisms used by PCMH implementations to establish relationships with other providers to facilitate coordinated patient care.[67] The mechanisms identified and their uses are outlined in the table below. All four mechanisms were found to be useful amongst the practices studied. The authors suggest that the optimal mix will depend on contextual factors, including the complexity of a patient's condition.

Table 5 Coordination mechanisms used by PCMHs

Description	Coordination mechanism			
	Interorganisational routines	**Information connectivity**	**Boundary spanners**	**Communication, negotiation, and decision mechanisms**
Description	Workflows that specify in advance what needs to be done by whom and in what order.	Mechanisms for transferring information electronically between interdependent organisations.	Individuals who interface horizontally across providers and organisations to coordinate care.	Systems in which medical neighbours agree about how to coordinate care for shared patients.
Function	• Improved information flow in the medical neighbourhood • Greater efficiency by being able to reuse solutions • Improved quality from the consistent use best practices • Shared understanding among those who perform the routine.	• More timely and accurate transfer of information to facilitate safety and continuity of care • Data to support collaborative quality improvement and performance measurement of the health system.	• In-depth understanding of patient needs. • Coordinated care for patients whose needs span different providers and organisations. •	• Explicit identification of mutual responsibilities for the communication and coordination of shared patients. • Improved communication • Coordinated patient care.
Contextual factors that call for mechanism	• Higher level of knowledge about condition • Lower patient complexity • Sequential coordination.	• Higher level of knowledge about condition. • Lower patient complexity • Sequential coordination	• Lower level of knowledge about condition • Higher patient complexity • Reciprocal coordination.	• Lower level of knowledge about condition • Higher patient complexity • Reciprocal coordination.
Examples of actions taken by patient-centred medical home to achieve mechanism	• Referral tracking systems • Test tracking systems • Tracking and following up of patients in hospital or	• Shared electronic health record • Electronic referrals • Secure e-mail communicatio n	• Care coordination staff • Physician follow-up of patients in hospital, skilled	• Care compacts for bidirectional communication and coordination • Agreements through independent

Description	Coordination mechanism			
	Interorganisational routines	Information connectivity	Boundary spanners	Communication, negotiation, and decision mechanisms
	emergency department.	• Electronic interface with hospital or specialists • Web-based referral tracking tool.	nursing facility or community.	physicians' association.
High performers	• Typically use electronic systems for test and referral tracking and for identifying patients in emergency department and hospital.	• Typically have electronic connectivity with specialists for referrals or to exchange clinical information and an electronic interface with hospital's electronic health records to identify hospitalised patients.	• Typically have one or more dedicated care coordinator positions.	• Typically, have written care compacts with specialists.
Low performers	• Still relying on paper-based systems.	• Still relying on paper-based systems.	• No dedicated care coordinator position; care coordination responsibilities are shared among staff.	• No written care compacts.

Source: Alidina et al.[67]

Partnerships with community services

Effective management of patients with chronic illness requires partnerships between primary care and community services.[64] Barriers to forming appropriate partnerships include lack of knowledge amongst primary care providers about the availability of community supports, and lack of infrastructure to support collaboration between primary care and community services.[129, 130]

One study trialled the 'Wraparound' process as a means of creating a partnership between PCMH practice staff, community services, and patients with chronic illness and their support person (family/carer).[129, 130] A

nurse care coordinator from a PCMH implementation, a community service representative, a team facilitator and a recorder made up the team providing support to patients. The intervention involved the team participating in an initial meeting with each patient and their support person to develop a care plan and regular follow up by the nurse care coordinator (including feedback to the team, and activation of additional support in instances where the patient was hospitalised). The intervention was intended to be short-term; aimed at transitioning patients to self-management. An evaluation of the pilot program found statistically and clinically significant improvements in care coordination and self-management support for patients. The evaluation did not find improved health outcomes but the researchers comment that this was potentially due to the short follow-up period.

Community health workers (CHWs), or unlicensed care coordinators (i.e. those without formal health training or certification), can also assist with connecting patients with local community-based resources. Personnel employed in these roles are usually drawn from the communities that they service and thus can identify the most appropriate local supports for their patients.[131] CHWs and similar roles embedded in PCMH implementations have been found to be effective in improving overall coordination of care for patients, as well as reduce emergency department presentations and hospital admissions.[132, 133] (See section 'Community health workers').

Linkages with specialty and hospital care

Lack of specialty care or hospital involvement with patient care and other linkages between secondary and tertiary care is mentioned by several studies as a barrier to an effective PCMH model.[15, 64] Not even clinics affiliated with medical schools, which have institutional linkages, escape this problem. One study reported "*challenges commonly found in academic settings: bureaucratic hurdles, departmental politics, and underinvestment in primary care by the parent organizations*" (p. S65).[64] Care compacts can make explicit the mutual responsibilities of providers for communicating and coordinating shared patient care[67] and can address the roles of providers for different types of referrals, information timing and flow, required prework, access for routine versus priority referrals, and how secondary referrals will be handled.[67]

Information sharing for continuity of care

A major barrier to achieving continuity of care for patients and effective transition between hospital and community is sharing of patient information across different providers and organisations.[67, 99]

At its simplest, information access is 'asymmetrical', hence different providers can see (but not add to) information stored in a database. More integrated systems include those that multiple providers can contribute to and interact with (such as shared electronic medical records).[67]

In the case study of the changes to the Greater New Orleans healthcare system following Hurricane Katrina described earlier[38], although there was initial agreement between partners to share information, each had a different opinion on the architecture, scope, ownership and business case for data sharing. A solution was to move forward with a subset of partners who were willing and able to participate in establishing the shared infrastructure. This has resulted in a system whereby primary care practices are notified (using a real-time automatic notification system) when a patient that they have seen (and who consented to share information) presents to a hospital emergency department or is admitted to hospital.

In the study describing Washington State's Multi-Payer Medical Home Reimbursement Pilot, a key challenge was not having the data required to undertake population health management.[29] The researchers identified that hospital administrators, emergency department managers, specialty care clinicians and community organisations were not involved in the design of the pilot. They report that, in hindsight, many of the technical barriers might have been overcome if these groups were involved earlier. They also add that data should be complete for all patients; it cannot exclude any group, as this will limit the ability to understand patterns in health outcomes and improve the health of the whole population.

In a study of the needs of emergency department, inpatient and PCMH staff to support patient care transitions, researchers found gaps in information technology systems.[134] For example, relevant information had to be searched for in different systems, and primary care providers received inconsistent notifications of their patients' care transitions. Stakeholders requested improved patient-provider and provider-provider communication and technology-enhanced care coordination.

Risk stratification

Risk stratification tools are used as a means of identifying patients that will benefit most from PCMH initiatives and/or should receive special attention.[26]

A study using a literature review and semi-structured interviews with representatives of 45 successful programs to determine attributes for the effective treatment of high-need, high-cost patients, identified 'targeting' as one of the effective attributes.[26] The researchers point out that "*some programs provide the same services to all people enrolled in the program; however, the more successful programs typically stratify program enrolees and provide additional services to certain high-need, high-cost individuals*" (e598).[26] They also point out that being a high-need and high-cost patient is insufficient for being targeted for inclusion in a program and/ or receiving special attention. Being able to benefit is a key consideration. They provide the example of patients on expensive drugs that are appropriate for their condition; an intervention will not lower the cost for these patients.

Many risk stratification tools are based on predicting hospitalisation. However, their predictive abilities are only one challenge for their adoption; clinical acceptance is another major consideration, as illustrated in a case study of the implementation of a population health approach in primary care in Denver. The authors document the development and implementation of a risk stratification system.[135] The features that led to the implementation of a clinically acceptable and actionable solution included:

- Team composition — multidisciplinary, with explicit support from top management
- Target population definition — use of data as well as reflection by contributors, recognition that the population is not static and that patients move in and out, and change risk tiers
- Algorithm rule development — clinical and utilisation criteria are both important; transparency of the algorithm affects clinical acceptance
- Performance assessment — front-line clinical teams can provide valuable information towards optimisation
- Optimisation of clinical workflow — consideration of how the tool works with point-of-care systems, such as care coordination protocols, and optimisation.

The authors conclude that risk adjustment approaches "*that integrate clinical perspectives with predictive modelling results can better identify 'high opportunity' patients amenable to medical home-based, enhanced team care interventions*" (p. 3).[135]

One study evaluated seven risk-adjustment/stratification instruments to establish which models would most effectively identify patients who would get the maximum benefit from care coordination.[136] All 83,187 patients in a primary care practice were studied using the following models: Adjusted Clinical Groups (ACGs), Hierarchical Condition Categories, Elder Risk Assessment, Chronic Comorbidity Count, Charlson Comorbidity Index and a model combining Minnesota Tiering with Elder Risk Assessment (ERA) score. The models were used to predict healthcare utilisation and costs for 2010 with binary outcomes (emergency department visits, hospitalisations, 30-day readmissions and high cost users). The researchers found that the ACG model outperformed the others in predicting hospitalisations, and that in predicting the top 10% highest cost users its performance was also good and superior to the others. But they "*found good concordance among all 6 different risk screening instruments for predicting hospitalization*" and concluded

that *"use of any of the tools may provide some support for providers and health plans who undertake case management"* (p. 732).[136]

Data and performance measurement

Lack of data and/or quality of data limits practices' ability to understand the impact of their changes[35], adequately engage staff/teams[35, 62] and prepare documentation for external recognition as a PCMH provider.[35] Challenges to obtaining accurate data include:

- Technological barriers (e.g. adequate functionality in electronic practice systems)[35]
- Inadequate skills amongst staff to support data collection and analysis[35, 62]
- Agreement amongst clinical leaders about which data is most important (so that staff can focus on accurately capturing priority data).[35]

Performance measures derived from practice data indicate the standard of quality to be achieved by a practice transforming into a PCMH, provide transparency about the effectiveness of initiatives that have been implemented and can stimulate further motivation for improvement.[23] However, they may have negative consequences for patient care, team function and the satisfaction of team members. This is through: undue focus on measures, thereby compromising patient-centred care; the lack of consistency of the metrics with PCMH principles; a 'top-down' approach to performance measurement; and, the opportunity cost of responding to the measures.[137] Other frustrations reported include that measures are not clinically meaningful; that they have to be manually compiled; that there is sometimes a perception that one would 'get in trouble' for not meeting implementation goals (although acknowledging that this does not actually happen); and, potential for feelings of shame through visible tracking of measures.[61]

In the Patient Aligned Care Teams implementation in the US Veterans Health Administration, participating providers reported concerns with *"the ability of existing metrics to accurately reflect primary care provider performance and workload"* (p. 246), such as counting of non-face-to-face patient consultations.[123] A second concern was the nature and availability of performance measures. One dimension of this was the *"time lag between practice redesign activities and data availability* [which] *made it difficult to assess the impact of process changes"* (p. 248).[123] A second dimension was that *"some metrics were only available at a facility level, which prevented providers from isolating the effect of their efforts from those of other clinic providers"* (p. 248).[123]

Strategies for overcoming barriers with performance measurement are:[137]

- Ensuring that metrics align with PCMH principles
- Investigating patients' priorities for care quality
- Investigating the time it takes to respond to metrics and titrating to the time available
- Articulating the clinical rationale for each measure
- Incorporating mechanisms for front-line staff to feedback unintended consequences of metrics.

Effective performance measures should be based on data from real-time systems so that they are meaningful to a practice and include a balance of patient care process measures and clinical outcomes.[16] The data should also be transparent, reliable, replicable and accurate.[41]

In one paper describing the transformation of primary care in British Columbia, Canada, to operate according to PCMH principles, the authors describe that performance was separated from payment and looked at a system level rather than at an individual GP level.[27] The authors comment that the approach adopted took *"the view that there are many methodologic and other shortcomings in the pay-for-performance approach when applied to individual GPs"* and that *"GPs will provide the best care they can when they are valued, supported, and paid reasonably"*. Therefore, *"the position was taken that a more collective approach—we all sink or swim together—would be more appropriate"* (p. 47). The authors also point out that

'performance' in 'pay for performance' systems more accurately means 'activity' as payment is linked to processes of care (such as doing immunisations or tests for diabetes) rather than outcomes.

In the three-year demonstration project to transform federally qualified health centres (FQHC) into advanced primary care practices in support of US Medicare beneficiaries, the sites periodically received data and performance from three different feedback reports.[11, 12] The first two allowed the FQHCs to track their performance on the Readiness Assessment Survey and to compare their performance with other demonstration sites. The third tracked FQHC performance on key cost and utilisation measures for Medicare beneficiaries attributed to that FQHC (e.g. inpatient admission, emergency department visits) and quality of care measures (e.g. glycated haemoglobin blood [HbA1c] testing, retinal eye exams, low-density lipoprotein [LDL] screening, and nephropathy testing rates among beneficiaries with diabetes). Feedback reports were available to FQHC from half way through the demonstration project onwards. However, by the end of the demonstration, 14% of sites never downloaded even one feedback report.[12]

Practice size/capacity

Small practices face several barriers to implementing a PCMH model, therefore, most practices implementing PCMHs reported in the literature tend to be larger. For example, a study comparing the quality of care in PCMH and non-PCMH practices found that the larger practices were more likely to become PCMH providers.[112] The authors cite other studies which have shown that larger practices have greater PCMH 'readiness' due to greater resources to implement specific features of the model (such as patient educators). For example, an earlier study referred to by several papers cited in this review, which was of a national survey of small and medium-sized practices (one to 19 physicians), found that few make use of established techniques for quality improvement that are a key foundation of the PCMH model. The study estimated that nationally (in the US), only 10% participated in quality improvement collaboratives, 10% used rapid cycle quality improvement strategies, 18% collected data from electronic records for quality measurement and 19% gave performance feedback to physicians.[138]

A survey of a representative sample small practices (those having less than five physicians) within the US seeking PCMH accreditation included questions around successful strategies these practices had adopted for implementing the PCMH model.[39] Of the 249 responses, 34.9% were solo practices. The mean number of physicians per practice was 2.9 and mean staff 8.2. Around 78.3% of responding practices had participated in a demonstration/pilot project and/or received payment for being a PCMH provider. Many had received help in terms of training of staff (85.5%), training for clinicians (84.2%), consultation/coaching/facilitation specific to the practice (63.9%), training on how to meet requirements for PCMH accreditation (81.3%) and assistance in preparing documentation for PCMH accreditation (81.0%), and access to a learning collaboration (59.3%). The motivators for PCMH implementation reported by practices included improving quality and patient experiences. The most common barriers identified were time and 'money and other resources to invest in staff, training, or equipment'. Practices that had lower levels of accreditation also identified information systems as a major barrier. Barriers less commonly identified included: knowledge and experience, clinician/staff resistance to change and clinician/staff turnover. The authors observed that "…*practices placed the greatest value on tangible supports. Although most practices received training for clinicians and staff, and many also received consultation or access to collaborative support, the type of help they valued the most was training and support related to the* [accreditation body's] *application process*" (p. S10), and that "… *most PCMH-recognized practices have yet to engage patients as partners in transformation efforts*" (p. S10).

Another study examined the relationship between practice characteristics, including size and ownership arrangements and the proportion of practices achieving 100% across different dimensions of the National Committee for Quality Assurance's PCMH recognition framework.[139] The study compared community health clinics, physician owned practices of various sizes, health system affiliated practices and military clinics.

Compared with larger practices, smaller practices (less than five physicians) tended to have a lower proportion of recognised practices achieving 100% scores on several dimensions including: culturally and linguistically appropriate services, having structured data for patient information, test tracking and follow-up, and referral tracking and follow-up. The authors also noted considerable variability across all practice types.

A study of practices meeting entry-level criteria for recognition as a PCMH provider for enhanced payments under Oklahoma's Medicaid program found that, in contrast to practices achieving an optimal level as a PCMH, entry-level practices[140]:

- Were smaller (usually solo practitioners)
- Had more limited resources
- Tended to be located in rural areas
- Had a higher member-to-provider ratio.

A survey of the entry-level practices also revealed that most were reluctant to advance to a higher level due to already being fully stretched with the current load of patients, and lack of resources to add more staff.[140] The requirements that practices found most difficult to satisfy were provision of four-hours per week of after-hours care, and setting up of a screening, intervention and referral program for mental illness and substance abuse. Solutions suggested by the authors included increasing co-pays for after-hour services to pay for the additional staff needed and increasing efficiency by allowing multiple practices to offer a joint after-hours program.

A major barrier for small practices at the outset is the capacity to complete the paperwork necessary to access incentive funding to implement PCMH features and/or achieve recognition as a PCMH provider.[141] The documentation required for recognition as a PCMH provider has been found to be particularly onerous.[11, 12] Towards this, one study recommends that processes associated with accessing incentive funding and applying for recognition be streamlined or otherwise minimised for small practices.[141]

A study of small to medium-sized PCMH providers in South-eastern Pennsylvania examining transformation amongst these practices found a great deal of variation in workforce composition.[142] Typically, the practices employed two to five medical assistants, with one practice employing 13. The number of active patients over a two-year period ranged from 1,988 to 14,000 patients per practice (average of 5,516), and between 430 and 2,444 patients per provider (average of 1,379). The authors observed that practices utilise a range of staff (nonclinical or clinical health professionals and support staff, such as case managers and social workers), to deliver patient-centred care.

A randomised controlled trial to establish whether solo and small primary care practices receiving support when transitioning to a PCMH showed improved quality (as measured by blood pressure control and increased rates of screening for breast cancer) and efficiency (as measured by reduced emergency department visits) amongst the intervention group.[143, 144] The intervention practices received dedicated practice redesign support, care management support by nurse care managers embedded in practice care teams (1 FTE per 1,000 patients), and reimbursement of the cost of qualifying for PCMH provider recognition as well as per-member-per-month payments for improvements in specific process and clinical quality measures. The control group received a $5,000[h] a year for participation if the practice was compliant with data submission requirements. In contrast to the intervention group, the same measures for the control practices remained unchanged or declined during the trial.[143, 144] The authors conclude that "*practice size posed no disadvantage in making the transition to a PCMH over time*" (p. 774).[144]

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[h] All costs are in US dollars (USD).

One study that specifically set out to estimate the cost of practice transformation to a PCMH found that per clinician and per patient transformation costs were greater for small and independent practices than for large and system-affiliated practices.[30] The researchers found that median total one-time costs for system-affiliated practices were $3,165[i] per clinician (range, $1,498 to $12,599), compared to $19,635 per clinician ($7,030 to $57,476) for independent practices while median ongoing yearly costs were $41,914 per clinician ($18,585 to $91,025) versus $71,769 ($24,668 to $93,856) respectively. Median total one-time costs for small practices (fewer than four clinicians) were $14,569 per clinician (range, $2565 to $57,456), compared to $5990 ($1497 to $23,542) for large practices (four or more clinicians) while median ongoing yearly costs were $78,929 per clinician ($41,914 to $93,856) and $28,730 ($18,585 to $78,749), respectively.

Despite their small size, it is still possible for small practices to successfully achieve various elements of the PCMH model. For example, in a study of PCMH-accredited practices with five or less physicians (of which 35% were solo physician practices), self-management support was commonly provided to patients.[145] However, it tended to be delivered by physicians. Also, in another study, the small practices studied tended to implement informal rather than formal care teams and regular meetings to review and plan care for patients rather than formal Plan Do Study Act (PDSA) approaches.[141] The authors commented that "*It appears that many of these practices achieved the spirit, if not the letter, of the law in terms of key dimensions of PCMH*" (p. S88)[141] and recommend that more flexible and less formal strategies be used for implementing PCMH models in smaller practices, and in evaluating the effectiveness of the implementation. Another study reporting on Blue Cross Blue Shield of Michigan (BCBSM) PCMH Designation Program identified that financial support from BCBSM and administrative support from their physician organisation[j] may have contributed to expansion of PCMH capabilities for smaller practices.[21] (Incidentally, of the 2,510 primary care practices among 39 physician organisations: 57% were solo-physician practices, 25% had two to three physicians and 18% had four or more physicians.) The authors conclude that "*External support can facilitate rapid growth in PCMH implementation, even for smaller practices*" (p. 852).[21]

A study reported on earlier also illustrates that small primary care practices can make changes consistent with PCMH goals without having to make the large infrastructure investments often required to implement the model.[22] The study was of CareFirst, a US insurer operating in three states. The study sought to examine whether practices could achieve lower spending, fewer hospital admissions and fewer emergency room visits through payment incentives. The insurer also offered practices information and care coordination support. The program established by CareFirst did not require certification by a PCMH-accrediting organisation and instead followed the core PCMH attributes defined by the Agency for Healthcare Research and Quality (comprehensive and coordinated care through a team of care providers, and an emphasis on hospital transition; chronic, complex, behavioural, and substance abuse care; accessible services through same-day appointments and 24/7 phone triage; patient-centeredness through care plans developed by nurses, clinicians, and patients together; and, quality through objective performance metrics required for earning shared savings). It was specifically established to appeal to smaller practices. By the third year, members had fewer hospital admissions and fewer emergency room visits. The annual adjusted total claims payments were 2.8% lower per participating member than before the program and compared with those who did not participate. The researchers conclude that cost savings can be achieved without practices having to make large infrastructure investments and that "*particular structural PCMH elements may not be required for good results*" (p. 1387).[22]

It may also be possible for small practices to achieve change quickly. In a study of pilot PCMH practices in Rhode Island, while initial performance on PCMH dimensions was low, improvement was rapid (two years).[17]

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[i] All costs are in US dollars (USD).

[j] Defined as a group practice.

Capabilities that all practices were able to achieve over the implementation period included access and communication, patient tracking and registry, and referral tracking. (The authors hypothesised that this was due to the fact that these were the measures used for achieving PCMH status, thus, "*what got measured had received more attention*" p. e271). Electronic prescribing, patient self-management support and care management standards were only achieved by the higher performing practices.

In the above study[17], solo physician practices had the highest capabilities on all of the PCMH standards assessed. The authors hypothesise a 'U-shaped' relationship between practice size and capabilities, suggesting that solo practices are more nimble and adaptable. However, the small sample size and voluntary nature of practices participating in the study (i.e. early adopters) means that the conclusions are not firm.

A qualitative study of 200 physicians from small practices found that they desired being part of a network or cluster as a means of sharing resources.[146]

Small practices face barriers in adopting health information technology. In one study, the rate of uptake of health information technology tools increased with the size of the practice.[109] Small practices (defined as those with two to nine physicians) were almost twice as likely to implement an EMR for example, compared with solo practices (one physician; odds ratio of 1.82). Medium/large-sized practices (ten or more physicians) were almost five times as likely to implement an EMR (odds ratio of 4.87) compared with solo practices.

Provision of specific services or services to specific populations

Mental health and substance abuse services

GPs are often the first port of call for people with mental illness and the PCMH model offers an opportunity to improve care through its focus on organised, evidence based care and coordination, and its focus on whole-patient care.[147, 148] However, there are concerns that mental health issues are often inadequately identified in primary care or that patients do not receive care according to evidence-based guidelines.[148]

Barriers to the effective delivery of mental health and substance abuse services in primary care are time, resources and lack of expertise.[149] While the employment of a dedicated role to attend to patients with these needs is a solution, less than half the sites surveyed in one American study had such a resource.[149] Practices were also less likely to have procedures for referrals, communication, and patient scheduling for responding to mental health and substance use issues than for other medical care. The authors conclude that there is "*a need for a fundamental change if care for mental health, substance abuse, and health behavior is to be included in the ongoing evolution of primary care*" (p. 642).[149]

While research shows that collaborative primary care/mental health models can improve care and patient outcomes, relatively little work has been done on how these models are best implemented.[147] One author reviewed the literature on strategies for implementing collaborative primary care/mental health models.[147] Some of the main approaches found were: interactive educational strategies, the use of technological support tools, stakeholder engagement in the design and execution of implementation plans, organisational changes, such as expanding the tasks of nurses, and financial strategies such as additional collaboration fees and pay-for-performance incentives. They saw the PCMH model as an enabler in implementing these strategies and conclude that "*Combinations of strategies, tailored to the local context, in close collaboration with local stakeholders, seem the best implementation approach*" (p. 503), but specify that "*collaborative models and their implementation strategies need to be locally adapted to specific contexts, capacity and financial possibilities*" (p. 509).[147]

Another study identified six components of collaborative care models: a population-based approach (i.e. systematically identifying all patients with a particular disease, providing appropriate treatment and tracking

outcomes); measurement-based care (using objective laboratory or physiological measurements in the treatment of patients); a treatment-to-target strategy (treatment using regular monitoring of the severity of a disorder); care management (involving a physician dedicating time to following the progress of particular patients); supervision by a mental health professional; and, brief psychological therapies (such as motivational interviewing and problem-solving treatment). The authors suggest that factors that may facilitate collaborative care are (1) a more favourable alignment of medical and mental health services in care organisations and PCMHs, (2) greater use of telecare and automated outcome monitoring, (3) identification of patients likely to benefit most from collaborative care models and (4) systematic training of both primary care and mental health providers in integrated team-based care.

A collaborative care model for depression in a PCMH implementation identified the following contextual factors that facilitated or hindered implementation of the model: clinic leadership, a quality improvement culture, staffing, technology infrastructure and external incentives/disincentives for organisational change.[150] The model featured universal screening for symptoms, risk stratification based on the severity of symptoms, care management for intensive follow-up, psychiatry consultations, and staff participation in a mental health infrastructure and training program. A quality improvement team was created to monitor protocol adherence and clinical performance on a quarterly basis and collaborated with operations management for process improvement. Using data extracted from patients' electronic medical records over a 22-month period, the researchers compared the progress of patients who saw only a primary care provider with those who saw both a primary care provider and a mental health provider, and found increased rates of primary care physician encounters, timely follow-up for monitoring depression symptoms and documentation of treatment.

Integration of mental health services into primary care remains a barrier for the provision of effective management of patients with mental health and behavioural issues. The US Veterans Health Administration began incorporating mental health services into a more integrated primary care system in 2007, and there is evidence that this has improved the identification and treatment of mental health patients, as well as increasing the likelihood of treatment in conformity with guidelines, and better engagement in the case of patients referred to specialist mental health services.[148] The successes have been attributed to strong infrastructure and leadership, standardised screening, assessment, and treatment, and clearly marked paths from primary care to integrated care, and to specialty care where needed.

A study of a mental health clinic co-located with a primary care clinic in New Haven, Connecticut describes a number of lessons learnt during the implementation process, with recommendations for providers and agencies who are considering or developing an integrated care model.[151] Among the lessons learnt are: the importance of carefully selecting the institutions to be partnered, with prior experience with integrated clinic management and a shared vision (especially among top management) being important facilitators; the financial viability of the integration process; a group effort, with key personnel from both partnering institutions committed to establishing and maintaining the clinic; a shared attunement to the culture of a medical clinic; an understanding of differences in workflow between the two kinds of clinic to be integrated; and, a sharing of medical information.

Another study gives an example of a program for improving integration of care for individuals with serious mental health or chronic physical health conditions — the HealthChoices HealthConnections (HCHC) pilot program.[152] HCHC was a community-based program for promoting consumer engagement and enhanced care coordination using 'navigators' — nurses, behavioural health clinicians, or case managers — who help consumers to find their way around the health care system. The researchers analysed qualitative data as well as Medicaid claims data to examine changes in emergency department visits, hospitalisations and readmissions, comparing an intervention group of HCHC patients with a control group. They found that emergency department visits decreased by 4% amongst the intervention group while increasing almost 6%

in the comparison group during the intervention period. (There were no statistically significant differences in hospitalisations or readmissions). These researchers conclude that the results "*demonstrate the promise of nurse navigators (care managers) to bridge gaps between the physical and mental health care systems*" (p. 213).

In a study of PCMH practices across the US considered as innovators in team care, most employed a behavioural health specialist who consulted with care teams about mental health, substance abuse and other behavioural health issues, and provided short-term crisis management and therapy.[96] The role was mostly performed by a licensed clinical social worker but some practices had added psychiatrists or psychiatric nurse practitioners to provide advice on psychoactive drugs. In general, mental health care was provided by multiple roles within practices. For example, medical assistants performed depression screening before the provider enters the room and registered nurses or behavioural health specialists made follow-up phone calls to depressed patients started on treatment.

One study investigated the degree of change in behavioural health (associated with mental health disorders) integration using a practice facilitator trained in integrated care.[153] The study was of 12 PCMH implementations, eight federally qualified health centres and four private practices. The degree of behavioural health integration was assessed with a quasi-experimental design using the Maine Health Access Foundation's Site Self-Assessment first at baseline and again after implementing site-specific behavioural health services. At the conclusion of the study, sites saw a statistically significant increase in the level of behavioural health integration from a baseline of 2.73 to a postintervention score of 3.49, with improvements from mild-to-moderate overall integration to moderate-to-advanced overall integration. Furthermore, ten out of the 12 sites achieved successful implementation of unique goals with assistance from the practice facilitator.

One study explored the role of organisational context in the implementation of an initiative to integrate mental health services into paediatric primary care.[154] The researchers set out to test whether organisational context, comprised of 'culture', 'climate', 'structures/processes' and 'technologies', influenced uptake of an intervention to implement mental health services in paediatric primary care. According to the authors, 'culture' refers to shared values and norms; 'climate' refers to staff members' shared perceptions of what happens within a practice; 'structures/processes' is used to refer to standardised policies and procedures and the configuration of roles and authority in an organisation; and, 'technologies' refers to the built environment, tools, equipment, and other resources used by staff as they carry out their work. Staff from 21 practices took part in a Building Mental Wellness (BMW) Wave 3 Learning Collaborative, a state-wide effort to improve detection and management of child and youth mental health conditions among primary care providers in Ohio. Quality coordinators met with staff from each practice monthly to discuss their progress and agree upon the level of completion of each of 17 discreet activities that were targets of BMW and the researchers tested the effect of organisational context on BMW Wave 3 program uptake at the practice level. They found that culture, structures/processes and technologies are important determinants for the uptake of activities for implementing health services in paediatric primary care. Implications are that "*pediatric primary care practices would benefit from assessing their organizational context and taking steps to address it prior to or in a phased approach with mental health service implementation*" (p. 2).[154]

Lifestyle interventions
A function of PCMH is to provide lifestyle interventions to populations at risk of developing chronic conditions and/or to refer patients to other providers to receive these services. Barriers and enablers to this include[155]:

- Clinicians' perceptions of their roles regarding lifestyle interventions. When clinicians perceive that lifestyle change counselling is part of their role this is more likely to occur. This is sometimes related to perceived competency of staff in a specific area of lifestyle change and/or their personal experience of

the issue (e.g. their level of physical activity or management of their own weight). Enablers include clarifying roles and responsibilities of individual members of primary care teams (ensuring that each plays a role in reinforcing healthy lifestyle messages), training staff in lifestyle interventions and involving them in programs to adopt a healthier lifestyle

- Anticipated outcomes of lifestyle interventions. When clinicians perceive that they can do little to effect lifestyle changes in their patients they are less likely to try. Also, clinicians are less likely to refer patients to programs when they don't know whether the program has worked for any patient
- Competing priorities and time to undertake lifestyle interventions with patients. Dedicated appointments for lifestyle change counselling are more likely to ensure that this occurs than trying to fit it in amongst other issues that a patient needs help with. Alternatively, having a dedicated role (e.g. a health coach) and/or referring patients to an available program can help.

In the study of PCMH practices considered as innovators in team care described earlier[96], the practices used staff without formal health training or certification to provide health coaching. In addition, the practices collaborated with their broader communities in these endeavours. For example, a practice in a low income rural community was the driving force behind the community's efforts to reduce childhood obesity.

Care of children

Various studies have found barriers and enablers to delivering appropriate care for children in the PCMH environment.

One study interviewed 20 paediatricians and family physicians at practices that had achieved PCMH recognition in the US to investigate their motivations in seeking this recognition and, in particular, what they perceived as the benefits and challenges of functioning as a PCMH for children.[37] Most of those interviewed said that recognition acknowledged existing practice characteristics but also encouraged ongoing transformation. Regarding the provision of health care for children, perceived challenges were dealing with additional physician responsibilities, communicating with other providers and health systems, and building sustainable care coordination procedures. Some interviewees offered examples of how functioning as a PCMH could benefit children. These included the ability to provide care continuity, the use of registries to track patients for proactive preventive and chronic care management, offering coordinated care using the expertise of experienced care coordinators, and exchanging information with other care sites such as emergency departments, specialists' offices, and schools.

Another study analysed data from the 2012 American Academy of Pediatrics Periodic Survey (PS 79) to determine paediatricians' views on whether care for children with special health care needs should be located at the primary care or subspecialty care level, and whether subspecialty care is the best locus for children with rare or complex conditions.[156] Data from 572 primary care paediatricians indicated that 65% agreed/strongly agreed that primary care is the best setting for most children with special health care needs, while 43% (a 'substantial minority') agreed/strongly agreed that subspecialty care is the best setting for children with rare or complex care needs. Among the reasons given for the latter view was a perceived lack of skill at the primary level to communicate and coordinate with other health care providers.

Another study set out to pinpoint the essential factors leading to the successful transformation of 12 high-performing paediatric primary care practices, six to seven years after their participation in a national medical home learning collaborative intended to foster implementation of the medical home model for children and young people with special health care needs.[157] The researchers' data sources were (1) validated Medical Home Index (MHI) assessments completed before, immediately following and six to seven years after participation in the learning collaborative, (2) a clinical staff questionnaire completed by a physician, care coordinator or other staff member in each practice, and (3) semi-structured interviews with a physician, two 'parent partners' who had children with special health care needs, and a care coordinator in each practice.

Questions were designed to identify factors that facilitated adoption of the medical home model and to understand its impact on the practice and on children, families, clinicians and staff. The MHI assessments showed a gradual improvement in the practices' MHI scores immediately after as well as several years after the collaborative. Qualitative analysis of the interview data showed that physicians identified the learning collaborative as crucial to their subsequent learning and that they benefited significantly from peer-based learning. Eleven of the 12 practices developed formalised quality improvement processes with active parent participation. All interviewees expressed the need for set standards to guide ongoing efforts to improve, with time for reflection and planning. They uniformly felt, however, that substantial personal time and working on multiple fronts were required for progress to be made. The physicians generally found parental involvement stimulating but that the recruitment, orientation and engagement of parents as team partners was difficult. Most interviewees emphasised the general importance of teamwork with active parent participation.

Another study set out to improve the rate of delivery of prevention services to one to 14-month-old patients in three academic paediatric clinics in a primary care PCMH setting.[158] These services included administration of routine vaccinations, influenza vaccination, completed lead screening, completed developmental screening, screening for maternal depression and food insecurity, and documentation of gestational age. From a current rate of 58%, they increased the delivery rate of the full bundle of preventive services to 92% through making use of specific features of the PCMH model, such as developing workflows, and using data and teamwork. They developed routine 'flows' and cycles to improve the rate at which patients received all bundle elements for which they were eligible, and weekly run charts and statistical process control methods to bring about a significant change in performance. A team structure was created to support primary care redesign, with some of the team's time devoted to preventive services for infants. The team included a steering committee for overall guidance and a project manager, with site-based teams at each primary care clinic. Nurses and medical assistants received payment for the hours they spent in these planning and training activities. A measure of the reliability of daily preventive service delivery was created, with the visit as the unit of analysis. This measure calculated the percentage of zero to 14-month-old visits during which the patient received all elements of the bundle for which they were eligible that day.

One study demonstrated the development of a structured, reproducible process for selecting feasible intervention strategies for implementation in a PCMH model for reducing hospitalisations among children with medical complexity.[159] The researchers used a series of in-depth interviews with the UCLA Medical Home Program's clinical and research teams, a national expert panel and a literature review, to identify strategies. Four intervention strategies were judged as potentially having a higher likelihood of success for reducing hospitalisations among children with medical complexity. These were (1) enhanced provider access, (2) anticipation, early recognition and prepared contingency plans, (3) caregiver knowledge and skill, and (4) efficient transition-of-care arrangements (e.g. visit at home one week after discharge). The feasibility of these was then assessed and two were selected for a subsequent randomised controlled trial.

The role of organisational context in integrating mental health services into paediatric primary care is described in the section 'Mental health and substance abuse'.[154]

Vulnerable populations

A key goal of the PCMH is to improve quality of care, which in turn has the potential to reduce disparities in health care and health outcomes amongst populations. Given this, one study specifically looked at the extent to which implementations of PCMH across four US states considered health disparities and the implications of the design of each of the initiatives on disparities.[160] The study found that leaders and health care providers believed that PCMH has the potential to reduce disparities as many of the features of the model are likely to provide disproportionate benefits to vulnerable populations. However, disparities were neither documented nor evaluated in the initiatives studied. Moreover, disparities were not adequately

adjusted for in quality metrics (i.e. through risk adjustment/stratification), with the results that practices predominantly serving vulnerable populations struggled to achieve quality improvement and, in turn, received less resources due to the configuration of funding approaches. The authors recommend that measurement and reporting of disparities be central to PCMH implementation, practices serving vulnerable populations be paid higher amounts to adequately meet the needs of these populations and that quality metrics are adjusted to account for disparities. A study of the implementation of the PCMH in the US Military Health System also recommends that "*consideration be given to compensate or otherwise reward the PCMH team for increased productivity for caring for high-risk patients and providing after-hours services*" (p. 151).[41]

One study compared the perceptions of care delivered in a PCMH setting amongst a vulnerable population (chronically ill, high-risk, low income patients) and their providers, highlighting tensions between the two groups.[118] The study found that provider strategies designed to increase patient access, such as patient portals and same day scheduling, did not work for patients for various reasons. Also, while access was important to patients, so was continuity of care. So, they negatively perceived situations where they required urgent care and were forced into seeing an unfamiliar provider, preferring sometimes to go to the emergency room instead. The researchers recommend that patients be engaged in developing PCMH implementation strategies that are suited to their circumstances.

Another study conducted 20 patient interviews at the University of Illinois Health Sciences campus with a view to investigating patients' attitudes to preventive medical care.[161] Many of the patients were underserved and underinsured, and the purpose was to record their experiences in the healthcare system. One theme that emerged was the need for empathy and rapport with their providers. Provider behaviour they identified as fostering a positive clinical relationship included step-by step explanations of procedures, attention to body language and clinic atmosphere, and appropriate time management. Cost was identified as the most common barrier to engaging in preventive care. Facilitators were social support and a long-term relationship with a provider. Many patients expressed feelings of dehumanisation in the healthcare system, reporting that their life circumstances were overlooked, or that they were judged based on insurance status or ethnicity. The researchers report that "*a large, over-arching category that emerged was the importance of holistic, patient-centered care, where providers considered the totality of a patient's physical health, their ways of coping, and their environment*" (p. 11). They suggest that the themes of holistic, patient-centered care and dehumanisation "*are...consistent with recent efforts to establish patient-centered medical homes when treating underserved populations. The PCMH can help integrate patient care, foster patient-provider communication, and create linkages with other services in the community*" (p. 14).

A study investigating the implementation of a PCMH model in a nurse-led primary care practice found 'life and social stressors' of patients to be a major barrier.[58] Specifically, attributes such as low income, active substance abuse, being part of a transient population, or housing instability, presented as obstacles that had to be addressed before the patient's health issues could be prioritised.

Screening, preventative care and other population health services

PCMHs have an important role in population health. To better understand the connection between the PCMH model and population health, one study sought to examine whether medical practices that performed population management were more likely to adopt other PCMH elements.[162] The objective was to identify associations between characteristics of family physicians who perform population management with other PCMH elements. To do this the researchers retrieved and analysed data from a survey relating to PCMH properties completed by 5,818 physicians on the American Board of Family Medicine Web site in 2011. The final sample included 3,855 physicians, 37.3% of whom reported performing population management. Demographic characteristics significantly associated with greater use of population management were female sex and graduation from an international medical school. PCMH components that

remained associated with population management after adjustment were access to clinical case managers, behavioural health collaboration, having an electronic health record that supports meaningful use, recent participation in a quality improvement project and routine measurement of patient difficulty securing an appointment. Performance of population management was associated with several PCMH elements and resources not present in traditional primary care offices. The authors suggest that attention to these elements is likely to enhance delivery of population management services in primary care.

Another study set out to investigate barriers to cervical cancer screening reported by health centres undergoing PCMH transformation.[163] The basis of the investigation was a qualitative analysis of submissions by practices seeking funding for PCMH transformation and for supporting their cervical cancer screening activities. Perceived barriers mostly related to the patient population (e.g. seeking only symptomatic care, mistrust of the medical community) or to infrastructure (e.g. poor record keeping, poor coordination with external providers or laboratories and lack of clinical staff). Fewer health centres identified provider-level barriers, such as noncompliance or general lack of training. The majority (74%) of health centres planned an educational or promotional program to increase the patient population's awareness of cervical cancer need and their awareness of the services offered by the health centres. Several health centres planned on hosting or participating in cultural events to engage their patient population. More than half (55%) the health centres planned on providing some training or education for providers. Staffing was a common way to allocate funding; the most frequent proposed addition to staff being someone who would specialise in coordination of care.

A qualitative analysis of 118 semi-structured interviews at 17 primary care practices in Pennsylvania sought to investigate how changes in hypertension care under PCMH implementation could lead to improved hypertension control.[164] Interviewees were clinicians (n = 47), medical assistants (n = 26), office administrators (n = 12), care managers (n = 11), front office staff (n = 7), patient educators (n = 4), nurses (n = 4), social workers (n = 4) and other administrators (n = 3). Participants were generally optimistic about improving hypertension care and felt that the collaborative PCMH model provides a move in the right direction. Clinicians described difficulties in expanding services under the PCMH model to meet the needs of the growing number of patients with hypertension, as well as how perceptions of hypertension control differed from actual performance. Staff and office administrators discussed achieving patient-centred hypertension care through patient education and self-management support with personalised care plans. Practice staff were predominantly responsible for providing patient education. They suggested that patient report cards were helpful tools. Challenges that emerged related to staffing and the training of personnel. It was suggested that clinicians and staff needed to communicate more, help each other to anticipate problems and encourage patient involvement in care — the latter made more difficult by high office turnover.

Two studies reported on the impact of an innovative care management model for diabetic patients implemented by seven recognised health centres serving 10,000 diabetic patients in Miami-Dade County.[165, 166] Changes were assessed using data from the patient registry at baseline, and six, 12 and 24 months post-implementation. A feature of the intervention was a centralised care management team that made pre-visit phone calls to diabetic patients who had scheduled appointments. These phone calls optimised patient knowledge and self-management goals, and provided patient care coordinators with relevant clinical information to optimise the office visit and help to ensure completion of recommended diabetic preventive and chronic care services. Data suggest that following the implementation of this care management model, more diabetic patients were receiving regular care, and compliance with recommended tests and screenings had improved. Pre-visit preparation was identified as the key strategy for improving areas critical for chronic disease management, such as patient engagement, appointments kept and compliance with recommended screenings, tests and services.

Additional enablers supporting the implementation of the PCMH

In addition to the enablers for responding to specific barriers in the previous section, initiatives that have the potential to address a range of barriers were identified in the literature. These are described in this section.

General

One study reported on the strategies used for PCMH transformation by the first 132 primary care practices in Minnesota achieving PCMH certification.[63] These are reproduced in the table below. The authors indicate successful use by practices of nearly all the change strategies recommended by early adopters. The strategies used less frequently by the early adopting clinics also tended not to be successful for the practices surveyed.[6]

Table 6: Strategies to support PCMH implementation

Strategy to support PCMH transformation	% Used, Worked Well	% Used, Didn't Work Well	% Didn't Use
Providing information and skills training	91	9	0
Designing care improvements to make the care process beneficial to patients	90	5	5
Including frontline staff in primary care redesign efforts	88	5	7
Reporting measurements of individual or care unit performance for comparison	85	11	4
Changing or creating systems that make it easier to provide quality care	83	16	2
Setting goals and benchmarking rates of performance quality at least yearly	83	16	2
Periodic measurement for assessing compliance with any new approach to care	83	12	5
Using teams focused on accomplishing the change process for improved care	80	13	7
Using opinion leaders and role modelling to encourage support for changes	74	14	12
Delegating care to non-physician staff	68	12	19
Using rapid cycling, piloting, and pretesting to reduce risk of negative results	68	14	18
Removal or reduction of barriers to better quality care	67	26	8
Customising the implementation of any care changes to each site of care	66	18	16
Providing the power to authorise and make desired changes	66	21	13
Including patients in primary care redesign efforts	64	9	26
Designing care improvements to make physician participation less work	60	20	20

Source: Solberg et al.[63]

For the three-year demonstration project to transform federally qualified health centres into advanced primary care practices in support of US Medicare beneficiaries, practices were provided with a range of supports.[11, 12] These included expertise and responses to individual site inquiries in relation to PCMH formal recognition, webinars about PCMH components and documentation and practice coaches. The evaluation found that the supports were "*not well coordinated until the demonstration's second year, which may have left some sites uncertain early on about the resources available to assist in achieving PCMH recognition and may have delayed their adoption of medical home change processes*" (p. xiv).[12] Also, the multiplicity of resources was initially confusing for many sites.

Education programs

Programs to educate practice staff on the PCMH model can include a variety of approaches. However, "*Whether one uses live webinars, workshops, educational outreach visits, or some combination of these interactive intervention approaches, the important issue is to plan, implement, and evaluate an educational program with an appreciation of appropriate outcomes and with an awareness of evidence-based practices*" (p. 29).[52] The study just quoted used an 'expanded outcomes framework' to evaluate a three-year demonstration project under the National Committee for Quality Assurance (NCQA) scheme designed to transform federally qualified health centres into advanced primary care practices in support of US Medicare beneficiaries.[52] The framework outlines seven levels of value or success achievable by a PCMH education program, beginning with the lowest levels — level 1 to 3 — where actual benefits to patients are negligible, and rising to levels 6 and 7, where participants actual behaviour as healthcare professionals is changed in a way that produces outcomes for patients. The framework is as follows:

- Level 7 Community Health Status — The degree to which the health status of a community of patients changes due to changes in the practice behaviour of participants
- Level 6 Patient Health Status — The degree to which the health status of patients improves due to changes in the practice behaviour of participants
- Level 5 Performance — The degree to which participants do what the continuing education activity intended them to be able to do in their practices
- Level 4 Competence — The degree to which participants show in an educational setting how to do what the continuing education activity intended them to be able to do
- Level 3B Procedural Knowledge (i.e. skill) — The degree to which participants state how to do what the continuing education activity intended them to know how to do
- Level 3A Declarative Knowledge (i.e. knowledge) — The degree to which participants state what the continuing education activity intended them to know
- Level 2 Satisfaction — The degree to which the expectations of the participants about the setting and delivery of the continuing education activity were met
- Level 1 Participation — The number of clinicians and others who participate in the continuing education activity.

The authors point out that the lower levels cannot be skipped to achieve higher ones and acknowledge that resources may not be available to address all the levels described but that these should be the goals.

Regarding the NCQA program to transform federally qualified health centres into advanced PCMHs, the authors found limited participation and feedback on the part of those attending.[11, 12] What was available to sites and how much of it they participated in was as follows:

- Three training webinars were offered by the NCQA. Even in the last six months of the demonstration, between 68% and 90% of sites across six regional clusters did not participate in any of these webinars, and overall, no region achieved webinar participation of more than 40%
- Thirty-seven 'office hour' webinars were also developed by American Institutes for Research, a subcontractor to the Centers for Medicare & Medicaid Services, who implemented the demonstration

and commissioned the evaluation. There was less than 20% average participation in the office-hour webinars.

The authors note that "*what is unclear from the project...is how many of the practices that achieved recognition was really any different in how they conducted their work or cared for patients as a result of undergoing the recognition process*" (p. 29). What was clear, however, was that the NCQA program fell far short of the higher levels which, on this analysis, training programs should ideally aim.

A study referred to earlier identified 'facilitative leadership' as one of the characteristics that distinguished practices with the greatest performance on patient clinical measures from practices with the lowest performance.[45] The authors suggest that key staff involved in PCMH implementation receive facilitative leadership training, either within the practice (e.g. through a practice coach/facilitator), or that medical schools and other health professional training programs consider this in their educational curricula.

Practice facilitation/ coaching

Practice facilitation/ coaching can help with all aspects of a practice's transformation to a PCMH, including:

- Getting started[16, 34, 42]
- Technical assistance with/ training for key elements of PCMH practice, such as teamwork and quality improvement (e.g. plan-do-study-act)[17, 78, 106]
- Assessing a practices/ individual staff members competencies[78]
- Sustaining PCMH approach over time.[78]

There are many forms that facilitation/coaching can take, including individualised consultation or peer-to-peer learning.[16] Coaches can be internal or external to the organisation. One study noted that internal coaches may be especially helpful for staff to see the applied value of quality improvement tools.[106]

One study found that transformation was accelerated amongst organisations implementing PCMH when an individual within the practice took on a quality improvement coordination role, working alongside the external coach.[23]

In a two-year randomised control trial, a dedicated practice facilitator provided practice redesign support to the intervention group of solo and small practices transitioning to a PCMH model.[143, 144] Activities were focussed on the use of the EMR and on workflow. Practices that received this intervention (along with other interventions such as payment incentives and care management support) achieved improved quality (as measured by blood pressure control and increased rates of screening for breast cancer) and efficiency (as measured by reduced emergency department visits). The researchers conclude that "*Without such supports, change is slow and limited in scope*" (p. 770).[144]

In its evaluation of 15 rapid test sites implementing PCMH in England, the Nuffield Trust identified supports that can be provided to practices by the National Association of Primary Care (NAPC).[9] The NAPC is an organisation that represents the interests of primary care professionals and developed the model that was implemented by the rapid test sites. The Nuffield Trust recommends that the NAPC identify outcomes and interventions that address local objectives and are consistent with PCMH, and delivers these through: ongoing coaching about the model, such as how to align clinical and financial drivers; supporting the development of logic models and other elements to assist with PCMH implementation, such as local provider engagement and population health management; and, training on data extraction and analysis. It also identifies the following tools/aids that can be provided by an overarching organisation such as the NAPC: communication aids linking local service developments with the aims of PCMH; support with strategic plans; evaluation; sharing of best practice development in PCMH, including a 'reference library' of exemplar logic models, case studies and measurement options; and, opportunities for peer-to-peer learning.

Learning collaboratives

Learning collaboratives provide the means for practices to exchange information and experiences, and test and share tools and resources.[16, 17, 20, 42, 43, 62] They have been found to be important for staff buy-in to the PCMH model[56], as well assisting practices to improve their performance (e.g. in one study, significant improvements were made in diabetic process measures, including eye examinations, foot examinations, smoking cessation and self-management goals).[167]

Mechanisms for exchange of information amongst collaborative members include seminars, webinars/virtual lectures, conference calls, face-to-face meetings, newsletters, virtual communities of practice, and individual and group site visits/ field trips.[16, 18, 42] Field trips have been found to provide an 'energy boost' for practices going through change, in some instances normalising the challenges of the change process for participants and providing encouragement to continue.[18, 42] Virtual approaches can assist in keeping up the energy of participants between face-to-face meetings[16], as well as being the primary mode of collaboration.[43]

In one study, the Institute for Healthcare Improvement's Breakthrough Collaborative Series methodology was used as designed to assist health systems with large-scale quality improvement. The methodology includes a combination of didactic learning sessions, skill development and application, and team development and application.[62]

The following components have been found to be important for effective learning collaboratives[16, 45, 62, 168]:

- Prework
- Setting clear and mutually agreeable goals
- Tracking and recording quality measures
- Application of learnings between sessions (e.g. using 'plan-do-study-act').

A study of three practices successfully implementing PCMH found participation in learning collaboratives to be a common factor amongst the practices.[23] However, one of the practices had failed to make desired changes after several years of involvement in a collaborative. While the collaborative had provided the ideas for change and the motivation, it had failed to provide the capacity to execute the ideas. For this, the practice used a quality improvement coordinator.

Capacity to execute may also be limited by resource constraints or other 'real world' factors. Therefore, training provided through collaboratives must include consideration of these challenges.[43]

In one study, researchers conducted an anonymous online survey of 353 participants (including providers, nurses and support staff) in a virtual learning collaborative designed to support PCMH implementation within the US Veterans Integrated Service Network.[43] The collaborative was established due to restrictions on travel funding which prompted the organisation to promote local approaches to training. It was also in response to the training needs of teams in geographically remote clinics who tended to be less involved in organisation-wide happenings. The purpose of the study was to investigate why and for whom the collaborative proved effective or otherwise, and to identify possible ways of improving it. It was found that the collaborative was of most help to those with prior PCMH training and those who fully participated in collaborative activities. Non-providers and those new to the PCMH experience felt their learning needs were not satisfactorily met. Reported barriers to participation included staffing constraints, lack of sufficient time and inadequate leadership support.

Learning collaboratives require significant time investment which must be recognised and supported organisationally.[62, 168]

Learning resources/ 'toolkits'

In many studies examined in this review, various resources were developed and made available to practices undergoing transformation to a PCMH. These included resources related to quality improvement, clinical processes, and information and knowledge (such as experts/other experienced staff).[20, 27, 65]

Learning resources can support transformation to a PCMH by describing the changes required, providing the evidence base and rationale for a given initiative/concept, laying out implementation steps and activities, and providing tools and case studies to support implementation.[42] The resources can be used to support coaching/facilitation.

In one implementation of the PCMH, topics for learning resources were based on practice feedback throughout the implementation process.[42]

Another study aiming to develop a replicable approach to implementing the PCMH amongst practices in the US serving vulnerable populations developed a multimodal technical assistance program to support practices.[35] The materials included implementation guides, interactive tools, and a catalogue of webinars and videos on a broad range of PCMH and policy topics.

One study describes an initiative in which the provincial government in British Columbia, Canada, developed what was called the Practice Support Program to transform primary care to operate according to PCMH-principles.[27] The Program consists of learning modules and peer-led delivery by GP champions from the local community trained in the modules. GPs have three half-day learning sessions, and between these, 'action periods' where they apply what they have learnt to their own practice. The authors of the study comment that the *"learning modules have truly been a major success in providing GPs with paid training and support, and the evaluation results have been extremely positive"* (p. 45).[27]

In another study, an evidence-based toolkit was developed for non-medical staff within PCMH services to improve outcomes in smoking cessation and hypertension.[169]

A group of researchers evaluated the Patient Aligned Care Team (PACT) Toolkit.[170] The Toolkit consists of an online repository of ready-to-use tools developed by the Veterans Health Administration that clinic physicians, nurses and other team members can download to more effectively implement PCMH principles and improve local performance on VA metrics. The evaluation sourced data from website usage analytics, an online survey of the PACT community, and key informant interviews. They found that the toolkit was used by 6,745 staff in the first 19 months of availability, that 80% of the target audience had heard of the Toolkit, and that, of those, 70% had visited the website. Tools had been implemented at 65% of 136 VA facilities. Qualitative findings revealed a range of user perspectives from enthusiastic support to claims of lack of sufficient time to browse the Toolkit. The researchers found that *"staff...whose time is most occupied with patient care seem to have benefitted less from the Toolkit than those whose roles (e.g. care managers) enabled them to review it in depth"* (p. S577).[170]

Performance measurement and feedback

Data-driven feedback has been cited as being valuable in the process of transforming to a PCMH.[18, 26] However, a study reporting on a literature review and semi-structured interviews with representatives of 45 successful programs to determine attributes for the effective treatment of high-need, high-cost patients identified that *"it is unclear how timely the data needs to be or exactly which data elements are the most critical"* (p. e598).[26]

In a paper reporting on the technical assistance provided to practices participating in the Safety-Net Medical Home Initiative, an overwhelming majority of practices (83.7%) acknowledged that collecting, submitting and receiving feedback on data helped to implement process improvements necessary for becoming a PCMH provider.[42] This was despite the difficulties they had in collecting and reporting reliable

measures. In this implementation, all sites received a small one-time grant to support data collection and reporting.

Roles incorporated into primary care to support PCMH functions

This section describes roles that have been identified in the literature as being increasingly incorporated into practices to support PCMH functions.

Medical practice assistants

Due to their ability to take on both clinical and administrative duties, medical practice assistants are playing an increasingly important role in PCMH practices.[111] Examples of tasks undertaken by medical practice assistants are[10]:

- Greeting and rooming patients
- Urine testing, and taking blood pressure, height and weight and reporting results to clinical staff for interpretation and action
- Collecting necessary records and equipment for the next day's procedures.
- Preparing packs for, and cleaning up after, minor surgeries
- Maintaining stock control.

The small to medium-sized PCMHs in South-eastern Pennsylvania described in an earlier-mentioned study (p. 55) had between zero and nine medical doctors on their staff and typically employed two to five medical assistants, with one practice employing 13.[142] The medical doctor to medical assistant ratio was 1:1.4 amongst the 11 practices studied. Similarly, in another study of practices across the US considered as innovators in team care, each GP was assigned between 1.5 and three medical assistants.[96] Where GPs worked with more than one medical assistant, this allowed one medical assistant to stay with the patient throughout their visit. Medical assistant tasks included intake, scribing for the provider, and handling post-visit questions and issues. Medical assistants with additional training in self-management support and diabetes care also conducted individual and small group visits with diabetic patients.

Another study investigated the number and distribution of primary care physicians, nurse practitioners and physician assistants (defined as unlicensed support staff, in particular medical assistants) in 7,431 PCMH and non-PCMH practices located in New York State.[77] Using census-based data, the ratios of nurse practitioners to primary care physicians, and physician assistants to primary care physicians in PCMHs, were measured and compared with those ratios in non-PCMH practices. The researcher found that the ratios of nurse practitioners to primary care physicians and the ratios of physician assistants to primary care physicians was in both cases more than twice as high in PCMH implementations. This suggests that the strong growth rate of PCMH implementations and the increasing demand for health care will create a high demand for more nurse practitioners and physician assistants in the future.

One study of how medical assistants enhanced practices' ability to achieve PCMH standards identified the following strategies[97]:

- Organising medical assistants into provider teams. This resulted in greater efficiencies as providers and medical assistants adapted to one another's work styles and preferences and developed greater trust
- Engaging medical assistants in population management. Roles included identifying when patients were due for routine tests or preventive care, following standing orders for preparing patients for these services, or performing some of these services. Examples of services included screening for smoking status, administering immunisations and performing monofilament diabetic foot exams
- Empowering medical assistants to 'own' key quality measures. Measures owned by the medical assistants included the percentage of patients queried about tobacco use, the percentage of patients with diabetes who have had a foot exam, A1C test, LDL cholesterol test and microalbuminuria screening

- Turning medical assistants into health coaches. Practices helped medical assistants learn more about chronic diseases so they could educate patients on how to better manage their conditions through regular follow-up care, routine testing for complications and better self-care (diet, exercise, smoking cessation, etc.). Several of the practices trained medical assistants to help patients set self-management goals, and some went even further and trained medical assistants to be health coaches
- Developing medical assistants as outreach workers. As part of their population management and self-management support roles, medical assistants called patients who missed appointments, were overdue for services or needed closer follow-up based on risk assessment
- Using medical assistants to help manage high-risk patients. Medical assistants made outreach calls and tracked patients who were hospitalised or visited the emergency department, freeing the nurses to do more intensive care management
- Cross-training. This included medical assistants covering for each other, and undertaking both front and back office duties.

Barriers to role expansion for medical assistants include availability of appropriate training (to prepare for the role in the first instance, and then for a subspecialist role such as chronic illness management), buy-in from medical assistants themselves and from other staff delegating tasks to medical assistants (particularly GPs), and maintaining the expanded role over time.[97]

Community health workers

Community health workers (CHWs) are defined as "*trusted public health aides (paraprofessionals) familiar with the community served*" (p. 445).[131] They generally do not have a clinical background; the focus of their role is liaison between health and/or social care agencies/workers and community members.[131-133]

A study of CHWs embedded in a paediatric primary care practice delivering an 'enriched' medical home service (involving home visits) for children at risk of poor outcomes identified the following top supports provided by CHWs[131]:

- Reviewing medical appointment logistics
- Assisting with medication maintenance
- Providing health education/ coaching.

Similar functions of the role have been described in other studies.[96, 132, 133]

The CHW role is enabling for PCMH practices in several ways, including:

- Ensuring that patients do not miss their appointments, and identifying and overcoming other non-medical obstacles to treatment.[131, 133] Missed appointments have negative implications for both the patient and the practice. Assistance with non-medical obstacles means that patients are more likely to follow through with services ordered by the practice
- Connecting patients with local community-based resources. Because CHWs are drawn from the communities that they service, they can identify the most appropriate local supports for their patients[131]
- Facilitating patients to transition to independence over time. Education by CHWs' and patients' modelling of CHWs' techniques in solving problems (such as transport logistics for attending appointments, or keeping records related to use of medication/ blood glucose level) can lead to patients being more proactive in organising their own care[131]
- Developing relationships with patients, and thus serving as a channel of communication between the patient and their practice. This can avert health crises and reduce presentations to emergency departments[133]
- Helping the practice deliver complex care (e.g. arranging for home intravenous antibiotic medication).[133]

CHWs and similar roles embedded in PCMHs have been found to be effective in improving overall coordination of care for patients, and reducing emergency department presentations and hospital admissions.[132, 133] However, their integration into a practice is not straightforward. Challenges that have been identified include lack of acceptance by other staff due to not having a 'license to practice' and lack of familiarity with the role amongst practice staff.[132] These can be overcome through education and communication.[132]

Clinical pharmacists

Several studies focus on the barriers and enablers and effects of integrating clinical pharmacists or pharmacy services into PCMH practices. In the implementation of PCMH amongst Pinnacle Midlands Health Network practices in NZ, roles of clinical pharmacists included[10]:

- Providing the clinical team with updates and responding to questions regarding medication safety and dosage
- Working as part of the clinical team to review and optimise patient medications for patients
- Holding phone or face-to-face consultations with patients to review medications
- Reviewing hospital discharge notes to check for errors and that medications are appropriate
- Following up discharged patients
- Ordering blood tests and referring patients for a GP consultation if necessary.

One study surveyed providers in PCMHs regarding which pharmacy services they considered worthwhile and what barriers they saw to successfully incorporating pharmacists.[171] The most important clinical services were found to be medication counselling, reconciliation, adherence assessment, polypharmacy assessment and drug information. Among cost or access-related services, only formulary review was singled out as important. Among top-tier educational services, new black-boxed warnings, drug market withdrawals and new drug reviews were singled out. Most of surveyed providers (74%) regarded the presence of a pharmacist in a PCMH as extremely valuable and most (70%) also felt it was extremely useful to have the pharmacist physically located within the PCMH model rather than having merely virtual contact with them. The top three perceived barriers to bringing a pharmacist into a PCMH instance were doubts about whether the pharmacist would have time to process the number of referrals, patients' understanding of the pharmacist's role and uneasiness about a pharmacist's competency in managing complex diseases.

Another study investigated the integration of pharmacists into the PCMH model, with particular attention to perceived barriers and facilitators.[172] The authors conducted interviews mainly with PCMH team members but also some specialty care providers and administrators. They found that enablers were clear role boundaries, good communication, shared goals and ongoing role negotiation, and that barriers arose in the absence of these factors. Another enabler was onsite location; coordination with pharmacists was reportedly easier if they had offices in the primary care clinic or nearby. Some non-pharmacist members of health care teams were resistant to pharmacist integration into the team on the grounds of perceived knowledge deficits and limited training.

One study investigating the barriers and facilitators to integrating clinical pharmacists into the PCMH model focused on hypertension and diabetes.[173] A barrier to integrating pharmacy services into the care model was found to be hesitation on the part of physicians to hand over disease management to a pharmacist and, consequently, a reluctance to give pharmacists prescriptive authority. Incidentally, the study found no differences in trends in blood pressure or glucose control between primary care patients whose hypertension and diabetes were co-managed with a pharmacist compared to patients who did not receive such care.

Another study reported on the effectiveness of the Intermountain Healthcare Collaborative Pharmacist Support Services (IH CPSS) program, which offers partnership and collaboration (rather than co-location of

services) between clinical pharmacists and PCMH implementations.[174] A retrospective, observational study was used to compare a CCPS cohort of patients with a non-CCPS cohort. The results were that CPSS patients were 93% more likely to achieve a blood pressure goal of less than 140/90mmHg as compared with the reference group, 57% more likely to achieve an HbA1c value of less than 80% and 87% more likely to achieve both disease management goals, showing that CPSS participation significantly improves patient outcomes.

Another study describes the process by which clinical pharmacists were gradually brought into the Bon Secours Medical Group in Virginia in 2012.[175] The pharmacists were solely employed by the group, which was comprised of 40 primary care and 60 specialty practices. The study observed that in addition to their direct involvement in patient care, the pharmacists' roles gradually evolved to include drug information activities, and quality and safety initiatives concerning population health and policy making at the organisational level. The researchers recommend that medical care providers planning to incorporate pharmacist services should think in broader terms than direct patient care activities, also considering a variety of other roles and responsibilities for pharmacists, including those at the organisational level, to maximize their contribution to a health care team.

Another study conducted teleconference interviews with a workgroup comprised of pharmacists practicing or conducting research in accredited PCMH practices in the US, to identify key factors leading to successful integration of pharmacists into PCMH practices.[176] The researchers used a set of guiding questions to conduct teleconference interviews with the workgroup over a series of conference calls during an eight-month period. Among their key findings were: that pharmacists should engage fully in understanding the evolving developments in health care reform and the opportunities for pharmacist patient care services in PCMHs; pharmacists should identify and understand the needs of patients, providers, and payers in the medical home community; and, that as the medical home model gains increasing recognition and expands, all members of the health care team (e.g. physicians, nurse practitioners, pharmacists) must establish clear roles and set expectations for patient care responsibilities in the practice.

Integrated community specialists
Various models integrating specialists in PCMHs implementations have been trialled. In one study, a part-time neurologist assisted by registered nurses and clinical assistants was collocated in a primary care practice. The key aim was to reduce unnecessary diagnostic testing and face-to-face consults to both integrated and tertiary neurology, which was achieved.[177] This was through the neurologist providing an accurate clinical diagnosis early to patients; collaborating with the primary care provider on care plans for neurological patients; and, knowledge transfer to primary care providers, allowing them to refine their approach to testing and management over time.

Enablers for Indigenous populations
Johnston et al.[178] describe a tribal implementation of a PCMH model in Alaska. In addition to the general functions and attributes of a PCMH, a key feature of the model is ownership by its patients, thus referring to them as customer-owners. The model has resulted in reduced hospitalisations following implementation. The authors relate this to improved access to a team of providers able to address medical concerns before they become serious or life threatening. This was particularly evidenced by adult asthma customer-owners, where an increase in care being sought was accompanied by a reduction in hospitalisation across the board.

Community health workers (CHWs), who are characterised by their strong ties with their local communities, also have the potential to improve health outcome for high-needs populations, including Indigenous populations.[131-133]

Gaps in the evidence

The focus of this review has been on evidence around barriers and enablers in the implementation of the PCMH. This evidence principally arises from qualitative and quantitative methods that have focussed on eliciting perspectives of the stakeholder involved with implementation. Only rare instances were identified of comparative/quasi experiment studies that directly test different approaches to implementation and in these the focus was typically on a very narrow aspect of implementation.

In most instances comparative/quasi experimental studies of the PCMH model have focussed on estimating differences in outcomes for practices that have implemented (some version of) the PCMH model compared with 'usual care', rather than the effect of different approaches to implementation. Within the literature there are also many observational studies that compare differences in practices that have attained PCMH recognition. These studies, whether cross sectional or longitudinal, often say little about the process of implementation.

As one author commented: "*Despite the hundreds of published articles about* [PCMH]*, there is a surprising dearth of even descriptive information about how anyone built one or recommendations about how to do so. There are plenty of articles about the multiple visions of what a medical home should look like, about what is needed to foster the change from the outside, and even a few preliminary studies of effects*." (p. 456).[6]

Discussion of findings

This Evidence Check has focussed on barriers and challenges to the implementation of a PCMH approach, and enablers that address these. It includes studies using a broad range of methodologies from qualitative to quasi-experimental designs.

The literature on the implementation of the PCMH has significantly expanded in recent years, reflecting publications related to implementations of PCMH models in various health systems within the US, including Medicare, commercial health plans, Medicaid, federally funded community health centres and the US Veterans Health Administration, and other implementations in England, Canada and NZ.

The review has identified a broad range of barriers and enablers for PCMH. These have been grouped into five main themes, as shown in Table 7 below. These largely align with those described by Janamian et al.[1], although a new broad category has been added ('care coordination beyond the practice'). Also, the category of 'insufficient practice resources and infrastructure' has been grouped with the 'time and resources' component of 'challenges with transformation and change management in adopting a PCMH model'.

Table 7 – High level summary of barriers and enablers for implementation of the PCMH

Barriers/challenges		Enablers	
1. Policy settings and funding incentives		1. Policy and funding reform including through accreditation	
2. Transformation and change management		2. Strategies to support transformation and change management	
General: Leadership Culture Staff experience Time and resources	Specific: Teamwork Substitution of face-to-face consultations Care plans/planning Continuity of care	General strategies: Education programs Practice facilitation/ coaching Learning communities/ collaboratives Learning resources/ 'toolkits'	New/ enhanced roles: Medical practice assistant Community health workers Embedded pharmacists Integrated community specialists
3. Care coordination beyond the practice		3. Care coordination beyond the practice • Partnerships with community providers • Linkages with specialty and hospital care • Information sharing and continuity of care	
4. Health information technology		4. Strategies to support more effective use of health information technology • Population health management tools • Risk stratification tools	
5. Data and performance measurement		5. Performance measurement and feedback	

The central challenge that remains is how to manage a process of change with the thin resources available in primary care settings. A conclusion to be drawn from this review is that these changes require multi-

facetted strategies that are sustained over time and are adjusted to reflect the context of particular primary care services and the nature of the primary care practices themselves. A balance between external supports and internal motivations for change from practice leaders is required. These findings align with conclusions drawn in a summative evaluation of PCMH pilots in the US which concluded[7]:

- A strong foundation is needed for successful redesign
- The process of transformation can be a long and difficult journey
- Successful approaches to transformation vary
- Visionary leadership and a supportive culture ease the way for change
- Contextual factors are inextricably linked to outcome.

The review also suggests that there is no 'magic bullet' implementation. As one author observes *"... there is no small group of strategies that, if implemented, will improve* [PCMH related] *performance measures... [this is] in keeping with other findings in the literature. For example, the extensive scientific literature on guideline implementation seems to be finally abandoning its long search for single change strategies in favor of multifaceted ones"* (p. 453).[6] Therefore, individual primary care practices need to "*assess carefully their own situation and identify those changes and strategies best suited to their situation and context. Perhaps we should all be more humble about our ability to know just what changes are needed in individual clinics and care systems and how others should go about making them*." The National Demonstration Project evaluation for the PCMH model, concluded *"developmental pathways to success vary by practice"* (p. S82)[8] and that there need to be local variations in the development and implementation of the PCMH model.

From a PHN perspective, the review suggests that key areas in which primary care practices can be supported in transforming to a PCMH include:

- Strategies to support transformation and change management, in particular the general strategies identified in Table 7 above
- Strategies to improve care coordination beyond the practice
- Strategies to support more effective use of health information technologies, both within the practice and within the local health system. A specific area in which PHNs could play a role is in assisting with systems that support practices to undertake population health management activities and risk stratification of their practice population (which could include facilitation of linkage of practice data with hospital data from local health services)
- Development of systems to assist performance measurement and feedback for practices, with a particular focus on reporting back to practices quality measures closely related to the PCMH model.

Applicability

A key limitation of the studies included in this review is that they are mainly focussed on particular sub-systems within the US health system, although studies outside of the US have also been included. The studies identified for the review are dominated by those that focus on PCMH implementations in the Veterans Health Administration (particularly arising from the Patient Aligned Care Teams program), federally funded community health centres and state-based Medicaid systems. There is an important, but less voluminous set of studies related to implementation involving Medicare populations (elderly populations). Studies involving commercial insurers in the US were fewer.

Another contextual issue for the US is the development of formalised accreditation processes for PCMH recognition (principally by the National Committee for Quality Assurance). Recognition as a PCMH has had implications for payment by insurers.

The US context of most of studies suggests that there may be issues in generalising from these settings to the Australian setting. Despite this limitation, many of the issues raised in these settings seem to resonate with those commonly discussed in Australia when the implementation of a PCMH-style approach is discussed.

Another issue is that the PCMH has multiple components, some of which may not be present in some models, and when present, organised in different ways. In this Evidence Check, 'PCMH' was assumed when studies described at least the foundational building blocks of the model as outlined by Bodenheimer et. al.[5] The implementations featured in the studies were also at various phases, some having achieved the full suite of components planned, while others were still implementing. Also, the paths to getting what the studies referred to as full implementation were different for different initiatives. Nevertheless, the focus of this Evidence Check was on barriers and enablers to implementing a PCMH and the exact features, or the degree of implementation, are not likely to be as relevant. These are more likely to be relevant when outcomes are compared.

Conclusion

The PCMH model has the potential to improve quality of care and enhance the experiences of primary care by patients and staff. However, it requires a major change effort for most practices, involving changes to work roles, processes and implementation of new technology. There are many potential barriers that can impact the success of implementation. However, lessons have also been reported in the literature, many of which can be implemented as strategies to overcome these challenges.

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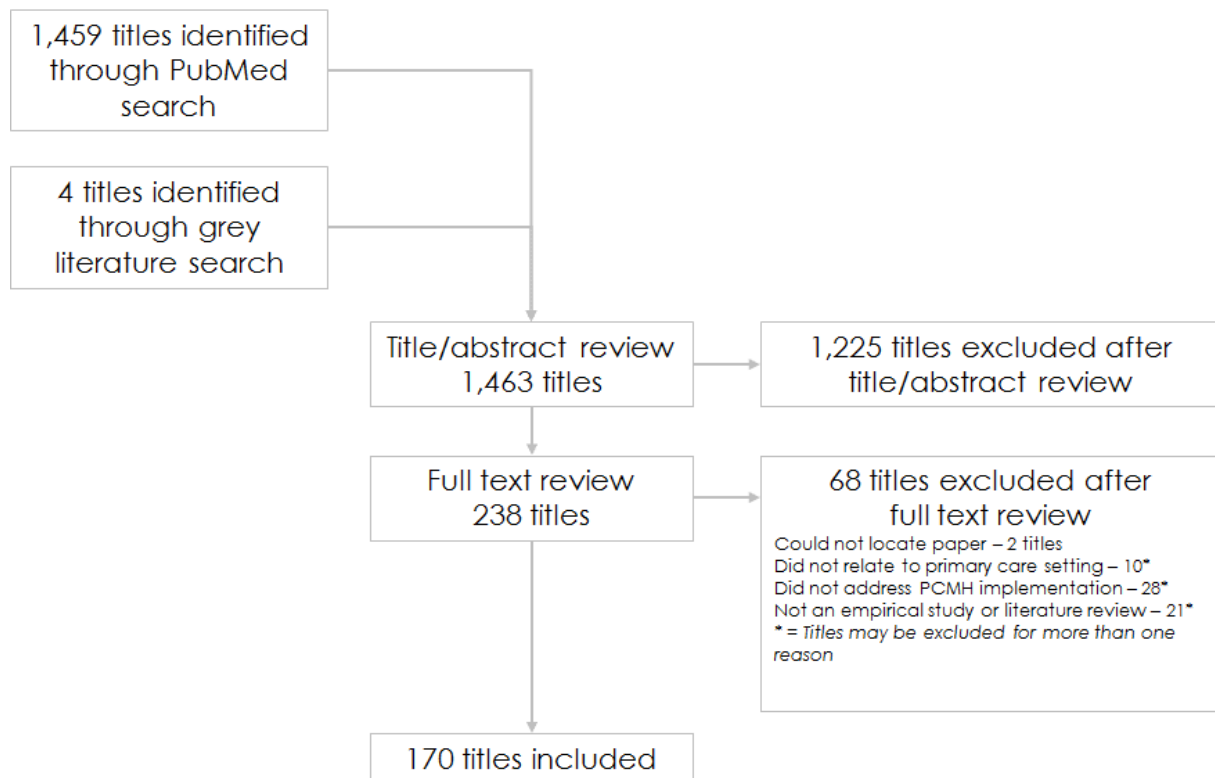
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Appendix 1: Literature selection process

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┌─────────────────────┐
│ 1,459 titles         │
│ identified through   │
│ PubMed search        │
└─────────────────────┘
┌─────────────────────┐
│ 4 titles identified  │
│ through grey         │
│ literature search    │
└─────────────────────┘
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| Title/abstract review 1,463 titles | → | 1,225 titles excluded after title/abstract review |

| Full text review 238 titles | → | 68 titles excluded after full text review |

68 titles excluded after full text review
Could not locate paper – 2 titles
Did not relate to primary care setting – 10*
Did not address PCMH implementation – 28*
Not an empirical study or literature review – 21*
* = Titles may be excluded for more than one reason

170 titles included

Appendix 2: Criteria to assess quality of selected titles

Each title was assessed using a score of 0 or 1 against the following criteria:

1. Aims and objectives clearly stated
2. An explicit theoretical framework, study design and/or literature review
3. A clear description of context
4. A clear description of the sample and how it was recruited
5. A clear description of methods used to collect and analyse data
6. Attempts made to establish the reliability or validity of data analysis
7. Inclusion of sufficient original or synthesised data to mediate between evidence and interpretation
8. Use of verification procedure(s) to establish credibility
9. Conclusions supported by results
10. Relevance.

The scores were then summed across the 10 items.