Implementing population health managemen

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Reorganizing and integrating public health, health care, social care and wider public services: a theory-based framework for collaborative adaptive health networks to achieve the triple aim

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Abstract

Objective: Population health management (PHM) refers to large-scale transformation efforts by collaborative adaptive health networks that reorganize and integrate services across public health, health care, social care and wider public services in order to improve population health and quality of care while at the same time reducing cost growth. However, a theory-based framework that can guide place-based approaches towards a comprehensive understanding of how and why strategies contribute to the development of PHM is lacking, and this review aims to contribute to closing this gap by identifying the key components considered to be key to successful PHM development.

Methods: We carried out a scoping realist review to identify configurations of strategies (S), their outcomes (O), and the contextual factors (C) and mechanisms (M) that explain how and why these outcomes were achieved. We extracted theories put forward in included studies and that underpinned the formulated strategy-context-mechanism-outcome (SCMO) configurations. Iterative axial coding of the SCMOs and the theories that underpin these configurations revealed PHM themes.

Results: Forty-one studies were included. Eight components were identified: *social forces, resources, finance, relations, regulations, market, leadership*, and *accountability*. Each component consists of three or more subcomponents, providing insight into (1) the (sub)component-specific strategies that accelerate PHM development, (2) the necessary contextual factors and mechanisms for these strategies to be successful and (3) the extracted theories that underlie the (sub) component-specific SCMO configurations. These theories originate from a wide variety of scientific disciplines. We bring these (sub)components together into what we call the Collabroative Adaptive Health Network (CAHN) framework.

Conclusions: This review presents the strategies that are required for the successful development of PHM. Future research should study the applicability of the CAHN framework in practice to refine and enrich identified relationships and identify PHM guiding principles.

Keywords

guiding principles, population health management, realist evaluation, reorganizing and integrating services, triple aim

Introduction

Population health management (PHM) is increasingly seen as a means to realize a sustainable and more integrated approach to health and care, contributing to the

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simultaneous improvement of population health and quality of care while reducing cost growth (triple aim (TA)).[1,2] PHM strategies seek to address the full range of health determinants (personal, social, economic and environmental)[3] and bridge public health, health and social care and wider public services (e.g. housing, education)[1,4] towards building healthier communities. Such strategies are often implemented through place-based PHM approaches.[4]

PHM models and approaches range from closely integrated to more informal collaborative adaptive health networks.[1,4,5] Examples include the Accountable Health Community model in the USA, which has evolved from accountable care organizations and involves the re organization of service delivery approaches through enhanced clinical-community linkages supporting local communities to address health-related social needs.[6] In England, there has been a move towards more integrated service delivery systems to meet the health and care needs of the local population, with the introduction of new care models and sustainability and transformation partnerships bringing together health and social care locally and having PHM at their core.[7] The Netherlands have introduced a programme of pioneer population management networks, which are developing new payment and service delivery models aiming to accelerate PHM, similar to the 'Healthy Kinzigtal' integrated care network in Germany.[8,9]

However, despite the attraction of PHM as an approach to improve the health of the local population, its actual use in practice remains challenging. This is, mainly, because the implementation of PHM requires a system-wide approach, and although the literature on care integration[10,11] and system transformation more widely[4,12] has provided some insights into the key ingredients for change, the overall process remains inadequately understood. Implementing PHM, as any complex change, will require changes in the way people and organizations function, and people's behaviour, in turn, will be determined by the specific circumstances within which they operate.[13,14] This requires an adaptive approach to create the necessary conditions to enable stakeholders to work collaboratively in (formal or informal) health networks towards developing PHM.

This study seeks to contribute to the emerging literature on PHM by providing an integrated theoretical overview underlying PHM strategies linking public health, health care, social care and wider public services to achieve the triple aim. It develops a framework highlighting the key components of PHM, each providing insight into (1) the strategies that need to be implemented to accelerate PHM development, (2) the necessary conditions (i.e. contexts and mechanisms) for these strategies to be successful and (3) the theories that underlie the relationships between strategies, contexts, mechanisms and outcomes. The framework summarizes the *how* and *why* of PHM development. The integrated overview captured in the framework can help programme managers, policy makers and researchers to design and/or improve and evaluate PHM approaches.

Methods

Study design

We performed a scoping realist review following the RAMESES reporting standards (see Online Supplement).[15] We sought to understand causality by linking strategies (S), contexts (C), mechanisms (M) and outcomes (O) (Table 1),[16,17] asking 'what is it about this strategy that works in this context and

Table 1. Realist evaluation concepts used in this study.

PHM strategy	*Intended plan of action.*[16,18] Aims to create change by providing (or reducing) resources or opportunities in a given context. PHM strategies understood as referring to the reorganization and integration of public health, health care, social care and other public sectors (e.g. housing, transport) to promote the TA.
Context	*'Backdrop' of place-based PHM approaches,*[18] which can be understood as any condition that triggers mechanisms. In this study, contextual conditions can be the different multilevel sociocultural, historical, economic, political or relational conditions[19] that are changed as a result of the implemented strategies.
Mechanism	*Generative force that leads to outcomes.*[18] Describes the changes in reasoning or behaviour of various stakeholders (e.g. multi-disciplinary accountability prompted by the introduction of new financial incentives). In contrast to strategies, mechanisms are understood as the *responses to the intentional resources* provided by the strategy.[18]
Outcome	*Intended or unintended outcomes of strategies.*[18] In this study, the reported outcomes are the measured outcomes as stated in reviewed studies, e.g. changes in knowledge or new financial arrangements.
SCMO configurations	SCMOs are heuristics that depict the relationships between strategies, context, mechanisms, and outcome.[16,17] The SCMO configurations in the current study describe the relationships between the strategies for PHM that, when implemented in a specific context, lead mechanisms to cause certain outcomes.

PHM: population health management; SCMO: strategy-context-mechanism-outcome; TA: triple aim.

why does it lead to specific outcomes'? Informed by a literature review of PHM,[2] we used the following working definition: *PHM refers to large-scale transformation efforts required for the reorganization and integration of services across public health, health care, social care and wider public services in order to improve population health and quality of care while at the same time reducing cost growth.*

Identifying studies

We searched the electronic databases Medline and Embase, Global Health, SciSearch and Scopus for English, Dutch and German language papers published between January 2010 and January 2016. This time period was chosen because a prior review of PHM[2] showed that it was only from 2010 that the triple aim was increasingly associated with the process of reorganizing and integrating services across public health, health care, social care and wider public services. A comprehensive search strategy was developed to identify studies using the following search terms: *health care, health care system reform, factors and mechanisms* (general and specific terms) combined with *social care, community care, welfare, public health, prevention* and *governance, accountability* and *supervision*. The search terms *governance, accountability* and *supervision* were added because PHM implies changes in the structures and processes as responsibilities for achieving the TA are shared (see Online Supplement Appendix 1 for the detailed search strategy).[20,21] Two researchers (BS and HD) independently screened identified studies (peer and non-peer reviewed) for eligibility following a set of exclusion and inclusion criteria and focussing on high-income countries (Online Supplement Appendix 2).[22] Studies were screened independently, with disagreements resolved by discussion within the research team.

Quality appraisal

Articles were quality appraised using the principles of rigour and relevance.[15] Methodological rigour was rated using the Wallace et al. quality appraisal tool,[23] while relevance was assessed by determining whether the extracted data from included studies contributed to answering the research questions.

Data extraction, application of realist principles and synthesis of PHM components

We created a bespoke data extraction form describing each identified place-based PHM approach, extracting information on the general characteristics of the approach (e.g. sectors and stakeholders included). We further analysed each included study for postulated causality between PHM strategies, contextual factors and underlying mechanisms put forward by study authors, and the outcomes of strategies (strategy-context-mechanism-outcome or SCMO configurations), as well as for theories mentioned in papers underlying assumed causal relationships or for alternative explanations of how strategies led to results. We used iterative axial coding[24] to relate SCMO configurations to the underlying theories as postulated in studies and to cluster them. This process was conducted in four cycles and identified a range of (sub)themes that we developed into (sub)components of our final conceptual framework. The (sub)components were defined based on identified theories and contained (1) the (sub)component-specific strategies, (2) the contexts and mechanisms that explained how these strategies led to (sub) component-specific outcomes and (3) the extracted theories that underlie identified SCMO configurations.

Data extraction, analysis and synthesis of the data were performed by two researchers (BS and HD) in a series of calibration exercises, independently comparing data extracted from 10 studies for level of detail, identification of relevant data and identification of SCMO configurations and underlying theories, to ensure consistency in our approach. Further data extraction, analysis and synthesis were conducted by one researcher (BS). The data were regularly shared and discussed within the research team to ensure validity and consistency in the inferences made. The Advisory Committee of the Dutch Monitor Pioneer Sites Population Management, which included scientists and representatives of the Dutch Ministry of Health, Welfare and Sports and of Dutch PHM initiatives, reflected upon the first results of this review. Based on these reflections, no adjustments were needed.

Results

The literature search yielded 3262 potentially relevant studies of which 415 were included on the basis of title and abstract only. Of these, about two-thirds were excluded as they addressed collaboration between fewer than two sectors (n = 281) or implied no change in governance (n = 42). The quality appraisal resulted in the exclusion of further 40 papers that lacked rich descriptions of contextual factors, with an additional 11 studies excluded because they did not discuss the underlying mechanisms. A total of 41 studies were finally included (see Online Supplement Appendix 3).

Study characteristics

The majority of the included studies were set in the USA and the UK (Table 2 and Online Supplement Appendix 4). Organizations involved were national, regional or local governments, research institutes,

Table 2. Key characteristics of included studies.

References[a]	Description of approaches and stakeholders involved	Country	Sectors				Duration of transformation (years)	Level of change	Duration research (years)[b]
			Public health	Health care	Social care	Wider public services			
Addicott and Shortell	Development of governance structures and accountability mechanisms within four ACOs (participants: commercial insurers, medical groups, hospitals, health plan, employer group), representing a variety of types and stages all of which had (two-sided) at-risk contracts in the commercial setting as well as existing or planned Medicare ACO agreements through shared savings or pioneer programmes.	USA	x	x	x		NA[c] (start in 2012)	Region-local	NA
Allen et al.	Six Beacon communities (participants: hospitals, medical centres, primary care practices, community clinics, federally qualified health centres, and local health departments, health IT organizations, community and faith-based organizations, quality improvement organizations and health plans) used health IT to optimize community-based care management programmes.	USA	x	x	x		3 (start in 2010)	Large community initiatives	NA
Armstrong et al.	Interdepartmental county collaboration (participants: Departments for Probation, Social Services, & Mental Health) to reform its children's system with the help of major childcare serving systems and providers, families and youth.	USA	x	x	x	x	5 (start in 2004)	Region	5
Bachrach et al.	Arkansas Health Care Payment Improvement Initiative; a state-wide multi-payer approach providing the market power to implement state-wide payment and delivery transformation. Participants: the largest private-sector employer Arkansas Walmart, the self-insured Arkansas State Public Employee and Public-School Health Insurance Plan and five payers: Medicare, Arkansas Medicaid, Arkansas Blue Cross and Blue Shield, Humana and QualChoice of Arkansas; Private sector; Arkansas State Government and providers.	USA	x	x	x		4 (start in 2011)	State region	NA
Barnett et al.	15 Primary and secondary health care organizations and community services which had received health service rewards for successfully generating and implementing service innovations.	UK	x	x		x	NA	Region-local	2 months
Breton et al.	Newly developed Health and Social Services Centres (CSSS) were given a population-based responsibility, linking public health and health and social care issues more formally within a single governance structure.	Canada	x	x	x		3 (start in 2005)	Region	3
Bull et al.	A non-profit palliative care organization in hospital-nursing homes, assisted living facilities, outpatient clinics (patient follow-up and psychosocial support for patients and families) developed a continuum of palliative services.	USA	x	x	x	x	8 (start in 2003)	Region	3
Checkland et al.	CCG approaches to link to public health. Stakeholders included public health, GPs, PCTs (PCTs charged until April 2013 with commissioning primary, secondary and community services), locality groups (representatives from geographical area), local authority, local provider trusts and the NHS Commissioning Board.	UK	x	x	x	x	3 (ongoing)	Region	1

(continued)

Table 2. Continued.

References[a]	Description of approaches and stakeholders involved	Country	Sectors				Duration of transformation (years)	Level of change	Duration research (years)[b]
			Public health	Health care	Social care	Wider public services			
Chreim et al.	Transformation of health care services in a community from provider-centred fragmented delivery to patient-centred integrated delivery through Regional Health Authorities. Participants: physicians, hospital, public health, extended care unit, provincial government, social and community service organizations and the medical professional association.	Canada	x	x	x	x	4	Large community initiative	4
Ford et al.	The VISN and Mental Health leaders rolled out the Mental Health Systems Redesign project, which was designed to help the VISN and facility mental health leaders learn skills to make the necessary and sustained changes in their systems of care.	USA		x	x		2 (start in 2010)	National	1
Greenhalgh et al.	Modernization Initiative in London, a large-scale transformational change initiative, contained more than 30 work streams. The governance structures of this initiative brought together numerous participants: acute hospitals, Charity funding organizations (Guys and St Thomas Charity), NHS, PCT (community-based trust to manage provision primary care services), community groups, patient groups and the voluntary sector.	UK	x	x	x	x	4 (start in 2003)	Region	1
Hearld and Alexander	17 Alliances from different market areas participating in AF4Q promoted individuals and organizations from different industry sectors to work collaboratively on improving the health and health care in local communities.	USA	x	x	x	x	Start in 2007	Region	5 (divided in three study periods)
Hearld et al. (a)	14 US multi-sector alliances of the AF4Q programme that worked on improving overall health for the community. Participants: communities, care (primary and secondary), healthcare purchasers (employers and insurers) and consumer organization (health care consumers), government agencies and other organizations (non-profit organization and academic institution).	USA	x	x	x	x	NA (start in 2007)	Region	2 (over two study periods)
Hearld et al. (b)	14 Alliances participating in the AF4Q initiative helped targeted communities improve the overall quality of health care, reduce racial and ethnic health disparities and provide models for national reform. Participants: communities, care (primary and secondary), health care purchasers (employers and insurers) and consumer organization (health care consumers), government agencies and other organizations (non-profit organization and academic institution).	USA	x	x	x	x	NA (start in 2007)	Region	2 (over two study periods)
Hempe	Integration of health and social care organizations. Participants: health care and social care organization, local mental health trust and local authority.	UK	x	x	x		NA	Region	1
Illback et al.	Engaging communities in the development and implementation of youth mental health services and supports in the Republic of Ireland. Participants: young people, family members, community leaders, educators, youth workers, specialized mental health workers and the local health manager responsible for statutory services (e.g. health, social services). Initiatives were led by the National Centre for Youth Mental Health.	Ireland	x	x	x	x	9 (start in 2007)	Region	NA

(continued)

Table 2. Continued.

References[a]	Description of approaches and stakeholders involved	Country	Sectors				Duration of transformation (years)	Level of change	Duration research (years)[b]
			Public health	Health care	Social care	Wider public services			
Ingram et al.	Development of different partnerships of seven local health departments with political stakeholders (governmental organizations), schools, community organizations, health organizations, universities, local hospitals, dental community.	USA	x	x	x	x	Ongoing (start in 1998)	Region	8
Judd and Keleher	The development of health promotion to inform 'better health' practices through respectful change processes based on research, practitioner-informed evidence and capacity-building strategies. Participants: researchers primary health care workforce, community health service practitioners (e.g. community health nurses), Aboriginal health worker, administrators, management team, social workers.	Australia	x	x	x	x	NA	Region	2
King et al.	Three case studies in three different health board locations to explore the way in which structural, professional and geographical boundaries have affected e-health implementation in health and social care, through an empirical study of the implementation of an electronic version of single shared assessment in Scotland. Varying partners within case studies: 1 and 3. NHS region working with one local authority council; 2. NHS region with three local authority council, social and health care professionals, data sharing management	UK	x	x	x		NA	Region	NA
Larson et al.	Transformations at four Brookings-Dartmouth ACOs implementing new payment and delivery models. Participants: varied from large independent practice association with affiliated hospitals to an integrated delivery system which owned five hospitals; national payers (5–-6).	USA	x	x	x		NA	Region	2 months
Lebrun et al.	Nine federally funded health centres' strategies to better integrate public health with primary care. Participants: public health organizations, health centres, community-based organizations, government agencies, universities, research institutes and State leaders.	USA	x	x			NA	region	2 months
Lewis et al.	ACOs (Medicare ACO contract shared savings or pioneer ACOs and Medicaid ACO contract, commercial payer ACO contract) increase in focus on managing behavioural health conditions (mental health and substance abuse) through the integration of behavioural health treatment and primary care.	USA	x	x	x		NA	Region	2 (over two study periods)
Liddy et al.	Community Connection Model: Champlain Local Health Integration Network implementing a chronic disease self-management programme. Participants: University based Bruyere Research Institute, Bruyere Continuing Care (a health service provider for the region with a mandate for elderly care, primary and palliative care) and the Champlain Community Care Assess Centre responsible for home care.	Canada	x	x	x		5 (start in 2007)	Large community initiatives	5

(continued)

Table 2. Continued.

References[a]	Description of approaches and stakeholders involved	Country	Sectors				Duration of transformation (years)	Level of change	Duration research (years)[b]
			Public health	Health care	Social care	Wider public services			
Macfarlane et al.	Modernization Initiative: a large-scale, whole-system transformation effort. Participants: the London-based Guys and St Thomas' Charity supporting a four-year partnership between two acute hospital trusts, two PCTs, community groups, patient groups and the independent and voluntary sector NHS, PCT (community-based trust to manage provision primary care services).	UK	x	x	x		4 (start in 2003)	Region	1
McHugh et al.	14 US multi-sector alliances of the AF4Q programme, strategies to improve quality at the community level. Participants: communities, care (primary and secondary), health care purchasers (employers and insurers) and consumer organization (health care consumers), government agencies, other organizations (non-profit organization, academic institution).	USA	x	x	x	x	NA (start in 2007)	Region	4 (over three study periods)
Oborn et al.	A policy entrepreneur aligning a number of institutional networks to conjoin related problems, making policy agendas happen and opening policy windows. Participants: the London Observatory, chairs of clinical pathways, NHS chief executives, London SHA, voluntary sector, health sector, management consultants, London health politics and research community (national–international)	UK	x	x	x	x	Ongoing (start in 2006)	Region	NA
O'Brien and Kaluzny	The Community Cancer Centres Program launched by the National Cancer Institute as a public–private partnership to facilitate the translation of the developing science to the community setting. Participants: 8 community hospitals and 2 multi-hospital systems (16 total), primary care physicians, regional and national scientific community and larger oncologic community organizations.	USA	x	x	x	x	NA	National	NA
Ottmann and Laragy	Consumer-directed-care programme for families with disabled children. Participants: health, social and community care.	Australia		x	x	x	5 (start in 2003)	Region	NA
Ovseiko et al.	Local implementation responses to the central government mandate to establish Health Innovation and Education Clusters. Participants: NHS provider trusts and commissioners, higher education institutes, local organizations, industry, local government and charities.	UK	x	x	x	x	Ongoing (start in 2007)	Region	1
Pate et al.	Development of Community Health Partnerships in which health and social care providers come together within a unified organizational framework. Participants: health and social care organizations.	UK		x	x		1	Region	1
Petsoulas et al.	CCGs collaborate to provide commissioning support services. Participants: CCG staff being NHS managers, GPs, lay members and practice managers.	UK	x	x	x		NA	Region	1
Plochg et al.	Development of an area-based programme in The Hague, the Netherlands tackling health inequalities drawing on a collaborative mode of governance collaborate to employ health promoting interventions and policies. Participants: local authorities and a broad range of local public and private actors	The Netherlands	x	x	x	x	4 (start in 2002)	Region	4
Shaw et al.	Redesigning services in partnership with providers. Participants: PCT managers and clinicians, general practice-based commissioners, NHS and foundation trust senior managers and clinicians, voluntary sector and local government representatives.	UK	x	x	x	x	NA	Region	2

(continued)

Table 2. Continued.

References[a]	Description of approaches and stakeholders involved	Country	Sectors				Duration of transformation (years)	Level of change	Duration research (years)[b]
			Public health	Health care	Social care	Wider public services			
Silow-Carroll et al.	Health care and delivery system reforms in the US states: Minnesota, Colorado and Vermont. Participants: multiple payers that together cover a large portion of the physician practice or hospital patients, Medicaid, Minnesota, Vermont and Colorado state planners, Regional Health Networks, hospitals, CMS, State-wide Data and Analytics Contractor (Colorado).	USA	x	x	x	x	Ongoing (start in 2010)	State	NA
Smith et al.	Interaction between financial and clinical risk at two critical phases of health care reform in England. Participants: PCTs (community-based trust to manage provision primary care services), health and social care, NHS, managers and frontline professionals.	UK		x	x		NA	Region	2 (over two study periods)
Smith and Barnes	UK POPPs in which community and voluntary sector-based health and social care sought to ensure quality of life and well-being for senior citizens. Participants: voluntary sector, health and social care, community partnership team, neighbourhood network, local and health authorities.	UK	x	x	x	x	2	Region	2
Sullivan and Williams	Integration of health and social care. Participants: local steering groups, chief executives and managers and frontline practitioners of public health, health and social care.	UK	x	x	x		NA	Region	NA
Thorson et al.	Grand Junction initiative have addressed problems and set standards for effective, efficient care through separate, self-governing organizations that perceive health care as a community resource. Participants: Hospital (level II trauma centre that provides tertiary referral services, hospice and palliative care), health plan, community hospital, physicians, quality health network.	USA	x	x	x	x	2 (start in 2006)	Region	2
Willem and Gemmel	22 health care networks in which the type and importance of governance structure and governance mechanisms is examined for network effectiveness. Participants: e.g. mental health, palliative care, social care, home care.	Belgium		x	x		NA	Region	NA
Zachariadis et al.	CCG leaders' establishing best practices and introducing new clinical pathways. Participants: public health, health and social care.	UK	x	x	x		NA	Region	1
Zenty et al.	University Hospitals Health System Inc., in Cleveland, Ohio, establishes ACO building. Participants: hospital physician networks and incentives, patients.	USA	x	x	x		6 (start in 2008)	Region	4

Note: ACO: accountable care organization; AF4Q: Aligning Forces for Quality; CCG: clinical commissioning groups; CMS: Centers for Medicare & Medicaid Services; CSSS: Health and Social Services Centres; GP: General Practitioner; IT: information technology; PCT: primary care trust; POPP: Partnerships for Older People Projects; SHA: Strategic Health Authority; VISN: Veterans Integrated Service Network.

[a]The list of references is provided in Online Supplement Appendix 3.

[b]The duration of the research project that has monitored the initiative-approach.

[c]NA: no available information if the approach is still ongoing or if it ended.

patient-client representative organizations, and voluntary organizations. Almost all studies concerned transformative changes at the regional-local level or large community initiatives. Twenty place-based approaches focussed on reorganizing and integrating services across public health, health care, social care and wider public services. Twenty place-based approaches have been in operation for more than five years.

Identified components and subcomponents

Iterative axial coding of the SCMO configurations and the underlying theories identified eight components considered to be key for the acceleration of PHM development: *social forces, resources, finance, relations, regulations, market, leadership* and *accountability*. Each component contains three or more subcomponents, with a total of 37 subcomponents identified (see Online Supplement Appendix 4 for further detail). We discuss each identified component in turn (Table 3). An overview of all configurations of applied PHM strategies identified in this study and the contextual factors and mechanisms that explain the outcomes of these strategies is available from the authors.

Social forces are anchored at the institutional level and consist of three broad types that provide guidelines for what generally does happen (cultural-cognitive), what should happen (normative) and what must happen (regulative) (Table 3 and Online Supplement Appendix 5). Our review found that in order to change what generally happens, four successive groups of strategies need to be implemented. These include making sense of new, uncertain or ambiguous situations related to PHM development. For example, strategies such as a new vision and goals underpinning the given collaborative partnership helped stakeholders' understanding of a new identity as they could identify with the new PHM identity in a way that did not downplay or replace their own identity.[25,26] Furthermore, knowledge exchange opportunities associated with new working models changed stakeholders' existing beliefs and working patterns by enabling ongoing discussions, which helped them getting a better understanding of how professionals from other disciplines interpreted different health concerns and how they valued and trusted particular approaches.[27,28] In addition, stakeholders became aware of the potential benefits of bridging boundaries between sectors, geographies, professions or structures (e.g. incompatible information technology systems).[29]

Resources refer to the demand and supply of resources and technologies that enable place-based approaches to create continuous improvements for the services delivered. SCMOs showed that successful PHM strategies that aimed to implement a learning environment did so through establishing contexts that reinforced continuous improvement.[30,31] Examples include hands-on training in multidisciplinary settings in the use of integrated health information system.[29,32] These contexts in turn motivated professionals across stakeholder organizations to achieve better integrated performance.

Finance refers to the management of financial arrangements and contains three elements: financial strategies, contractual relationships and contractual scope and requirements. Our review found that social relationships between contracting parties (as reflected in socio-legal theories[33]) played an important role in establishing new financial arrangements such as value-based payment models.[34,35] The transition to a new relationship style was reported to be challenging in cases were stakeholders had had relatively long histories of 'arm's-length' negotiations between contracting parties primarily about the financial terms of their contract. For example, moves to value-based or performance-based payment models in the USA and the Netherlands required openness between contracting parties to jointly identify shared interests, aims and performance targets.[34,36] In England, commissioning (strategic purchasing and contracting of health services) was also described as being dependent on prior relational work with flexibility and reciprocity between commissioners and providers as crucial contextual factors for redesigning and reducing costs of transactional services.[35,37]

Relations refer to how cultural change is enacted at an interpersonal level. In addition to the seven constructs defined by Lanham[38] (trust, mindfulness, heedfulness, respectful interaction, diversity in perspectives, social and task-relatedness and communication channels), we identified an additional construct 'the history of personal relationships'.[34,39] SCMOs showed, for instance, that in case of cross-sector collaboration, lack of a personal history between professionals with different expertise from different organizations negatively influenced organizational change and learning. SCMOs also showed that conditions that strengthen social interaction between these professionals, e.g. by locating them in the same building or room, offered openness to others' ideas, provided new meaning to differences in perspectives or facilitated trust in others' ability.[40,41]

Regulations refer to health policies and related laws and regulations, problems that need political attention, political influence and the political agenda. SCMOs revealed, for instance, that leaders tried to influence the regional political agenda by connecting regional and provincial-state-national problems and by engaging with strong allies (payers, politicians and knowledge institutions).[40,42,43] Integrating regional (state,

Table 3. The CAHN framework' components and examples of underlying SCMO configurations.

	Examples of SCMO configurations			
Components	Strategies	(+Enabling, −inhibiting) contexts	Mechanisms	Outcomes
Social forces	• Introduce a new PHM vision, mission and goals to professionals working in organizations that participate in the new collaborative partnership • Support the introduction of a new shared (patient-centred) working model	• +Conditions: not downplaying or replacing existing identities of stakeholders, support of leadership, an alternative resource stream that supports the place-based PHM approach • −Conditions that hinder the understanding of the underlying rationale of the PHM approach: lack of opportunities to spread mission-vison-goals and to explain the new partnership; lack of strong leadership in the participating organizations • +Conditions that reinforce changing ways of thinking and acting: interactions between professionals, patients, clients, champions, researchers	• Creates an understanding of how the new partnership's identity relates to that of their own identity • Enables the questioning of information (asymmetries-commonalities between information regarding place-based PHM approaches' identity, values and goals) to that of the professionals' identity, values and goals • Creates awareness of professional -organizational identity, of new ways of working and of new values that underpin the new model • Creates awareness of the positive and negative consequences of the bridging of boundaries	• Understanding of the underlying rationale and new identity for the place-based PHM approach • Confusion about a shared identity • Awareness of the possibility of dilution of professional's own identity heightened their existing identity • New formal roles and ways of working • Legitimacy of patient involvement in new service model • New values are being articulated, repeated and shared
Resources	• Provide training along with the introduction of integrated health information systems • Organise additional funding • Develop a learning environment that integrates measures for improved quality management	• +Conditions that reinforce continuous improvements: more and better links between and within organizations professionals • +Financial incentives coupled with the targets of the quality standards • +Distributed support across organizations and professionals	• Enforces social pressure to improve performance • Fosters enthusiasm to build knowledge over time • Incentivizes continuous improvements • Specific measures induced unintended workarounds	• Cultural change towards continuous improvement (evaluations) • Cultural change leads to sustainability over time • Shared accountability across professionals, organizations, sectors to support continuous improvements • Workarounds lead to modification of monitoring processes and standards directly tied to achievements
Finance	• Develop new financial arrangements (value-based payment model) in co-creation between contracting parties • Organize advancement towards new payment contract	• +Conditions that reinforce negotiations between contracting parties on the terms of new financial contracts: shift to personal contact in which problems are solved together; data sharing – patient attribution • −Constraining conditions: asymmetry in information	• Activates engaging into a new type of relationship between contracting parties. • Creates openness within new relationships to identify joint interest to reduce financial risks • Fosters imbalance of power between contracting parties	• Shift to value-based payment model • Increased collaboration between payers and providers, which facilitated the establishment of place-based PHM approaches • Shared learning – resolution of technical challenges (e.g. data sharing) • Delays the establishment of new financial arrangements
Relations	• Stimulate encounters between professionals when implementing radical change • Build a collaborative culture at the operational level that enhances quality improvement	• +Conditions that reinforce enhanced negotiations and social interactions: e.g. co-location • +Conditions that reinforce shared learning and commitment to improvement of performance: bringing people together to talk about tools and techniques; history of trust	• Creates questioning and challenging of practices • Enhances trust, familiarity with views, capacities and roles of other professionals • Creates reciprocities, trust, mindfulness	• Mutual adjustment to each other's roles • Understanding of individual capacities • Greases the wheels for collaborations between individuals at the operational level

(continued)

Table 3. Continued.

Components	Examples of SCMO configurations			
	Strategies	(+Enabling, −inhibiting) contexts	Mechanisms	Outcomes
Regulations	• Connect regional problems to state/provincial/national problems • Enlist strong allies to give credibility to the policy content • Enrol critics	• +Conditions that shape policy networks to create a policy windows for addressing complex problems: frontrunners that can draw influential (medical) groups and policy communities and politics together; common goals and interest via a strategic vision; engagement of the public	• Creates political awareness and sensitivity to the problem • Fosters feelings of connectivity • Ensures that the frontrunner can speak on behalf of others and that others can speak for the goals the frontrunner envisioned	• Enabled the development of a new policy that facilitated PHM development • Mobilization of resources and stakeholder groups (upstream and downstream) • Sharing of control for policy development, as others speak for the frontrunner
Market	• Align interest of (potential) stakeholders • Use historical relationships as the precedent to move regional developments further towards PHM	• +Conditions that reinforce alignment of interests: credibility of the constituent organizations; credibility of PHM leaders i.e. knowledge of past, present and future market developments • −Concerns about goal alignment; threats to organizations' competitive position	• Respected leaders help bring attention to the place-based PHM approach and garner support for their goals • Creates more reluctance to commit to place-based PHM approaches' goals	• Place-based approaches establish themselves as neutral and credible forums where stakeholders' interest are protected, which enabled getting organizations involved that had not yet joined the collaborative • Impediment to alignment of organizations
Leadership	• Install appropriate leadership roles (e.g. distributed leadership)	• +Conditions that reinforce trust and stability in leadership to induce common ground for change; legitimacy, decision-making and resources given to new leadership roles;membership of regional–state–national health councils or boards; sustained and responsive engagement; a history of commitment to community needs	• Creates credibility for stakeholder's new roles in line with PHM views and interests • Induces trust of staff and community in the leader • Recognizing the need to establish links with the community to build trust	• Adaptation of PHM views and interests • Staff retention and buy-in • Enables the building of trust & relationships with communities
Accountability	• Organize accountability processes across organizations • Manage competing accountabilities	• +Conditions: appropriate stakeholder representation •−Constraining conditions for shared accountability: lack of a legal entity which limits the scope of means to enforce accountability; different levels of commitment of participating organizations (more voluntary than hierarchical control); organizations having different time horizons, risk orientations and decision-making styles	• Creates believe in leaders' competency • Reduces misunderstanding of the aims of the place-based approaches. • Induces persuasion and peer pressure as means of enforcement and sanctions for non-performance	• Competent and credible representation enabled clear accountability policies • Accountability is difficult to define and to enforce

PHM: population health management; SCMO: strategy-context-mechanism-outcome.

province) and national health problems into a new regional vision and its alignment with stakeholder support across institutional networks (e.g. to verify the policy content), political levels and regional or national payers strengthened the receptiveness of governmental bodies for policy change. These contextual factors created a sense of urgency and a broad awareness of and credibility for the health problems and the policy content, which contributed to securing political power and support and financial resources.

Market refers to the establishment and continuation of partnerships between stakeholder organizations and the structure and dynamics of the regional setting in which organizations operate. Our review found that in addition to factors that influence collaborative working between organizations in a geographical area[44] (e.g. trust, agreement on purpose and needs; see Online Supplement Appendix 4), historical relationships between stakeholders and their respective leaders also influenced the establishment and continuation of collaborative initiatives.[25,31] For instance, initiatives' leaders who aimed to align stakeholders' interests to further develop the place-based initiative used their knowledge of past regional working relationships and developments to put these into a future regional perspective, as such they presented themselves as neutral and credible forums within the regional setting where organizations' interest would be protected. This appeared to foster respect and positive attitudes in the region, which in turn helped to attract new stakeholders, even among organizations whose activities partly overlapped with that of the place-based approaches.

Leadership refers to leadership structures, processes and styles that provide support and direction for the development of PHM across organizations and sectors. The review pointed, for instance, to the importance of distributed leadership whereby leadership is conceived as a collective process involving multiple participants within the place-based initiative. SCMOs showed that PHM strategies, which sought to enable the building of common ground across stakeholders, created distributed leadership roles across stakeholder organizations with legitimacy, decision-making and resources available within these roles.[43,45] This was seen to enable leaders to gain credibility for their roles, allowing them to exert influence to bring about change across the different stakeholder organizations in the initiative.

Accountability refers to who (which parties) can be held accountable or hold others accountable, the domains and processes of accountability including formal and informal procedures, for instance, for adherence to PHM goals and specific performance thresholds. The management of competing accountabilities was seen to be particularly challenging because of the many stakeholders involved who operated in different sectors and different contexts and had different perspectives on what accountability meant. PHM strategies that implemented governance structures, which represented key leaders of stakeholder organizations and who were recognized for their expertise, commitment and credibility, were seen to help manage competing interests, reduce confusion about the initiative's purpose among participating organizations and resulted in stakeholders meeting their responsibilities.[31,45]

Figure 1. Collaborative adaptive health network (CAHN) components for successful PHM development. PHM: population health management.

The CAHN framework

We brought together the eight components in the form of what we termed the CAHN framework (Figure 1). The name of the framework seeks to reflect that place-based approaches are regional networks in which stakeholders from different sectors that operate in different contexts establish a (formal or informal) collaborative health network with the purpose of developing PHM. This requires an adaptive approach in terms of PHM strategies' resources or incentives to bring about the necessary changes for stakeholders to work collaboratively for developing PHM. The eight components are interdependent, with the outcome of one component strategy forming the (pre-)context for another component in the chain of implementation steps. For instance, our review found that strategies to develop a learning environment (resources) resulted in data sharing, performance metrics and patient attribution between contracting parties. This created a new context, which formed the basis for negotiations on the financial terms of contracts (finance).

Discussion

This review presents a theory-based framework drawn from the available evidence on PHM strategies that

reorganize and integrate public health, health care, social care and wider public services to achieve the triple aim. It identified eight components considered to be key for the acceleration of PHM development: *social forces, resources, finance, relations, regulations, market, leadership and accountability*, with a total of 37 subcomponents. The review captured a wide range of theories including sociology, political science, cultural science, organizational science, economics and system dynamics. As such, the (sub)components that make up the CAHN framework summarize the insights into how and why PHM can be successfully accelerated. We believe this to be the first study presenting an overview of the components identified to be key for PHM development using a realist methodology. It goes beyond conceptualizations of integrated care, as for example summarized in the Development Model for Integrated Care[11] by capturing the continuum of public health, health care, social care and wider public services and theories underlying the reorganization and integration of services across the continuum. It provides insight into strategies and the relevant contextual factors and mechanisms to better understand why specific strategies reached specific outcomes in specific circumstances.[14,46]

The strengths of this study rest on the realist methodology,[18] describing the causal relationships between strategies, contexts, mechanisms and outcomes of PHM development and their underlying theories. The framework suggests routes for designing and implementing PHM strategies and creating the structures and processes needed to effect change in the contexts in which initiatives operate in such a way that most likely stimulate progress on PHM.

This review has a number of limitations. First, most included studies are set in the USA and the UK, which limits the generalisability of our findings to other settings and national contexts. At the same time, some features around organizational values and cultural norms that we identified are likely to be applicable to a wider range of health systems. Second, identifying what caused something to happen in open systems such as place-based approaches is complex. The conditions, that is, the changed context and the mechanisms that make the outcomes possible, are also often poorly described, affecting the quality of the evidence on identified SCMOs. Third, we argue that the eight identified components are interdependent, but the extent of this interdependency remains unclear as does the relative importance of individual components in different settings.

To gain further insight into the conceptualization and operationalization of PHM, more research is needed. Using the CAHN framework, future research could investigate the further development of PHM in the countries captured in this review; there is also a need to study other systems and settings to enable refining and enriching the components and testing the validity of the framework. In addition, future research should investigate how the different components of the CAHN framework relate to each other and their relative importance in different systems and settings. There is also a need for the further refinement of specific components, in particular leadership and accountability, which were not underpinned by theories or models as these were not provided by the included studies. Finally, there is need to investigate the PHM guiding principles for future initiatives.

Conclusions

This review identified eight components considered to be key for the acceleration of PHM development and which form what we described as the CAHN framework. We provide an integrated overview of the strategies that are required for the successful development of PHM, the necessary contextual factors and mechanisms to achieve specific outcomes and the theories that were extracted from the included studies and that deepened the understanding of these relationships. Future research should study the applicability of the framework in practice to refine and enrich identified relationships and identify PHM guiding principles.

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Supplemental material

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