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Disentangling the impact of alternative payment models and associated service delivery models on quality of chronic care: A scoping review

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ABSTRACT

Payment reforms are frequently implemented alongside service delivery reforms, thus rendering it difficult to disentangle their impact. This scoping review aims to link alternative payment arrangements within their context of service delivery, to assess their impact on quality of chronic care, and to disentangle, where possible, the impact of payment reforms from changes to service delivery. A search of literature published between 2013 and 2022 resulted in 34 relevant articles across five types of payment models: capitation/global budget ($n = 13$), pay-for-coordination ($n = 10$), shared savings/shared risk ($n = 6$), blended capitation ($n = 3$), and bundled payments ($n = 1$). The certainty of evidence was generally low due to biases associated with voluntary participation in reforms. This scoping review finds that population-based payment reforms are better suited for collaborative, person-centred approaches of service delivery spanning settings and providers, but also highlights the need for a wider evidence base of studies disentangling the impact of financing from service delivery reforms. Limited evidence disentangling the two suggests that transforming service delivery to a team-based model of care alongside a purchasing reform shifting to blended capitation was more impactful in improving quality of chronic care, than the individual components of payment and service delivery. Further comparative studies employing causal inference methods, accounting for biases and quantifying aspects of service delivery, are needed to better disentangle the mechanisms impacting quality of care.

1. Introduction

Rising prevalence of chronic diseases is challenging health systems to respond to changing and dynamic needs [1]. Governments often bear the majority of the fiscal burden, and are thus challenged with delivering high-quality services given budgetary constraints and mounting fiscal sustainability concerns [2]. Improving quality is another challenge that, in fragmented healthcare systems, has been related to better coordination, person-centered and 'value-based' care [3]. Purchasing has thus been one mechanism at the disposal of policymakers to incentivize improvements in quality of chronic care, given the shortcomings of classical fee-for-service (FFS) arrangements to reach this aim [3–7].

A substantial number of prior reviews have investigated the impact of purchasing reforms on quality, albeit with varying scopes in terms of the type of models studied (e.g. network-level payment models [8], global budgets with quality incentives [9], or mixed payment methods [10]), the type of setting (e.g. primary care [11] or outpatient care [12]) and type of chronic disease (e.g. diabetes [13], strokes [14] and cancer [15]). Given that the success of purchasing is likely to be highly contingent on the context, the contract details, and the organization of service delivery [15], some reviews have focused on particular types of service delivery models, their associated payment models, and their impact on quality, such as Accountable Care Organizations (ACOs) [16], Patient-Centered Medical Homes (PCMHs) [17] or more broadly integrated care models [18].

Past reviews have acknowledged the challenge of understanding the relationship between context, mechanisms and outcomes when it comes to financial and service delivery reforms, yet highlight the importance of doing so to better inform policymaking and the design of payment reforms [8,13,19]. While payment reforms often aim to stimulate changes in service delivery, payment reforms can be (and often are) implemented alongside service delivery reforms, thus rendering it difficult to disentangle the impact and effectiveness of the two. While some prior reviews have focused on detailing both the financing and service delivery aspects of payment reforms [8,9,19], none have aimed to disentangle the impact of payment on quality of chronic care from changes to service delivery,

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likely due to methodological difficulties.

To better understand the mechanisms and contexts in which payment models are successful in improving the quality of chronic care, we aim to gather overarching evidence on a range of population-based alternative payment models (APMs) across settings, by considering both the financing and service delivery model. By APMs, we refer to payment models that reward healthcare providers for delivering high quality care and that deviate from FFS. We focus on population-based models, rather than disease-specific ones, given their potential for improving population health more broadly through better coordination and integration of services. However, we also exclude studies on pay-for-performance (P4P), given the extensive coverage of this model in the literature thus far. A broader focus on different alternative population-based payment models allows for conclusions to be drawn about what works in which settings.

Furthermore, we aim to disentangle the impact of financing from changes to service delivery where possible, to better inform and understand what precise aspects of purchasing and service delivery lead to improvements in quality. We define service delivery models as different approaches to providing healthcare. These models are used to assess, plan and implement healthcare services. Based on the World Health Organization's (WHO) definition of quality [20], we take a broad view of quality, thus including process and health outcome measures, but also utilization where it pertained to populations with chronic diseases. This decision stems from the view that changes in utilization can be informative towards efficiency of care, one element of quality. We specifically address the following questions: What population-based APMs and associated service delivery models have been used to improve the quality of chronic care? What evidence is there disentangling the impact of payment models from service delivery on quality of care?

2. Material and methods

This article is based on a scoping review of the academic and grey literature that assessed the impact of APMs and their associated service delivery models, originally commissioned by the WHO and published as a final report [21]. Given the broad focus on APMs, a scoping review rather than a systematic review was carried out in order to gather a broad and diverse body of evidence on purchasing and service delivery together. To ensure adherence to quality standards we developed a protocol based on the Joanna Briggs Institute (JBI) guidelines [22] and following the AMSTAR (A Measurement Tool to Assess Systematic Reviews) checklist, as far as criteria for scoping and systematic reviews align [23]. The protocol is accessible on OSF Registries [24].

2.1. Search strategy

We identified key search terms through existing reviews on payment models, adapted these to our research questions, and refined them through trial searches. The final list of search terms is presented in Table 1. Further details, including particular MesH terms used and search strings per repository, can be found in the Appendix A1. We adopted a three-stage strategy to identify relevant literature: First, we conducted a systematic search of the five academic repositories PubMed, Web of Science, Scopus, Cochrane Database of Systematic Reviews, and Google Scholar. Second, we hand-searched the reference lists of all relevant systematic reviews identified in the first step for relevant single-study papers. Third, we performed a targeted search of the grey literature using Google incognito and by searching relevant organizations' repositories (OECD, World Bank, WHO). Despite this broad search strategy, ultimately, only academic articles were included in the review, as the grey literature identified did not meet the inclusion criteria. All searches were conducted in November 2022.

Table 1
Search terms used to identify relevant literature.

Cluster of terms	Search terms
Alternative payment models	Accountable care organization, alternative payment model, bundled payment, capitation, comprehensive primary care, coordinated care model, disease based model, global budget, global payment, episode based payment, healthcare financing, health maintenance organization, integrated delivery system, integrated financing, managed care organization, network-level payment, outcome based payment, patient aligned care team, patient centered medical home, pay for coordination, per member per month, population based payment, purchasing arrangement, quality based purchasing, risk based payment, shared savings, shared gain, value based payment, value based purchasing
Chronic diseases	Noncommunicable, NCD, chronic care, chronic disease, multimorbidity

Note: chronic disease-specific terms (i.e. diabetes, cancer, cardiovascular disease, etc.) were not included in the search terms. This was for pragmatic reasons to manage the number of articles, but also because we focus on broader population-based payment models, rather than disease-specific models. Multimorbidity was originally included as a search term, but upon further consideration was considered as an exclusion criterion, due to past literature finding that different service delivery models are needed to address the health issues of people with two or more chronic conditions versus only one.

2.2. Screening process

The search for literature (after the removal of duplicates) resulted in 3480 resources (Fig. 1). Before starting the full title and abstract screening, two researchers trialed 20 titles, using and clarifying the inclusion and exclusion criteria (Table 2), with more than 75 % of agreement [22]. Subsequently, two researchers separately screened all titles and abstracts, documented their decisions in an Excel file, compared these, and solved disagreements by consensus. In a second step, the full texts of 318 resources meeting the inclusion criteria were retrieved and a second pilot test (n = 5) was undertaken. For the full-text screening, we proceeded as in the first screening phase, resulting in the exclusion of 284 resources. The remaining 34 articles were included in the analysis.

Articles were included only if they measured quality indicators related to the management or prevention of various chronic conditions, or if the study population was narrowed down to individuals with chronic conditions. Based on the WHO's definition of quality [20] and Donabedian's model [26], we considered structure, process and health outcome measures that relate to the effectiveness, safety, person-centeredness, timeliness, equity, integration and efficiency of care. In cases of service utilization, only admissions/hospitalizations due to the chronic disease were considered as measures of quality, on the basis that they indicate avoidable admissions and are thus a measure of effective delivery of appropriate care. A common reason for exclusion was insufficient detail on the payment and service delivery model. In terms of the payment model, authors must have clearly outlined the base payment of the reform, additional financial incentives and their design, and whether participation was mandatory. Additionally, information on the setting of service delivery and the type of providers affected were needed. These criteria led to the exclusion of some articles on ACOs and PCMHs, for example, that did not highlight the payment models behind them.

2.3. Extraction and analysis

We prepared an extraction sheet based on the Cochrane Effective Practice and Organisation of Care (EPOC) resources [27] with a priori defined categories deemed relevant for our review, guided by relevant factors highlighted by Stokes et al [28]. To ensure consistency, we trialed the data extraction with two researchers charting information for two selected research papers and subsequently compared the results.

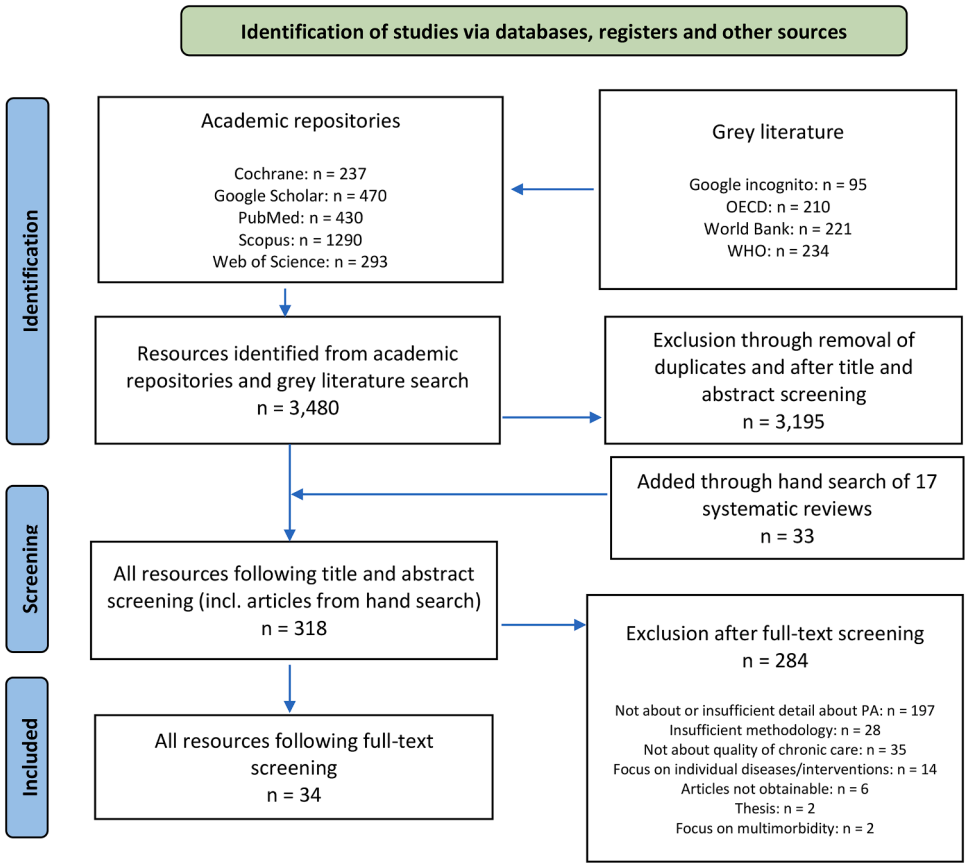

Fig. 1. PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and other sources [25].

Table 2
Overview of inclusion and exclusion criteria.

	Inclusion criteria	Exclusion criteria
Themes covered	• Studies examining alternative payment models (beyond pay-for-performance) with the aim of improving quality for chronic diseases • Studies examining the impact on quality outcomes (structure, process and outcome measures according to Donabedian's model [26]) • Studies looking at quality improvements for various chronic diseases/conditions	• Studies providing insufficient detail on APMs • Studies focusing exclusively on pay-for-performance mechanisms • Studies looking at quality improvements for one specific disease/condition • Studies focusing on multimorbidity or outcomes for people with several chronic conditions at once
Timeframe	• Published from 2013 onward	• Published before 2013
Type of resources	• Peer-reviewed scientific publications • Grey literature (government publications, working papers, research reports) • Systematic reviews for handsearching	• Bachelor's and Master's theses
Types of studies	• Studies using causal inference methods (i.e. regression-based analysis, controlled studies, etc.)	• Case studies • Descriptive/observational studies
Language	• English	• Other than English
Geographic areas	• Global	

Based on this trial the extraction sheet was slightly amended and categories were clarified; the extraction of the remaining articles was divided between two researchers. We extracted information as outlined in Table 3 according to the authors' findings and refrained from providing our own interpretation of the studies' results individually, including where findings were contradicting.

Given there are no quality appraisal tools for scoping reviews, we ensured the quality of articles in two ways. First, we assessed the risk of bias of each article according to the Critical Appraisal Checklists developed by the JBI for different types of research. Second, an amended version of the GRADE approach based on the type of study, risk of bias,

Table 3
Details extracted from articles.

Theme	Details
Article details	Author, title, duration of study, aims, key findings
Program overview	Type, country, aim of the program, programme design, coverage of population, provider participation, implementation, and target of incentives
Provider participation	Coverage, type, mandatory participation, base payment, single vs. Multiple payer system
Reward & payment structure	Rewards and how they're calculated, frequency of rewards, who receives the payment, distribution method, penalties and how they're calculated, (dis)incentives
Quality indicators measured	Structure, process, outcomes
Research design/ methodology	Empirical method used, population/intervention group, comparator group, type of study, population/sample size, exclusion of certain populations
Risk of bias of article	JBI checklist used, potential issues/biases
Service delivery model	Type of health care setting, workforce, aspects of integrated care, coordination of care, continuity of care
Impact on outcomes	Direction and magnitude of changes in outcomes related to process and health outcomes, continuity of care, integration of services, coordination
Additional elements /mechanisms	Governance, information systems, quality initiatives, regulations

and effect size, was used to discern the certainty of evidence across articles (Appendix A2) [29].

We clustered the articles included in this review into five groups based on similarity of the type of payment models they analyzed, informed by a classification by Tsiachristas [30] based on level of financial and care integration: 1) capitation/global budget arrangements, 2) bundled payments, 3) shared savings and shared risk arrangements, 4) pay-for-coordination arrangements, and 5) blended capitation. Furthermore, a final cluster included articles that compared different variations of APMs.

3. Results

3.1. Description of the literature

The scoping review identified 34 articles that met the inclusion criteria, highlighted in Table 4. In terms of country representation, most articles hailed from high-income countries. A majority focused on the United States (74 %, $n = 25$), followed by Canada ($n = 3$), China ($n = 2$), Germany ($n = 2$) and the Netherlands ($n = 2$).

Five types of APMs were identified in the scoping review. The largest number of articles analyzed capitation or global budget arrangements (36 %, $n = 13$), from which six focused on the Alternative Quality Contract (AQC) in Massachusetts. The second-largest cluster focused on pay-for-coordination arrangements (26 %, $n = 9$), followed by shared savings/shared risk arrangements (17 %, $n = 6$). Three articles analyzed a blended capitation model based in Ontario, Canada. One article assessed a bundled payment in the Netherlands. The two remaining articles compared across variations or types of models.

Most articles studied single-payer arrangements ($n = 21$), with public (n = 8) or private purchasers (n = 13), while 11 analyzed multi-payer APMs. The remaining articles did not provide information on the purchaser(s). As the focus of the scoping review was on population-based models rather than disease-specific payment models, the target population of the APMs was primarily the general population and narrower, such as to children ($n = 1$) or frail older adults ($n = 1$), in only a few cases.

Given the strict inclusion criteria of causal inference methods to discern the causal impact on quality of care, most articles used a difference-in-differences methodology (67 %, $n = 23$). Fewer used regression models with time effects ($n = 8$). Two used interrupted time-series and one employed a randomized-controlled trial (RCT).

The certainty of evidence was generally assessed as quite low, despite the use of causal mechanisms and methods for overcoming biases, with only 4 articles identified as having a high or moderate certainty of evidence (Table 4). One of the most prevalent issues was selection bias, both in terms of the providers where participation was voluntary (i.e. those most likely to benefit and with necessary capacity participating), but also the expectation that patients with worse health would be more likely to enroll with these providers.

The most common type of quality indicator used were process measures related to chronic disease prevention and screening, (63%, n = 22), such as management of diabetes and cardiovascular diseases and cancer screenings. Fewer articles ($n = 14$) used health outcomes (e.g. self-reported health, mortality, survival rates, patient-perceptions of quality, readmissions, hospital admissions due to chronic disease). From these nine, only three included patient-perceptions of quality.

3.2. APMs, associated service delivery models and their impact on quality of chronic care

The scoping review identified five clusters of APMs. In the following we provide a short description for each of the APMs, the service delivery models in which they were embedded and their impact on quality of chronic care (Table 5).

3.2.1. Global budget/capitation

The largest share of articles discussed capitation-based/global budget models (n = 13), where providers received a global budget to cover all their patients or a per-member fee for those covered by the predetermined services [31–43]. Variations within this type of arrangement exist in terms of the financial responsibility/risk taken on by providers, the services covered and the setting in which they were provided. In nine of these articles, financial incentives based on quality performance were used in addition to global budgets/capitation. Within this cluster, most articles found positive impacts on a range of quality measures.

Four articles examined capitation in primary care, including comprehensive care and chronic disease management programs provided by General Practitioners (GPs) [31,34,36], or team-based comprehensive care provided in Patient-Centred Medical Homes (PCMHs) [33]. While in some of these primary-care based models GPs acted as gatekeepers to other services [34,36], others provided team-based multidisciplinary care [31,33]. All of these arrangements uncovered mostly positive impacts on different measures of quality of chronic care. Additionally, a capitation model with financial incentives for monitoring chronic care patients in Germany improved survival rates [36], reduced hospitalizations due to ambulatory-care sensitive conditions (ACSH) and reduced chronic-care related hospitalizations for some conditions [34]. However, there were no changes to re-admissions for patients with chronic conditions in a risk-adjusted partial capitation PCMH model [33]. The use of health information technologies (HIT) and electronic health records (EHR) were also highlighted as initiatives used to improve information transfer and decision-making across each of these primary care models.

In two articles, global budgets were used to reimburse service delivery in hospitals, albeit with mixed findings. A hospital-based global budget model with P4P based on quality measures in China showed improved treatment indicators for acute myocardial infarction, but reduced oxygenation index assessments for chronic asthma [37]. The Maryland All-Payer model, a global budget with P4P characteristics and shared savings/risk, mandatory monthly data reporting and eligibility for lump sum investment money to reorganize service delivery, had no impact on chronic-disease specific case-mix adjusted readmission rates or risk-standardized mortality [35].

A single article examined the impact of a managed care organisation (MCO) with full-risk, risk-adjusted capitation covering all services for Medicaid beneficiaries, finding that patients with severe and chronic conditions in the MCO received more ancillary services and post-acute care treatment (home health services) as compared to FFS arrangements [32].

Within this cluster, six articles [38–43] analyzed the Alternative Quality Contract (AQC), a risk-adjusted population-based global budget model with quality bonuses and shared savings/risk based on 64 quality measures, covering primary and specialty care under the same private payer ACO. A few of the six articles evaluated the model as positively affecting quality of care. Aggregate chronic disease management scores had improved after 4 and 8 years of implementation [38,39]. Health outcomes of glycated hemoglobin and blood pressure control increased [39,42]. One article found minor increases in psychotropic medication management visits for individuals with behavioural risks among AQC organisations that took on some financial risk for behavioural health [42]. Other articles found no/limited spillover effects for Medicare beneficiaries [43], no improvements in process measures for managing asthma among children [40], and limited improvement in equality of chronic disease management between lower and higher socioeconomic groups [41].

3.2.2. Pay-for-coordination

The second cluster of articles analyzed pay-for-coordination arrangements (n = 9), where providers received a per-member fee per enrolled patient to cover the coordination and integration of their

Table 4
Summary of literature included.

#	Year	First Author	Country	APM studied	Program (if applicable)	Service delivery model (if any)	Purchaser	Target group	Intervention (Year)	Outcomes assessed	Methods	Study Design	Certainty of evidence
Capitation/Global Budget													
[31]	2016	Yin	Shanghai, China	Capitation & per capita reward		Comprehensive care in primary care	Not mentioned	General population	Before: Capitation; After: Capitation & per capita reward (2011)	O	DiD	NCD patients in Shanghai before/after vs. NCD patients in Kumming before/after (control)	Low
[32]	2020	Munnich	Florida, USA	Capitation (PMPM)	Medicare Managed Care	Managed Care Organization (MCO)	Single (Public, Medicare but delivered through private MCOs)	All Medicaid enrollees in Florida	Before: Medicaid FFS After: PMPM payment (Medicaid Managed Care) (2014)	O	DiD	Medicaid beneficiaries (All and then only with substantive chronic illnesses) vs. Non-Medicaid (privately insured and non-insured) before and after in Florida	Low
[33]	2017	Salzberg	Albany, New York, USA	Capitation (PMPM), limited FFS		PCMH	Single commercial payer (Capital District Physicians Health Plan, (CDPHP))	Members enrolled in CDPHP	Before: FFS After: Capitation (PMPM) with limited FFS (2009)	O	ITS	Patients receiving care under PCMH with payment reform or without payment reform vs. Patients receiving care at FFS non-PCMH sites	Very low
[34]	2021	Sawicki	Baden-Wuerttemberg, Germany	Capitation (PMPM), financial incentives		Comprehensive care in primary care	Multipayer (public and commercial)	General population	Before: FFS After: Capitation (PMPM), financial incentive for monitoring chronic care patients (2004)	O	Logistic regression with time effects	Enrolled patients receiving new primary care program vs. Patients receiving usual primary care (2011–2018)	Very low
[35]	2021	Viganego	Maryland, USA	Global budget, P4P based on quality measures, Shared savings/risks	Maryland All-Payer Model		Multiple payer (Medicare, Medicaid, and commercial insurers)	General population	Before: FFS After: global budget, P4P based on quality measures, some shared savings/risks (Maryland All-Payer Model) (2010)	O	Interrupted time-series	Maryland residents aged 19+ hospitalized with principal diagnosis of CHF, AMI and IS in global budget payment Maryland hospitals before and after	Very low

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Table 4 (*continued*)

#	Year	First Author	Country	APM studied	Program (if applicable)	Service delivery model (if any)	Purchaser	Target group	Intervention (Year)	Outcomes assessed	Methods	Study Design	Certainty of evidence
[36]	2019	Wensing	Baden-Wuerttemberg, Germany	Capitation (PMPM), financial incentives		Comprehensive care in primary care	Multipayer (public and commercial)	General population	Before: FFS After: Capitation (PMPM), financial incentive for monitoring chronic care patients (2004)	O	Cox proportional hazards regression	Enrolled patients receiving new primary care program vs. Patients receiving usual primary care (2011–2018)	Very low
[37]	2021	Zhou	Guizhou region, China	Global budget, P4P			Not mentioned	Total population in the region	Before: FFS After: Global budget; P4P (2016)	P	DiD	Global budget hospitals vs. FFS hospitals before/after	Moderate
[38]	2014	Song	Massachusetts, USA	Global budget, Quality bonuses, Shared savings/risks	Alternative Quality Contract (AQC)	ACO like model	Single commercial payer (Blue Cross Blue Shield of Massachusetts (BCBSM))	All enrollees under BCBS	Before: FFS contract tied to some P4P measures (lower value than in AQC) After: Global budget, quality bonuses, shared savings/risks (BCBSM AQC) (2009)	P	DiD	Insured individuals enrolled with ACQ organisation defined by contract years 2009, 2010, 2011, or 2012 vs. Commercially insured individuals in employee-sponsored plans across all 8 other Northeastern states	Very low
[39]	2019	Song								P, O	DiD	BCBS enrollees assigned to PCP part of AQC vs. Enrollees across all 8 other Northeastern states	Very low
[40]	2014	Chien								P, O	DiD	0–21-year-olds receiving care from AQC groups (those with special healthcare needs and those without) vs. 0–21-year-olds in non-AQC groups	N/a.
[41]	2017	Song								P	DiD	Enrollees in lower socioeconomic areas in 2009 AQC cohort enrollees with	N/a

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Table 4 (*continued*)

#	Year	First Author	Country	APM studied	Program (if applicable)	Service delivery model (if any)	Purchaser	Target group	Intervention (Year)	Outcomes assessed	Methods	Study Design	Certainty of evidence
												ACQ PCPs vs. enrollees in higher socioeconomic areas	
[42]	2015	Barry								P	DiD	Enrollees in AQC organisations that accepted behavioural health risk or didn't vs. enrollees not participating in AQC; people with chronic diseases and co-occurring mental health condition	Low
[43]	2013	McWilliams								P, O	DiD	Beneficiaries continuously enrolled in Parts A and B of traditional FFS (not enrolled with BCBSMA) and received at least 1 primary care service with AQC provider during intervention vs. Beneficiaries served by non-AQC providers	Very low
Pay-for-coordination													
[44]	2016	Jones	Vermont, USA	Pay-for-coordination (FFS)		PCMH	Multipayer (public and private; Medicaid, Medicare and three major commercial insurers)	Enrolled patients	Before: no clear information After: annual per person payment on top of FFS (2010	P	DiD	Patients enrolled in PCMH vs. Patients not enrolled in PCMH and receiving primary care in non-providing practices	Low
[45]	2016	Kern	Hudson Valley, New York, USA	Pay-for-coordination (FFS)		PCMH	Multipayer (commercial)	Commercially insured patients across several regions	Before: no clear information After: PMPM payment (no information on baseline payment) (2009)	P	Cohort study	Patients attributed to physicians implementing PCMH with EHR vs. 1) patients attributed to physicians with EHR but no	Very low

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Table 4 (*continued*)

#	Year	First Author	Country	APM studied	Program (if applicable)	Service delivery model (if any)	Purchaser	Target group	Intervention (Year)	Outcomes assessed	Methods	Study Design	Certainty of evidence
												PCMH; 2) patients attributed to physicians without EHR and no PCMH	
[46]	2020	Spees	North Carolina, USA	Pay-for-coordination (FFS)		PCMH	Single (public, Medicaid)	Medicaid beneficiaries	Before: no clear information After: PMPM payment on top of FFS (1998)	P	DiD	Effects of PCMH membership on Medicaid enrollees with cancer and chronic condition (s) vs. Medicaid enrollees with the same chronic condition but without cancer diagnosis	Low
[47]	2017	Flieger	New Hampshire, USA	Pay-for-coordination (FFS)		PCMH	Multipayer (commercial)	Commercially insured patients	Before: FFS After: PMPM payment on top of FFS (2009)	P	DiD	Patients enrolled in PCMHs in 9 pilot sites vs. Patients without PCMH enrollment	N/a
[48]	2013	Fifield	New York, USA	Pay-for-coordination (FFS) tied to quality measures		PCMH	Multipayer	General adult population (mix of HMO, PPO, Medicaid and Medicare patients)	Before: FFS After: PMPM tied to quality improvements on top of FFS (2008)	P, O	RCT	Practices randomly recruited and assigned to intervention and control group; patients in PCMH intervention group vs. Patients in non-PCMH control group	High
[49]	2017	Shi	Louisiana, USA	Pay-for-coordination (FFS)	Quality Blue Primary Care (QBPC)		Single payer (commercial)	General population	Before: FFS After: Performance adjusted PMPM fee on top of FFS (2013)	P	DiD	Beneficiaries that visited QBPC providers vs. Beneficiaries that visited non-QBPC providers	Moderate
[50]	2016	Rosenthal	Cincinnati, Ohio, USA	Pay-for-coordination (FFS), quality incentives		PCMH	Multipayer (commercial)	Enrolled patients	Before: FFS After: PMPM and quality incentives on top of FFS (2009)	P	DiD	Patients attributed to pilot practices vs. Those attributed to a matched comparison cohort	Low
[51]	2013	Werner	New Jersey, USA	Pay-for-coordination (FFS),		PCMH	Single payer (commercial)	General population, Horizon Blue	Before: FFS After: PMPM coordination and	P	DiD	Horizon beneficiaries enrolled in	Very low

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Table 4 (*continued*)

#	Year	First Author	Country	APM studied	Program (if applicable)	Service delivery model (if any)	Purchaser	Target group	Intervention (Year)	Outcomes assessed	Methods	Study Design	Certainty of evidence
				coordination & quality payments				Cross Blue Shield of New Jersey beneficiaries	quality payments on top of FFS			PCMH practices vs. Horizon beneficiaries enrolled in comparison practices	
[52]	2022	Markovitz	Michigan, USA	Pay-for-coordination (FFS), quality incentives	Comprehensive Primary Care Plus (CPC+)	Medical home	Multipayer (public and commercial)	Entire population	Before: no information After: care management fees and quality bonuses on top of FFS (2017)	P	DiD	CPC+ enrollees vs. Non-CPC+ enrollees	N/a
Shared savings & shared risk													
[53]	2019	Kicinger	Maryland, the District of Columbia, and northern Virginia, USA	Shared savings, bonus payments	Care First Model	PCMH	Single commercial payer (Care First)	Enrollees of Care First Blue Cross Blue Shield Insurance	Before: FFS After: Shared savings, bonus payments (Care First Model) (2011)	P	Regression w. time and member FEs	Members attributed to PCMH providers vs. Members of PCPs that never joined the program	Low
[54]	2015	Friedberg	Pennsylvania, USA	Shared savings, PMPM fees for care managers	Northeastern Pennsylvania Chronic Care Initiative (PACCI)	PCMH	Multipayer (2 commercial payers)	General patients at participating practices	Before: FFS After: Shared savings, PMPM fees for care managers for practice transformation (Northeastern Pennsylvania Chronic Care Initiative (PACCI)) (2009)	P	DiD	Patients attributed to practices participating in pilot vs. Patients attributed to non-participation practices	Low
[55]	2014	Pope	USA	Shared savings	Medicare Physician Group Practice	Early ACO	Single (Medicare)	General population	Before: Medicare FFS After: Shared savings (Medicare Physician Group Practice) (2005)	P	DiD	Medicare FFS beneficiaries that received services from participating practices vs. Beneficiaries at non-intervention offices that received services	Moderate/ low
[56]	2019	Navathe	Hawaii, USA	Shared savings & shared risk	Population-based Payments for Primary Care (3 PC)		Multiplayer (commercial, and public, including Medicare advantage, and Medicaid	General population within Hawaii Medical Service Association (HMSA) health plan	Before: FFS After: shared savings; shared risks (Population-based Payments for Primary Care (3 PC)) (2016)	P, O	DiD	HMSA members attributed to 3 PC participating physician organisations vs. HMSA members attributed to PCP remaining in FFS	Low

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Table 4 (*continued*)

#	Year	First Author	Country	APM studied	Program (if applicable)	Service delivery model (if any)	Purchaser	Target group	Intervention (Year)	Outcomes assessed	Methods	Study Design	Certainty of evidence
[57]	2019	Zhang	California, USA	Shared savings & shared risk		ACO	Single payer (commercial)	General population in 4 Californian counties; individuals enrolled with PCP	Before: Assumed to be FFS After: shared savings and shared risk (2010)	P	DiD	Non-Medicare enrollees with 7 years of commercial HMO enrollment in 4 northern California countries vs. Non-Medicare enrollees never enrolled in ACO	Very low
[58]	2021	Hayen	Netherlands	Shared savings, P4P		Primary care centres	Single payer (Menzis)	Individuals enrolled with Menzis	Before: FFS After: Shared savings contract; P4P; bundled payment for chronic care (2014)	P	DiD	Menzis enrollees registered with GP in intervention group vs. registered with GP in control group	Low
Blended capitation													
[59]	2015	Kiran	Ontario, Canada	Blended capitation, blended FFS, quality incentives	Family Health Organisations [FHO] and Family Health Groups [FHGs)	Type of PCMH	Single (public)	General population	Before: FFS After: Blended capitation & blended FFS; quality bonuses (Family Health Organisations [FHO] (2003) and Family Health Groups [FHGs] (2006))	P	Regression w. time-effects	Blended FFS versus Blended capitation vs. Blended capitation w. Team-based practice	Low
[60]	2021	Vu								O	Regression w. time-effects	Family practitioners that switched from blended FFS to blended capitation vs. Those that stayed in blended FFS	Very low
[61]	2021	Vu								P	Regression w. time-effects	Providers switching from blended FFS to blended capitation vs. those remaining in blended FFS	Very low
Bundled payments													
[62]	2022	Hoedemakers	Netherlands	Bundled payment	Care Chain Frail Elderly (CCFE)	Integrated care	Single (dominant private health insurer in each region)	Top 1% of the frailest elderly people registered with a GP that live at home with complex care needs	Before: FFS After: Bundled payment (Care Chain Frail Elderly – CCFE) (2017)	O	DiD	Frail elderly people enrolled in CCFE vs. Frail elderly receiving usual care	Low
Comparing across types of APMs													

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Table 4 (*continued*)

#	Year	First Author	Country	APM studied	Program (if applicable)	Service delivery model (if any)	Purchaser	Target group	Intervention (Year)	Outcomes assessed	Methods	Study Design	Certainty of evidence
[63]	2017	McConnell	Oregon & Colorado, USA	Oregon: Global budget, bonus payments; Colorado: PMPM (FFS), bonus payments		ACOs	Single-payer (public, Medicaid)	Medicaid beneficiaries	Before: FFS Medicaid After: two types of Medicaid ACOs (Oregon 2012, Colorado 2011)	P	DiD	Medicaid enrollees in Oregon vs. Medicaid enrollees Colorado	Low
[64]	2014	Hall	Florida, USA	Shared savings, monthly case management (FFS)		POPs (PSNs), HMOs	Single-payer (public, Medicaid)	POPs only for children, HMOs for Medicaid beneficiaries	Comparison across types of arrangements: Managed care arrangements with shared savings and monthly case management fees on top of FFS (Pediatric Only Plans, (POP)) versus Health Maintenance Organizations (HMO)	O	Ordered logistic regression	Parents with children attributed to POPs/PSNs vs. Parents with children attributed to HMOs	Very low

Abbreviations: FFS= Fee-for-service; DiD= Difference-in-differences; ITS= Interrupted Time Series; RCT= Randomised Controlled Trial; RE= Random effects; FE= Fixed effects; PMPM = Per-person-per-month; P4P= Pay-4-performance; U= utilization; P= process; O= outcome; MCO = Managed Care Organization; ACO= Accountable Care Organization; PCMH = Patient-centred Medical Home; NCD= Non-communicable Disease; POP= Pediatric Only Plan; PS*n* = Provider Service Network; HMO= Health Maintenance Organisation; PCP= Primary Care Physician; EHR= Electronic Health Records; CHF= Congestive Heart Failure; AMI= Acute Myocardial Infarction; IS= Ischemic stroke.

Table 5
Summary of quality incentives, service delivery and impact on quality indicators across articles.

#	First Author, year	Payment model	Services covered by purchasing	Quality incentives	Service delivery model	Additional elements	Quality indicators	Impact	Key conclusions of author (s)
Capitation/Global Budget									
[31]	Yin, 2016	Capitation & additional financial reward	Primary care	Per capita reward per enrolled patient	Comprehensive care (health promotion, disease prevention, diagnosis, treatment for illnesses, NCD management and rehabilitation care); Multidisciplinary teams (GPs, nurses and public health specialists)	EHR system	Patient-perceived quality of primary care measures		Long-term provider-patient relationships, better coordination between CHCs and hospitals, and capitation to GPs for patient enrollment may have contributed to improved patient-perceived quality of care and overall NCD management.
							First-contact utilization	+	
							First-contact accessibility	None	
							Continuity of care (follow-up care)	+	
							Coordination of services	+	
							Coordination of information	+	
							Comprehensiveness of available services	None	
							Comprehensiveness of provided services	None	
							Family centeredness	None	
							Community orientation	+	
							Culture competence	+	
							Primary Care Assessment Tool (Composite score)	+	
[32]	Munnich, 2020	Full risk capitation; risk-adjusted PMPM payment	Services for all Medicaid beneficiaries and their subsequent care needs		MCO		Medicaid beneficiaries with substantive chronic disease admissions		Medical flows and treatment decisions didn't change after shift from Medicaid FFS to primarily MMC. Patients with severe and chronic diseases received more services and better continuity of care. Providers may have been incentivized to prioritize managing chronically ill patients given their high costs or improve acute to post care transitions to reduce future costs. There may have been increased competition in competing for Medicaid beneficiaries as result of transition from Medicaid FFS to MMC contracting.
							Ancillary services received	+ (COPD, heart failure)	
							Post-acute care treatment (discharged with home health services)	+ (COPD, heart failure)	
[33]	Salzberg, 2017	Capitation; risk-adjusted PMPM; limited FFS	Primary care, comprehensive care		PCMH; Team-based care; comprehensive care	Use of Health Information technology	Patients with chronic conditions (Hypertension, Hyperlipidemia, Diabetes, Coronary atherosclerosis)		PCMHs alongside monthly risk-adjusted lump payment led to some improvement in outcomes among patients with chronic conditions. Payment policies have
							Readmissions	None	

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Table 5 (*continued*)

#	First Author, year	Payment model	Services covered by purchasing	Quality incentives	Service delivery model	Additional elements	Quality indicators	Impact	Key conclusions of author (s)
									differential effects: only some individuals (i.e. Chronically ill) may benefit from partial capitation once PCMH model is in place.
[34]	Sawicki, 2021	Capitation (PMPM)	Primary care, comprehensive care	Financial incentive to monitor patients with multiple chronic conditions; additional incentives for specially trained practice assistants to help coordinate care; additional quality requirement to engage in quality improvement based on data	Guideline-based care; coordinated comprehensive program; structured chronic disease management; GPs as gatekeepers; coordination activities	Computerized clinical decision-support, peer-group trainings	Patients w. Diabetes mellitus type 2 ACSH Diabetes-related hospitalization Patients w. Chronic heart failure ACSH CVD-related hospitalization Patients w. Coronary heart disease ACSH CVD-related hospitalization	 – none – – – –	The primary care intervention reduced risk of chronc-disease-related hospitalization for several chronic conditions. Strengthening primary care can lead to reduction in hospitalizations for high-risk patients
[36]	Wensing, 2019	Capitation (PMPM)	Primary care, comprehensive care	Financial incentive to monitor patients with multiple chronic conditions; PCPs participated in continuous quality improvement activities	Voluntary program; comprehensive coverage; management of chronically ill patients; coordination of access to specialist care; structured disease-management for some chronic diseases	Improved information transfer between primary and secondary care; data-drive quality improvement; use of computerized decision support for drug prescribing	Survival rates	+	Strong primary care and change to capitation can increase patient survival. Structured management of patients with chronic diseases can contribute to improved patient survival
[37]	Zhou, 2021	Global budget based on diseases treated; P4P	Hospital services	Nested P4P: % of budget set as bonus for performance assessment, evaluated through international treatment guidelines and medical outcomes; points deducted if quality decreased from previous year			Treatment indicators for AMI Aspirin within 24h Aspirin at discharge Beta-blocker at discharge Smoking cessation advice Treatment indicators for chronic asthma Oxygenation index assessment Influenza Vaccine Pneumonia vaccine Smoking cessation advice Treatment indicators for stroke Aspirin within 24h Aspirin at discharge Statin at discharge Smoking cessation advice	 None + + + – None None None None None None None	Global capitation alongside P4P led to improved quality of care in terms of 4 measures of quality for guideline treatment of chronic conditions, but negatively impacted 1 measure. Global capitation and P4P together can reduce quality risks of payment reforms and improve quality of care
[35]	Viganego, 2021	Global budget based on patient demographics, historic utilization and revenue and quality measures; P4P; Shared savings/risks	Hospital (inpatient, outpatient, emergency department); not targeted to physicians	Budget adjusted based on performance (HCAHPS and clinical process measures measured by Quality-Based Reimbursement Program). Measures included patient satisfaction, rates of	Aim was to incentive better coordination, better continuity of care, and more efficient referral pathways.	Lump sum for investments into changing service delivery process towards better coordinated care, chronic disease management, and resource utilization.	Congestive Heart Failure case-mix adjusted readmission % risk-standardized mortality % Acute Myocardial Infarction Case-mix adjusted readmission %	 None None None	The reform had no impact on outcomes and quality measures for 3 major cardiovascular conditions

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Table 5 (*continued*)

#	First Author, year	Payment model	Services covered by purchasing	Quality incentives	Service delivery model	Additional elements	Quality indicators	Impact	Key conclusions of author (s)
				preventable admissions and readmissions, hospital risk-adjusted mortality, and hospital-acquired conditions; penalty for overage of budget (up to 50%); small amount of shared savings if under-budget; hospitals required to transmit data to HSCRC monthly for monitoring;			Risk-standardized mortality % Ischemic stroke Case-mix adjusted readmission % Risk-standardized mortality %	None None None	
[38]	Song, 2014	Risk-adjusted global budget; Quality bonuses, Shared savings/risks	Primary and specialty care provided to population	Quality bonus and size of shared savings/shared risk based on % of eligible enrollees whose care met the threshold of quality for measure (64 measures of quality of care related to chronic care management, prevention, patient experience, hospital measures).	ACO-like model; primary, specialty and pediatric care	Both AQC and non-AQC small practices received quality improvement and contracting support from the physician organisations that they belonged to.	% of enrollees whose care reached threshold performance for measure (aggregated) Chronic disease management (Aggregate process measure)	 +	AQC enrollees generally saw great quality improvements after 4 years, although other external factors cannot be ruled out. Global budget contracts combined with quality incentives may encourage improved quality and changes in practice patterns.
[39]	Song, 2019			Additional strategies employed by various providers, such as rewards to physicians or groups for efficient practices. Periodic reports received from the insurer regarding cost and quality performance (also comparing to other organisations) to help identify areas for improvement.			Colonoscopy services[1] Mammography services Chronic disease management (Aggregate process measure) Glycated Hemoglobin & Blood pressure control (outcome)	+ + + +	Unadjusted measures of quality were higher or similar to average regional and national quality measures. Potential for ACO models with financial rewards, risks and quality incentives can slow spending growth while maintaining quality of care.
[40]	Chien, 2014						ER visit with asthma as primary diagnosis Asthma: appropriate medications Asthma: Medication management	None None None	AQC had a small positive impact on pediatric preventive care quality measures tied to the P4P aspects. Children with special needs experienced greater improvement than children without. Asthma-related measures were not tied to P4P aspects which may explain why they were not impacted. Lack of impact on non-P4P measures suggests no spillover impact from providers focusing only on incentivized measures.

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Table 5 (*continued*)

#	First Author, year	Payment model	Services covered by purchasing	Quality incentives	Service delivery model	Additional elements	Quality indicators	Impact	Key conclusions of author (s)
[41]	Song, 2017						Chronic disease management (Aggregate process measure)	None	Process quality measures generally improved more for AQC enrollees living in lower-socioeconomic areas compared to higher-socioeconomic areas in first four years of AQC. AQC may have contributed to narrowing disparities in terms of quality. Large quality incentives with a sufficient global budget can help providers improve care.
[42]	Barry, 2015						Average number of psychotropic medication management visits	+ (total & those with behavioural risk)	AQC organisations that took on risk for behavioural health only experienced slight increase in quality measures and utilization measures for non-risk individuals and not for those with behavioural risk. Shortages among mental health providers as well as weak referral networks may be a contributing factor.
[43]	Mcwilliams, 2013						Admission rate for ACSCs (patients with cardiovascular or diabetes)	None	AQC did not improve quality for Medicare beneficiaries (i.e. No spillover effects). AQC efforts to improve quality may have been restricted to BCBSMA enrollees.
							30-day readmission rate	None	
							Mammography screening	None	
							LDL-C testing (diabetes)	+	
							Hemoglobin A testing (diabetes)	None	
							Retinal examination (diabetes)	None	
							LDL-C testing (cardiovascular)	+	
Pay-for-coordination									
[44]	Jones, 2016	Pay-for-coordination (FFS); PMPM payment to operate a Community Health Team	Primary care	Annual per person payments based on NCQA PCHM score; Additional PMPM payment for administrative entity in each service area to operate a Community Health Team	PCMH Diverse multidisciplinary teams; coordinated care (including with community services and community-based self-management programs)	Learning collaboratives; sufficient investment for infrastructure needed for implementation	Breast cancer screening	+	Authors found improvement in utilization, and quality outcomes for the whole population, who received the majority of their primary care in the medical home setting.
							Cervical cancer screening	+	
							Use of imaging studies for low back pain	None	

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Table 5 (*continued*)

#	First Author, year	Payment model	Services covered by purchasing	Quality incentives	Service delivery model	Additional elements	Quality indicators	Impact	Key conclusions of author (s)
							Hemoglobin A1c (hba1c) testing (for diabetes patients)	None	Increased time of program and working with Community Health Team staff led to PCMH sites to diverge from non-participating sites.
							Eye exams (for diabetes patients)	+	
							Nephropathy screening (for diabetes patients)	None	
							Low-density lipoprotein cholesterol (LDL-C) screening (for diabetes patients)	+	
[45]	Kern, 2016	Pay-for-coordination (No info on baseline payment)	Primary care	Must have achieved level III accreditation as defined by the NCQA	PCMH Shift to multidisciplinary team care; coordinated care across providers and settings; chronic disease management; care management	Organizational support for practice leadership and individual practice-level support for PCHM transformation; Support from nurses and practice coaches with experience in continuous quality improvement; EHR implementation	Eye examinations (for patients with diabetes)	+	The PCMH was associated with modest changes in most measures and provided similar quality compared with practices that used EHRs and paper records. Unclear why some measures did not improve although authors attribute this to the complexity of clinical workflow (i.e. Different types of decision support, disease management, and care coordination) needed to improve different measures
							Hemoglobin A1c testing (for patients with diabetes)	+	
							Low-density lipoprotein cholesterol testing (for patients with diabetes)	None	
							Nephropathy screening for patients with diabetes	-	
							Breast cancer screening	None	
							Colorectal cancer screening	None	
							Appropriate medications for patients with asthma	None	
[46]	Spees, 2020	Pay-for-coordination (FFS)	Primary care		PCMH for Medicaid beneficiaries		Adherence to medications for each chronic condition	None	PCMHs did not affect medication adherence for patients with chronic conditions (for both groups, i.e., with and without cancer diagnosis).
[47]	Flieger, 2017	Pay-for-coordination (PMPM) (FFS)	Primary care		PCMH Advanced team-based primary care; whole-person approach to care; care coordination; population health management;	Use of health information technology to support care provision	Hba1c (glycated hemoglobin a1c) testing	None	The PCMH pilot had no impact on quality outcomes. Authors do not pinpoint potential reasons for limited impact apart from stating that structural features of the PCMH model being implemented across the 9 pilot sites may have varied. Lack of practice facilitator to support each pilot's transformation may have led to varied impact across sites.
							LDL (low-density lipoprotein) testing	None	
							Nephropathy screening and treatment	None	
							Dilated retinal eye examination	None	
							Breast cancer screening	None	
							Colon cancer screening	None	
							Cervical cancer screening	None	

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Table 5 (*continued*)

#	First Author, year	Payment model	Services covered by purchasing	Quality incentives	Service delivery model	Additional elements	Quality indicators	Impact	Key conclusions of author (s)
[48]	Fifield, 2013	Pay-for-coordination (PMPM) tied to quality measures (FFS)	Primary care	PMPM amounts based on improvements in quality (based on NCQA's 2008 PPC-PCMH and clinical quality based on HEDIS); Practice transformations necessary to qualify for NCQA PCMH recognition	PCMH Care coordination; engagement of complex patients to educate and provide guideline care; care management support from nurses embedded in practice care teams; redesigning workflows to enhance efficiency and access;	Facilitators to guide/ support implementing the PCMH model; embedded care management support to support providers to qualify for NCQA PCMH recognition EHR utilization; coding improvement	Screening for breast cancer screening Cardiovascular Lipid Screening Nephropathy screening Diabetic lipid screening Diabetic hba1c screening Hypertensive blood pressure control Cardiovascular Lipid Control Diabetic Blood Pressure Control Diabetic Lipid Control Diabetic HbA1C Control	+ None None None None + None None None None	The PCMH intervention led to improvements in hypertensive blood pressure control and breast cancer screening, but most indicators did not improve. Furthermore, the interventional also led to a reduction in ED visits (not reported as quality, but efficiency measure). Changes in measures may be result of embedded care managers within PCP-led team and use of EHR to identify complex patients for targeted care and education. Care managers engaged with high-ED users.
[49]	Shi, 2017	Pay-for-coordination based on patients with one of 4 targeted conditions and performance measures (FFS)	Services provided by primary care networks/primary care providers	Fees based on relative performance compared to other practices in the program; weekly appointments and coordination with insurance payer; measurement, and performance targets	Patient-centred care; individualized care plans; aligning population health resources with primary care practices; care management; standardized chronic condition management plans; patient coordinator for each practice;	Use of extensive health information data for decision-making and measuring outcomes; free web-based patient-centric health information exchange tool; medical education programs; quarterly collaborative forums for discussing program design	Glycated hemoglobin (A1C) testing Low-density lipoprotein cholesterol testing Microalbuminuria testing	+ + +	The QBPC program was associated with an increase in diabetes management outcomes.
[50]	Rosenthal, 2016	Pay-for-coordination (PMPM) (FFS)	Primary care; provider-owned network	Small incentives for meeting quality thresholds; friendly competition among teams to encourage quality improvement initiatives; dedicated time for quality improvement for workers; measuring, tracking and reporting of quality measures	PCMH; physician-led clinical team; evolving team roles; new protocols for care management and care coordination; outreach to specialists and hospitals (tracking patients, sharing data, improving outcomes); proactive patient care; continuous improvement cycles employed to target evidence-based measures for chronic care; patient engagement (focus groups, advisory groups, surveys) to gauge patient's experiences and recommendations	Additional initial investment in implementing PCMH model; technical assistance; face-to-face learning sessions and conference calls; collaborative forums for receiving guidance and shared experiences of best practices with other providers	HbA1c testing for patients with diabetes Diabetes patients with lipid testing in the past year Diabetes patients with dilated eye exams Colon cancer screening Breast cancer screening Cervical cancer screening	None + None None None None	The PCMH pilot was associated with limited benefits to primary care practice transformation and led to a reduction in ambulatory care-sensitive ED visits and an increase in lipid testing for patients with diabetes (2 out of 12 quality indicators). Limited impact may be because practice improvements were not targeted to higher need patients.

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Table 5 (*continued*)

#	First Author, year	Payment model	Services covered by purchasing	Quality incentives	Service delivery model	Additional elements	Quality indicators	Impact	Key conclusions of author (s)
[51]	Werner, 2013	Pay-for-coordination (FFS)	Primary care	PMPM performance-based incentives (based on utilization, safety and quality) Practices had to receive PCMH accreditation (NCQA) and participate in a diabetes-focused practice-improvement	PCMH; team-based care; use of population care coordinators to coordinate care for high-risk, complex patients; whole-person care; improved continuity of care; coordinated care	Investment for infrastructure development	Annual eye exam (for diabetes patients) Hba1c measurements (for diabetes patients) Annual LDL-cholesterol testing (for diabetes patients) Nephropathy screening (for diabetes patients) Colorectal cancer screening Mammography Pap smear LDL-Cholesterol testing for patients with cardiovascular disease	None None None + None + None None	Healthcare utilization did not significantly change with the adoption of the PCMH model
[52]	Markovitz, 2022	Pay-for-coordination; care fees to support extended care teams	Primary care	Quality bonuses based on healthcare use and quality performance	Medical home; extended care teams (i.e. Including social workers)		Annual hba1c testing (for diabetes patients) Low-density lipoprotein cholesterol (LDL) testing (for diabetes patients) Retinopathy screening (for diabetes patients) Nephropathy management (for diabetes patients) Breast cancer screening Cervical cancer screening Composite measure of quality of the 6 individual measures	None None None None None None None	CPC+ was not associated with improvements in overall quality performance or any of the six individual quality performance measures for private-plan enrollees. Lack of impact may be due to limited time frame of evaluation, too weak of financial incentives to improve performance and lack of requirement for private payers to adopt the incentive structure created for Medicare beneficiaries.
Shared savings & shared risk									
[53]	Kicinger, 2019	Shared savings, bonus payments	Primary care, comprehensive care	Shared savings up to 50–60% of FFS billings dependent on quality scores; bonus payments based on reaching quality threshold (measures of management of diabetes, immunizations and preventive screenings for cancer, preventable ER visits, hospital admissions, etc.)	PCMH; comprehensive and patient-centered care; chronic care management, preventive services, population health maintenance; office hours on weekends	Structural capabilities (e-prescribing, use of EMRs, use of electronic communication)	Hba1c testing Eye examination Medical attention for nephropathy Colorectal cancer screening Cervical cancer screening Colorectal cancer screening	+ -/none + -/none + +	The PCMH model with strong financial incentives can increase preventive care processes and improve quality of care. Measures that decreased may be because of additional coordination needed or because of "choice overload" of recommended screenings.
[54]	Friedberg, 2015	Shared savings; PMPM fees for care managers	Primary care providers (varying in specialty: family practice, internal	Shared savings (40–50%) based on quality and performance targets; additional payments to	PCMH; team-based care; comprehensive care; care management, patient outreach, care	ICT capabilities: registry use, electronic test ordering, sharing information across	Hba1c testing Eye examination Cholesterol screening	+ + +	Interventions that combine structural transformation with financial incentives may

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Table 5 (*continued*)

#	First Author, year	Payment model	Services covered by purchasing	Quality incentives	Service delivery model	Additional elements	Quality indicators	Impact	Key conclusions of author (s)
			medicine, mixed specialty)	support care manager salaries; practice transformation support payments (PMPM); PMPM bonus for NCQA recognition equal to level reached (recognition based on control measures for chronic diseases, utilization rates, follow-ups, care manager role, etc.) performance feedback; web-based disease registries to generate quality reports; Annual feedback on hospital and ER utilization; requirement to obtain PCMH recognition by 18th month	coordination, referrals to community services; capabilities in care transitions	providers (primary and specialty care), web-based disease registries; coaching to facilitate transformation	Monitoring diabetic nephropathy Colorectal cancer screening Breast cancer screening	+ None +	lead to larger improvements in quality of care.
[55]	Pope, 2014	Shared savings	Network of services: PGPs, academic medical centers, integrated delivery systems, hospitals	Savings dependent on quality of care based on medical record-based measures Reporting/feedback to encourage adherence to care protocols	Early ACO; care management programs involving patient self-management techniques; complex care coordination for populations with comorbidities; regular follow ups for patients with chronic diseases	Variety across participating sites; disease specific/patient registries and EMRs; information system interventions (e.g., automated alert systems in medical records); educational support for staff regarding evidence-based care guidelines	Hba1c testing Lipid measurement Nephropathy care Eye exams Left ventricular ejection fraction testing Lipid profile test (coronary artery disease) Breast cancer screening	+ + + + + +	This early ACO model led to improvement in quality process indicators. Shared saving arrangement may contribute to greater efficiency and quality for Medicare. Key components identified by authors as important: patient engagement, support for care management programs, improving care transitions and expanding role of non-physician providers.
[56]	Navathe, 2019	Risk-adjusted PMPM/ global budget (based on risk, utilization and plan type); transition period for risk onset; Shared savings & shared risk	Primary care to attributed members as part of physician organizations	Shared savings up to 40% based on performance and quality measures (quality must remain stable or improve); 20% of PMPM budget at risk based on key engagement measures for population health; quality based on concise measures to create goal gradients and reduce choice overload Dashboard with performance feedback and cost of care for pos and PCPs for quick tracking of	Reforms to transform primary care; shifting some care activities from primary care to remote care		Breast cancer screening Cervical cancer screening Colorectal cancer screening Diabetes: eye examination Diabetes: Medical attention for nephropathy (process) Diabetes: blood pressure control (outcome)	None – None None None +	Only small improvements were seen in quality overall. Population-based models can lead to improved quality for some measures as result of change of structure.

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Table 5 (*continued*)

#	First Author, year	Payment model	Services covered by purchasing	Quality incentives	Service delivery model	Additional elements	Quality indicators	Impact	Key conclusions of author (s)
				quality and to provide immediate feedback			Diabetes: Glycated Hemoglobin in control (outcome)	None	
[57]	Zhang, 2019	Shared savings & shared risk; cost targets based on risk allocation	Primary care; specialist care; home-visits		ACO (board-governed by leaders from each provider); chronic care coordination and management (home visits and phone calls); specialist visits for chronic care; increased preventive care and primary care; improved patient discharge process; follow-up care to reduce re-admissions		Breast cancer screening Cervical cancer screening Chlamydia screening in women Colorectal cancer screening HPV vaccine HA1c testing Medical attention for nephropathy	+ + + – + None +	There was a mixed impact of ACO on outcomes. The ACO improved process quality indicators for the most part despite no quality incentives, however there were variations in quality indicators across years
[58]	Hayen, 2021	Shared savings; P4P; investment costs can be claimed; bundled payment for chronic care service delivery; small FFS payment for patient visits and specific medical procedures	Primary care, comprehensive care	Shared savings if GPs outperform expenditure benchmark determined by absolute score on quality metrics and improvement on performance (patient satisfaction, chronic care delivery, prescription drug policy and whether or not the practice was or remained accredited); access to data on performance (also available before pilot but especially used during)	Primary care centres; GP accountability for care outside of network; interprofessional consultations for decision-making regarding patients;	Electronic nudges to prescribe drugs efficiently	COPD control measures ($n = 7$) Diabetes control measures ($n = 16$) Patient satisfaction ($n = 10$) Prescription drug policy ($n = 7$) Type 2 diabetes patients enrolled in chronic care program	- ($n = 4$) + ($n = 8$) None + ($n = 1$)/ none –	GPs exhibited gatekeeping resulting in reduced specialist services. The results on quality indicators were mixed, while patient satisfaction didn't change.
Blended capitation									
[59]	Kiran, 2015	Two models, both with quality incentives: 1) Blended risk-adjusted capitation (70% capitation, 20% capitation, 10% quality incentives); 2) blended FFS (80% FFS, 15% capitation, 5% quality incentives).	Primary care, comprehensive care. Blended capitation covers 119 service.	Financial incentives for both based on preventive health services, chronic disease management, enrollment of patients with severe mental illnesses, aftercare following hospital discharge, and after-hours care (higher payments after 5 pm). Blended capitation model can receive additional money to hire professionals for team-based care.	Both models: PCMH; physician led; minimum size of 3 organisations Blended capitation: range of requirements including patient enrollment, potential to form interdisciplinary team-based care		Diabetes measure: optimal number of HA1c retinal eye examination Diabetes measure: optimal number of HA1c measurement Diabetes measure: optimal number of HA1c cholesterol measurement Cervical cancer screening Breast cancer screening Colorectal cancer screening	+ + + + None None	Shift to blended capitation with and without team-based care improved some process measures related to diabetes care, but less so for cancer screenings.
[60]	Vu, 2021a						ER visits (for mental health reasons)	–	Switching to blended capitation: Increase in financial incentives to provide after-hours care in blended capitation

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Table 5 (*continued*)

#	First Author, year	Payment model	Services covered by purchasing	Quality incentives	Service delivery model	Additional elements	Quality indicators	Impact	Key conclusions of author (s)
									arrangement may have encouraged family practitioners to provide more after-hours mental health care which may have contributed to reduce ER visits. There is the potential that incentives reduced service overprovision.
[61]	Vu, 2021b						Visit to FP within 14-days following discharge	None	There was a potential selection bias of physicians whereby heterogeneity in outcomes based on age and gender were observed.
Bundled payments									
[62]	Hoedemakers, 2022	Bundled payment	Bundled payment contract between care groups and health insurer per patient; covers all primary and community-based services		Integrated care linking primary care with community care; comprehensive assessment of patient's needs; person-centered care; care coordination and case management; multidisciplinary teams; personalized care plans; monitoring care plans by Nurse Practitioners	Secured ICT-platform (Care2U) used to share information and support collaboration between professionals	Patient perceived outcomes Physical functioning Psychological well-being Enjoyment of life Social relationships/ participation Resilience Person-centredness Continuity of care Autonomy Burden of medication	 None None None None None + None – +	CCFE program did not improve the health of elderly but was still positively evaluated by patients. The program led to sustained improvements in patient-centredness and enjoyment of life according to providers.
Comparing across types of APMs									
[63]	Mcconnell, 2017	Oregon: Global risk-based budget; (PMPM) bonus payments Colorado: PMPM and bonus payments (FFS)	Primary care	Both: Bonus payments Oregon: additional funding for administrative staff, data infrastructure, and resources for implementation, training, and related services Colorado: Centralized data repository to track and report clinic performance	Medicaid ACOs Both: patients assigned to PCMH; care coordination; high utilizer programs (complex coordination); programs to reduce ED use Oregon: Multistakeholder board meetings between health care delivery providers and consumers who reflect the community's needs; hospital-to-home transition program; integration of oral and mental health		Appropriate medications for individuals with asthma	None	The Oregon Medicaid Accountable Care Organization model exhibited improvements in some measures of care compared with the Colorado Medicaid Accountable Care Organization model, which was more limited in scope. In Oregon, access to some healthcare services could be increased, while preventable and low-value utilizations could be decreased.
[64]	Hall, 2014	PSNs, POPs: Shared savings; monthly case management (FFS) HMO: full-risk capitated payments	Managed care arrangements that provide all necessary services for a defined population; pops		Managed care arrangements (PSNs, POPs) Both PSNS & POPs: coordination, utilization management and health		Overall rating of health care Rating of personal doctor Rating of speciality care	None + +	There is some evidence that PSNs might result in better experiences and greater satisfaction with care. Parents of may prefer a

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Table 5 (*continued*)

#	First Author, year	Payment model	Services covered by purchasing	Quality incentives	Service delivery model	Additional elements	Quality indicators	Impact	Key conclusions of author (s)
		dispersed to providers in numerous ways	provide only pediatric care		improvement activities POPs: care coordinators work with physicians, families, and social workers to schedule and follow-up on health care services		Overall health plan rating	+	PSN (or POPs) arrangement to that of an HMO for their children, although no link was found of improved ratings of care in POPs by parents of children with chronic conditions
							No problems finding personal doctor	+	
							Always getting help needed during regular hours	None	
							No problems getting specialist appointments	+	
							Easy to get care and tests needed	+	
							Easy to get prescriptions needed	+	
							Getting appointment as soon as wanted	+	
							Always got care right away	None	

Abbreviations: FFS= Fee-for-service; DiD= Difference-in-differences; ITS= Interrupted Time Series; RCT= Randomised Controlled Trial; RE= Random effects; FE= Fixed effects; PMPM = Per-person-per-month; P4P= Pay-4-performance; U= utilization; P= process; O= outcome; MCO = Managed Care Organization; ACO= Accountable Care Organization; PCMH = Patient-centred Medical Home; NCD= Non-communicable Disease; POP= Pediatric Only Plan; PS*n* = Provider Service Network; HMO= Health Maintenance Organisation; PCP= Primary Care Physician; EHR= Electronic Health Records; CHF= Congestive Heart Failure; AMI= Acute Myocardial Infarction; IS= Ischemic stroke.

services with other providers/services; these fees were usually paid out on top of baseline FFS arrangements [44–52]. Some pay-for-coordination arrangements also included additional financial incentives tied to performance and quality thresholds (n = 5) [48–52].

Pay-for-coordination was often introduced as part of the implementation of PCMHs or similar primary-care based service delivery models. PCMHs usually encompass multi-professional care teams, aiming at the provision of comprehensive care and the coordination of care across healthcare settings. Furthermore, they focus on chronic disease management, population health, evidence-based guidelines, and programs for specific patient groups such as smoking cessation programs. In many cases, this form of service delivery was supported by the use of health data and HIT. To increase chances of successful implementation, some of the PCMHs received additional initial investment funding or technical support and engaged in learning collaboratives. In some cases, providers were requirements to obtain official PCMH recognition and to participate in quality improvement initiatives. In one case [50], patient engagement in the form of focus groups and surveys was used to monitor and inform quality initiatives.

The majority of articles in the pay-for-coordination cluster found some positive impact on the quality of chronic care (6 of 9). Most of the articles assessed changes to diabetes care (n = 9) and cancer screenings (n = 7). The most common measures used in connection with diabetes care were hemoglobin testing, eye exams, nephropathy screening, and LDL cholesterol screening. Three of the nine studies that assessed LDL cholesterol screening found a positive effect [44,49,50], with the remaining articles finding no effect [45,47,48,51,52]. Two studies found a positive effect on hemoglobin testing [45,49] and eye exams [44,45]. A positive effect on nephropathy screening was found in one article [51], while another found a negative impact [45]. Three studies found no changes to diabetes care [47,48,52]. Of the seven articles that assessed changes to different types of cancer screening, three found a positive impact on breast cancer screening [44,48,51] one for cervical cancer screenings [44], and none for colorectal cancer screenings.

Individual articles also assessed other chronic care measures. Fifield et al [48] reported positive outcomes for hypertensive blood pressure control with high certainty of evidence, but no changes for cardiovascular lipid testing [47]. In the two articles that found no impact on quality of care, the authors speculate this may have been due to a lack of a facilitators to help support the implementation of the reform [47], limited time frame of the evaluation, and weak financial incentives to improve performance [52].

3.2.3. Shared savings (and shared risk)

The third cluster included articles discussing shared savings arrangements (n = 4) [53–55,58] or arrangements combining shared savings with shared risk (n = 2) [56,57], with both usually being based on a FFS model. In a shared savings arrangement, providers are eligible to receive a portion of the savings, typically determined by quality performance, if their total expenditure is less than the previously agreed-upon benchmark. With shared risk, providers are also held accountable for overspending if costs exceed the benchmark.

Regarding healthcare setting and service delivery models, shared savings/shared risk were implemented in primary care settings in connection with PCMHs [53,54], or in primary care more generally [56,58]. Two studies assessed shared savings/shared risk in an ACO, which also included hospitals [55,57]. PCMHs and ACOs put an emphasis on team-based care through collaboration and care coordination across professions, providers, and settings. Furthermore, in these models, a focus was also on health promotion and prevention, care management, and improving care transitions and follow-up care, supported by digital health tools such as EHR, web-based disease registries, automated alert systems, data-driven approaches to decision-making, and e-prescribing. Additional incentives consisted primarily of performance feedback, and in cases of PCMH models, the requirement to receive PCMH recognition by a certain deadline.

All six articles in this cluster reported some positive outcomes on the quality of chronic care, although with some conflicting findings in some areas of chronic disease management. Most found a positive effect on process measures of diabetes control, including hemoglobin testing and nephropathy screening [53–55,58], eye exams [54,55,57,58] and diabetic blood pressure control as a health outcome [56]. Conversely, some reductions were seen for eye examinations for diabetes [53,59].

Nearly all articles also assessed changes in cancer screenings, albeit with mixed findings. Three articles found a positive impact on breast cancer screening [54,55,57], two on cervical cancer screening, and one on HPV vaccination uptake [57]. Other studies found a negative impact on cervical [56] and colorectal cancer screenings [53,57].

Overall, those studies in which shared savings/shared risk arrangements were implemented alongside a patient-centered, integrated service delivery model, namely PCMHs [53,54] or ACOs [55,57], seemingly reported slightly better outcomes on the quality of chronic care than the studies where payment reforms took place in a general primary care setting [56,58]. For example, a shared saving arrangement in a PCMH with additional bonus payments linked to prevention and chronic disease management measures found improvements in preventive care processes and quality of care, though suggested “choice overload” contributed to no changes or decreases in other measures [53]. An early ACO model comprising a network of services, including PGPs, integrated delivery systems and hospitals, with shared savings, found positive impacts on four process measures of diabetes control, breast cancer screening and lipid profile tests for coronary artery disease [55].

In contrast, some authors [58] found that a shared savings model with P4P and bundled payments for patients with chronic diseases in primary care in the Netherlands led to increases in 8 process measures for diabetes control, yet a decline in four process measures of COPD control, suggesting prioritization of certain measures. Similarly, Navathe et al [56] concluded a capitation-based shared savings model for primary care had only limited improvements in quality overall in the first year with increases in diabetes blood pressure control, but reductions in cervical cancer screenings.

3.2.4. Blended capitation

Three articles examined the impact of physicians voluntarily shifting from a blended FFS model to blended capitation from 2003 onward in Ontario, Canada [59–61]. The former model entails most earnings arising through risk-adjusted capitation based on a defined bundle of services provided to enrolled patients with limited earnings from FFS, while the latter comprises the reverse. Additionally, both arrangements included P4P elements, relating to disease prevention and chronic disease management, aftercare following hospital discharge and after-hours care. These APMs were implemented in primary care settings as a type of patient-centered medical home that provided comprehensive care, requiring changes relating to organization of service delivery, the introduction of formal patient enrollment and after-hours care provision. The blended capitation arrangement additionally included financial incentives for physicians to form team-based practices and provide multi-disciplinary care services.

Literature from this cluster found that switching from blended FFS to blended capitation in primary care settings in Ontario, Canada, had a positive impact on process quality of diabetes care [59] and on outcomes related to mental health, including ER visits due to mental health reasons [60], suggesting a more efficient use of resources [61].

3.2.5. Bundled payments

The fifth type of APM represented bundled payments but included only one article [62]. In general, in bundled payment arrangements providers are reimbursed based on expected costs for a clinically defined episode of care for certain diseases, covering all the services provided during this episode. The bundled payment of Care Chain Frail Elderly (CCFE) was part of a Dutch program that aimed to support frail elderly patients with complex care needs to live in their homes as long as

possible. The program included the integration of primary and community care, multi-professional healthcare teams, individual case management, and person-centered care plans, all supported by HIT and the sharing of information among different professionals. The authors assessed changes to the quality of chronic care through patient-reported outcome measures and found a positive impact on person-centeredness, but also a decrease in autonomy and an increase in the burden of medication [62].

3.2.6. Comparison across arrangements

The final cluster comprised two articles comparing variations of APMs across different locations or types. One article compared an Oregon-based Medicaid ACO (risk-adjusted global budget with full financial risk) against a Colorado Medicaid ACO (PMPM and bonus payments on top of FFS) [63]. Both models consisted of primary care medical homes that coordinated care, had automatic enrollment of patients, and additional financial incentives. However, the Colorado model focused more on enhanced payment for coordination and case management, while the Oregon model was more comprehensive in the services covered and included funding for administrative staff, data infrastructure, implementation resources and training for its implementation. The results indicate that while the Oregon model was superior in a number of measures, neither model proved superior to the other in terms of chronic care related measures of quality, including appropriate medication for individuals with asthma.

The second article compared care for children enrolled in various Medicaid Managed Care models (i.e. capitated arrangements between the state and managed care plan). Hall et al [63]. found that Pediatric Only Plans (POPs) within Provider Service Networks (PSNs) were generally rated better across a number of subjective process measures by parents than in HMOs. However, no evidence was found of improved ratings of care in POPs by parents of children with chronic conditions.

3.3. Disentangling the impac tof payment models from service delivery

Reforms to payment models often go hand-in-hand with changes to service delivery models. Disentangling the two to determine what aspects of financial or service delivery reforms impact quality of chronic care specifically when both are present, is therefore difficult to do. In a limited number of articles, authors were able, or attempted in some way, to disentangle the two to draw conclusions on their contributions to improvements in quality of chronic care. None of the articles however, quantified and tested aspects of service delivery or reimbursement as variables in their analyses.

In exploring the impact of a blended capitation model in Ontario, Canada, versus a blended FFS model, Kiran et al [59] additionally distinguished between blended capitation with a multidisciplinary team-based care model (incentivized by additional funding) versus blended capitation or blended FFS in settings without team-based care. The authors found that blended capitation alongside forming team-based practices had the most positive impact on process quality of diabetes care, relative to blended capitation alone and blended FFS. This suggests a superiority of financing and service delivery reforms together in bringing about positive change to process quality for some chronic diseases, versus changes to financing alone.

In another example of trying to disentangle the impact of service delivery from purchasing reforms, Hall et al [64] explored differences in parents' perceptions of quality of care for their children with chronic conditions, in a HMOs versus a Pediatric-Only Plan (POP). As a sort of Provider-Sponsored Network, the authors hypothesized that these POPs would be rated better by parents with children with chronic conditions, as the result of differences in organizational structure (i.e. size), not-for-profit ownership, mission to serve only Medicaid patients, and their general focus on pediatric care. The authors found that while POPs were generally rated better by parents over a number of access and quality ratings, parents of children with chronic conditions did not provide higher ratings among children-focused POPs versus HMOs, despite their specialized plans geared towards children with chronic diseases.

McConnell et al [63]. compared two different ACO models based on different payment models across two U.S. states, Colorado and Oregon, to better understand what approaches are effective for improving the quality of care. While both ACOs were comparable in terms of enrollment of beneficiaries and service delivery model (i.e. Primary care medical home), minor additional initiatives were implemented by each. The Oregon model implemented a hospital-to-home transition program, while the Colorado model implemented a centralized data repository to track and report clinical performance. The authors found relative performance improvements of the Oregon model compared to the Colorado model, although not for chronic care.

In three articles, payment reforms were seemingly taken in a top-down approach with no explicit changes to the service delivery model, but where the intention was to incentivize different behaviour among providers through the new reimbursement method, with mandatory participation [32,35,37]. In these cases, it can be inferred that changes to service delivery resulted from changes in the payment model, thus suggesting the directionality of impact and allowing us to attribute impact to the payment model. For example, Munnich and colleagues [32] detailed a legislative intervention in Florida that mandated a shift from FFS to full-risk capitation (per-enrollee-per-month payment) via managed care contracting for Medicaid beneficiaries, with the expectation that managed care plans would coordinate all care and manage chronic diseases of patients. For some chronic diseases, this mandatory reform to capitation via managed care contracting resulted in an increase in ancillary services and post-acute care treatment, likely as means for better management of chronic patients and improvement in post-acute care transitions to reduce future costs. Similarly, a local government in China chose 16 hospitals to switch from FFS to a global budget as means for reducing expenditure, with positive impacts on some chronic disease-specific process measures of quality [37]. The mandatory shift to global budgets for all hospitals in the Maryland All Payer model however, found no changes to quality measures for three cardiovascular conditions [35].

In the remainder of the articles, authors were unable to or did not attempt to disentangle the impacts of financing from those of service delivery. In some of the clusters, such as the pay-for-coordination cluster and most of the shared savings/shared risk group, payment and service delivery reforms were inherently intertwined as they were implemented concurrently in bottom-up approaches, rendering it difficult to disentangle the impact of one from the other. As the PCMH model emphasizes comprehensive, patient-centered, coordinated care led by physicians, and financial reimbursement that supports this, then reforms to reimbursement go hand-in-hand with service delivery changes. Similarly, of the articles on shared savings/risk, payment reforms often accompanied explicit and pre-determined changes to service delivery, primarily through agreements between payers and providers, such as in ACO models.

4. Discussion

We found that most clusters of APMs indicated some positive impact on quality of chronic care, however, quality indicators varied substantially between articles, limiting direct comparisons. With an overall view across different types of APMs and their associated service delivery models, it appears that population-based purchasing reforms in combination with more collaborative forms of service delivery were more frequently successful in improving the quality of chronic care than in cases where purchasing changes were limited to a single setting. This was seen in the shared savings and risk cluster, where collaborative and team-based forms of service delivery were seemingly more likely to lead to positive impacts of process measures of preventive care and chronic disease management, versus those only including primary care

providers. This was also evident with global budget and capitation models which appeared to be more effective in comprehensive or gatekeeping primary-care based models and in ACOs covering primary and specialty care, and less so in hospital-based service delivery models. The more mixed findings in hospital settings may in part be due to the limited scope of services covered by the global budget and limited coordination with outside services, such as primary care, which individuals with chronic conditions are most likely to benefit from in the longer term [65]. This speaks to designing payment models in a way that covers a range of providers in collaborative forms of service provision along the continuum of care, to ensure sufficient accountability, responsibility and buy-in. Purchasing reforms isolated to single settings or providers may not provide sufficient incentives to organize and provide care in a way that patients with chronic conditions need.

Payment reforms have the aim to either indirectly incentivize changes in provider behavior and service delivery, or in agreement with providers, to more explicitly reimburse them based on a certain model of service provision. Few articles aimed to, or could, disentangle the impact of financing reforms from changes to service delivery. Where authors were able to do so, this was often by comparing arrangements that differed in only one particular aspect, often through difference-in-difference models. The directionality of impact was also possible to discern in cases where payment reforms were mandatory, but did not specify or require explicit changes to service delivery. Given the limited number of articles achieving this and the mixed findings, only one concrete implication arose from this: the combination of support to transform service delivery to a team-based model of care alongside a purchasing reform shifting to blended capitation was more impactful in improving quality of chronic care, than the individual components [59]. Although the evidence-based is thin, these results suggest that financing reforms are just one element of initiatives for improving quality of care, and that service delivery is a crucial piece of the puzzle. In fact, purchasing and service delivery reforms were implemented concurrently in most studies. These reforms often occurred within the scope of implementing an ACO or PCMH model, which require collaboration between payers, who set the terms of reference for reimbursement, and providers, who must implement the service delivery changes. It's therefore likely that in these cases, the widespread positive impacts seen are due to sufficient buy in on both sides of the purchaser-provider relationship.

Unsurprisingly, despite efforts to keep a global reach, the review revealed a strong concentration of literature stemming from high income countries, particularly the U.S. Particularities of the U.S. health care system, namely the highly complex and fragmented nature and the multi-payer structure concentrated on private payers, likely limit the transferability of some of the models to other health care systems. The incentives behind different payment models may have different effects on provider behavior in contexts where providers do not have the option to choose their patients based on their type of coverage, as in other healthcare systems [66]. In systems where providers can choose their patients based on their coverage, this could lead to inequities in patients taken on and treated, thus biasing upward the impact of interventions on quality of chronic care.

4.1. Recommendations for future research

Based on this scoping review, several key considerations for research can be inferred. First, the certainty of evidence was generally quite low, despite the use of causal mechanisms and methods for overcoming biases associated with voluntary participation. In the future, researchers must continue to consider these biases in their methodology and interpret their results accordingly.

The evidence base is thin on studies explicitly aiming to disentangle components of the purchasing and service delivery reform, likely out of methodological challenges. Future research should aim at disentangling purchasing and service delivery characteristics through the use of comparative methods, such as difference-in-difference models, and by quantifying service delivery aspects, to better understand the relationship between context, mechanisms and outcomes.

Few articles assessed the impact of APMs on the quality of chronic care through patient-reported outcomes [31,62,64]. While studies based on clinical indicators can provide useful information about changes to processes and physical outcomes, this provides only a partial picture of quality of chronic care. While not without their criticism, patient-reported measures are important, particularly if care is to be person-centered and aligned with individuals' goals and preferences. Future research could draw on existing patient-centered methodologies [67,68] and thereby contribute to a more comprehensive understanding of the effects of APMs on the quality of care.

Finally, future research would benefit from better understanding which chronic care measures providers prioritize in cases of choice overload. A large number of studies uncovered positive impacts on cancer screening measures and diabetes control measures related to diabetes, suggesting these may be easy measures for providers to prioritize.

4.2. Limitations

While this scoping review used a robust methodology to collate evidence, the review was not exhaustive. Only English texts were included, potentially limiting the representation of countries. Heterogeneity of terminology used in the literature may also have limited the studies identified. While we narrowed the scope of this review to chronic conditions and excluded multimorbidity, many studies did not distinguish between individuals in their sample that had one chronic condition versus more. As past literature has suggested that most payment and service delivery models are not well-suited for addressing the needs of individuals with multimorbidity [69], the limited impact on quality in some articles may be due to this oversight.

Although our inclusion criteria required a certain level of information on the payment and service delivery model, we generally found that beyond these criteria, articles did not provide sufficient information on the payment and service delivery models. Details concerning how payment is dispersed to providers in group-based arrangements, the precise measures used to evaluate performance, and the magnitude of financial incentives relative to providers' pay, were frequently missing. Across most articles, vague language centring around coordination and integration of services was often used, without further explanations of how this was operationalized in practice.

5. Conclusion

This scoping review set out to compile evidence on purchasing reforms and associated service delivery models at the disposal of policymakers for incentivizing improvements in quality and to better disentangle the impact of payment reforms from service delivery reforms on quality of chronic care. The broader evidence suggests that population-based payment models achieve the best outcomes in combination with collaborative, patient-centered forms of service delivery spanning different settings and providers. While this review is useful for policymakers in indicating how purchasing fits into broader service delivery models and how payment models compare across settings, a wider evidence base of articles isolating the impact of particular elements on quality of care is still needed to better understand the mechanisms impacting quality of care, to better inform policymaking. To achieve this, researchers will need to employ comparative causal inference methods through exploiting timing of mandatory payment reforms. Researchers are further encouraged to quantify aspects of service delivery in their models and to compare similar arrangements that vary only in a particular aspect to better isolate particular mechanisms.

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CRediT authorship contribution statement

Cassandra Simmons: Writing – review & editing, Writing – original draft, Project administration, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Mirjam Pot:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation. **Klara Lorenz-Dant:** Writing – review & editing, Writing – original draft, Validation, Methodology, Funding acquisition, Data curation, Conceptualization. **Kai Leichsenring:** Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Funding acquisition, Formal analysis, Conceptualization.

Declaration of competing interest

The authors have no conflicts of interest to declare.

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Supplementary materials

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