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Identifying alternative models of healthcare service delivery to inform health system improvement: a scoping review of systematic reviews

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Identifying alternative models of healthcare service delivery to inform health system improvement: a scoping review of systematic reviews

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Abstract

Objective: Health systems face the challenge of identifying evidence to guide decision-making on the delivery of services that maximise health outcomes and contain cost. The objective of this scoping review was to describe the extent, range and nature of available evidence from systematic reviews of alternative healthcare delivery arrangements relevant to high-income countries.

Design: Scoping review of systematic reviews.

Methods: We included English language systematic reviews examining the effects of alternative delivery arrangements relevant to high-income countries, indexed in PDQ-Evidence and published between 2012 and 2017. We extracted data on the characteristics of included reviews, including year of publication, number and design of primary studies, populations/health conditions, types of interventions and outcomes reported and whether the reviews included economic evaluations.

Results: Of 829 retrieved records, 531 reviews fulfilled our inclusion criteria. Almost all (93%) reviews reported on patient outcomes while only about one third included resource use as an outcome of interest. Just over a third (n=189, 36%) of reviews focused on alternative information and communications technology interventions (including 162 reviews on telehealth). About one quarter (n=122, 23%) of reviews focused on alternative care co-ordination interventions. 15% (n=80) of reviews examined interventions involving changes to who provides care and how the healthcare workforce is managed. Few reviews investigated the effects of interventions involving changes to how and when care is delivered (n=47, 9%) or interventions addressing a goal-focused question (n=38, 7%).

Conclusions: A substantial body of evidence about the effects of a wide range of delivery arrangements is available to inform health system improvements. This scoping review provides a map of the extent, range and nature of available synthesised evidence and identifies gaps that would be usefully addressed by future research.

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Article summary

Strengths and limitations of this study

- We have followed published methodological guidance for conducting this scoping review
- The search was limited to the last 5 years to retrieve up-to-date reviews of alternative delivery arrangements relevant to high-income countries
- As this scoping review sought to map the state of the literature in this area, we did not appraise the quality of the included reviews and did not attempt to synthesise the results of the included systematic reviews
- Systematic reviews that were awaiting classification in 'Pretty Darn Quick'-Evidence at the moment of search were not captured in the search

Background

The last century has seen a continuous growth in investment in the health systems of high-income countries [1]. This has contributed to significant improvements in population health and a reduction in demand for medical care of communicable diseases, but a proportional increase in demand for the management of chronic and complex conditions [2, 3]. In addition, advances in medical technology, and more population based screening and management of disease risk factors have increased the scope of healthcare services [4, 5][6-8]. Taken together, this has fuelled the inflation of healthcare costs [1]. The cost of delivering healthcare in most high income countries is now considered unsustainable and is expected to be unaffordable by the middle of the 21st century without major reforms [1].

A challenge for healthcare systems and funders is how to deliver high-value, effective care while slowing (and where possible reversing) the rate of increase in costs. This requires an understanding of the effectiveness and economic impact of current service models, and a determination of whether there are alternative models of healthcare delivery that might lead to improved efficiencies without compromising the quality and outcomes of care..

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The value of a given model of healthcare service delivery is based upon its ratio of benefits and harms relative to its cost [9, 10]. In an ideal health system, healthcare resources should be allocated across interventions and population groups to generate the highest possible overall level of population health at the lowest cost. In practice, this means reallocating resources away from resource intensive interventions that have little or no benefit and redistributing to cost-effective and/or resource-wise interventions to enhance the allocative efficiency of health systems. Reconfiguring the way healthcare is delivered may be one method for improving the allocation of finite healthcare resources.

There are a number of different ways that healthcare delivery may be modified, including changing the location that healthcare is delivered (e.g., hospital to home), providing care in a group setting rather than to individuals, substituting care provided by one health professional to care provided by an alternative appropriately trained healthcare professional or lay person, or using technology to assist with the provision of care (e.g. telehealth). Provision of services in alternative ways such as this may lead to similar, and in some cases better, outcomes for patients. However, they may also modify the costs (or shift them to other stakeholders) or the demand for service due to more liberal access. Therefore, in addition to effectiveness, robust economic evaluations of alternative models of care delivery are required to inform decisions about the allocation of funding based on their relative value. High cost models that deliver benefits to patients may still be good value, while low-cost models of care that provide little or no benefit may have limited value [9].

Numerous systematic reviews summarising the effects of alternative models of care delivery have been published to date. Almost all have focused on changes in the delivery of

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healthcare for a single condition [11], a change to the scope of practice of a single type of health professional role in a specific setting [12], or a single delivery arrangement type such as chronic disease programs [13], multidisciplinary care, or integrated care interventions [14]. A Cochrane overview of alternative delivery arrangements relevant to low-income countries was recently published [15]. Given the differences between low-income and high-income countries in terms of service demands and access to specialist care and technologies, the findings of this overview may have less relevance or applicability to service delivery in high-income countries. No similar study of alternative delivery arrangements relevant to high-income countries has been published to date.

The aim of this scoping review was to describe the extent, range and nature of available systematic reviews of alternative delivery arrangements for health systems relevant to high-income countries published in the last five years. A timeframe of five years was chosen to ensure that the review contained evidence and data about effects that are most up-to-date, reliable and potentially ready to implement. A secondary aim was to identify gaps in the availability of up-to-date systematic reviews of alternative delivery arrangements needed to inform health system sustainability initiatives and future research directions.

This review forms part of a five-year Partnership Centre for Health Systems Sustainability, funded by the Australian National Health and Medical Research Council (NHMRC) and other partners. The Partnership Centre is a collaborative of investigators, system leaders, expert advisors, system implementation partners, and funding partners from around Australia and aims to investigate and create interventions to improve health system performance sustainability (https://www.healthsystemsustainability.com.au/).

METHODS

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Protocol

The protocol for this scoping review has been published [16] (Supplementary file 1). It was informed by the methodological framework that emphasises transparency of the scoping review process to increase the reliability of the findings[17,18]. Scoping reviews such as this are particularly useful for systematically mapping research findings across a body of research evidence that is heterogeneous and/or complex in nature. We reported our scoping review according to the PRISMA for Scoping Reviews (PRISMA-ScR) statement [19].

Criteria for considering reviews for inclusion

All English language systematic reviews examining the effects of alternative delivery arrangements for health systems relevant to high-income countries published in the last five years were included. Alternative delivery arrangements include changes to the method of how and when care is delivered, where care is provided and changes to the healthcare environment, who provides care and how the workforce is managed, co-ordination of care and management of care processes, and information and communication technology (ICT)_systems [20].

For inclusion, systematic reviews needed to assess the effects of alternative delivery arrangements of relevance to high-income countries (as classified by the World Bank for the 2017 fiscal year) [21], have a methods section with explicit inclusion criteria, and report at least one of the following outcomes: patient outcomes (health status, health behaviours), quality of care, access and/ or utilisation of healthcare services, resource use, impacts on equity and/ or social outcomes, healthcare provider outcomes, or adverse effects. Systematic reviews that included interventions in any setting were included and

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encompassed hospital (inpatient or outpatient care, acute or subacute), primary care, long-term care facilities/ residential care and the community.

Search methods for identifying reviews

'Pretty Darn Quick' (PDQ)-Evidence was searched to identify systematic reviews of interventions to improve the organisation of healthcare services published between 1st January 2012 and 20th September 2017. PDQ-Evidence is a database of evidence for decisions about health systems derived from the Epistomonikos database of systematic reviews. PDQ-Evidence includes the following databases: Cochrane Database of Systematic Reviews (CDSR), Database of Abstracts of Reviews of Effectiveness (DARE), MEDLINE via PubMed, EMBASE, CINAHL, PsycINFO, Latin American and Caribbean Health Sciences Literature (LILACS), JBI Database of Systematic Reviews and Implementation Reports, Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre) Evidence Library, and the Campbell Collaboration online library. The 'intervention' publication filter was used to include only systematic reviews that included studies of interventions, and excluded diagnostic (impact and accuracy), prognostic, prediction (diagnostic and prognostic) and qualitative systematic reviews.

Selection of reviews

Two review authors (RJ, SC) independently screened the titles and abstracts and coded as 'retrieve' (potentially eligible or unclear) or 'do not retrieve' (ineligible). At least two of four review authors (RJ, PP, JN, KR) independently screened the full text reports for inclusion.. The reason for exclusion of ineligible systematic reviews was recorded. Disagreements were

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resolved through discussion or involvement of a third review author (DOC or RB). A PRISMA flow diagram was developed to summarise the search and selection process (Figure 1).

Data extraction and management

Data was extracted on systematic review characteristics (year of publication, authors, number and design of included studies, journal), population, health condition/s (where reported), types of outcomes of interest (namely, patient outcomes, quality of care, access and/ or utilisation of healthcare services, resource use, impacts on equity, social outcomes, healthcare provider outcomes, adverse effects), and whether reviews included economic analyses. A data extraction form was piloted and refined [18]. Review authors involved in data extraction (RJ, PP, JN, KR) independently extracted data from the first ten included reviews and discussed their findings to ensure consistency. Consistency of extraction was also performed independently by two review authors (RJ, PP) for a third of included reviews to ensure data collection was robust and to determine level of agreement. As the mean agreement across review authors was 93% a single review author independently extracted the data from the remaining included reviews.

Collating and summarising results

Delivery arrangements were categorised using the Cochrane Effective Practice and Organisation of Care (EPOC) taxonomy of health system interventions[20] which characterizes interventions according to conceptual, functional and/or practical similarities. The delivery arrangement domain of the taxonomy classifies interventions into five categories (and related subcategories) based on changes to the following:

1. how and when care is delivered;

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2. where care is provided and changes to the healthcare environment;
3. who provides care and how the healthcare workforce is managed;
4. co-ordination of care and management of care processes; and
5. ICT systems.

To this taxonomy we added a category of goal-focused reviews. This was used to categorise systematic reviews that included delivery arrangements from more than one of the above categories to address a specific problem or goal.

As this was a scoping review, rather than an overview of systematic reviews designed to synthesise the results of the included systematic reviews, a critical appraisal of the quality of the included systematic reviews was not conducted.

We summarised our findings quantitatively by presenting a numerical count of reviews in each delivery arrangement category, visually using a bubble chart to display the quantity and range of reviews across categories, and also using a narrative synthesis.

RESULTS

Results of search

The search yielded 829 citations. After title and abstract screening, 623 full text reports were retrieved and assessed for eligibility. 92 full text reports were excluded and 531 systematic reviews were included (Figure 1). The citations of included reviews are in Supplementary file 2.

Description of included reviews

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Of the 531 systematic reviews, 125 (24%) were Cochrane reviews. 224 (42%) reviews were published in 2016-2017. A total of 12,230 individual studies were included across all systematic reviews, and these included 6,911 randomised controlled trials. 106 (20%) reviews focused on common chronic diseases (e.g., diabetes, chronic obstructive pulmonary disease, heart failure, chronic kidney failure, asthma, musculoskeletal conditions) and 53 (10%) reviews focused on patients undergoing lifestyle and prevention interventions. Over 90% of reviews examined the effects of alternative delivery arrangements on patient outcomes (e.g. mortality, morbidity). Approximately one third of reviews reported access and/ or utilisation of healthcare services as outcomes. One third of reviews included economic evaluation studies. Only 12% of reviews included quality of care measures as outcomes and only 6% and 3% of reviews reported impacts of alternative delivery arrangements on equity and social outcomes, respectively (Table 1).

Figure 2 provides an overview of the 531 systematic reviews, organised according to the Cochrane EPOC taxonomy. The greatest number of reviews focused on changes to ICT systems used by healthcare organisations to manage the delivery of healthcare (n=189). The majority of these focused on telehealth interventions (n=162). The fewest number of reviews (excluding goal-focused) were concerned with changes to how and when healthcare is delivered (n=47). The reviews relating to each category are described in more detail below.

1. How and when care is delivered

Of the 47 systematic reviews included in this category, 14 (30%) were Cochrane reviews and 16 (34%) were published in 2016-2017 (Table 2). A total of 1085 primary studies were

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included in systematic reviews for this category, including 394 (36%) randomised controlled trials.

Systematic reviews in this category included a number of quality and safety initiatives (e.g., use of safety checklists to reduce wrong site surgery), alternative methods for queuing patients (e.g., patient-initiated clinics in chronic disease, strategies to reduce waiting times for elective surgery procedures). Many of the reviews in this category were not focused on a specific health condition (n=17, 36%), but where they were, the greatest number of reviews related to maternal and child health (n=7, 15%) (Supplementary file 3). Few systematic reviews examined group versus individual care (n=5, 11%) (e.g., group antenatal care for pregnant women), or triage strategies (n=2, 4%) (e.g., improving patient flow the emergency department). There was one Cochrane review with no included studies focused on walk-in clinics versus physician offices and emergency rooms for urgent care and chronic disease management.

2. Where care is provided and changes to the healthcare environment

There were 55 systematic reviews included in this category, 24 (44%) were Cochrane reviews and 21 (38%) were published in 2016-2017. Of 1002 primary studies in this category, 323 (32%) were randomised controlled trials.

Most reviews investigated changes to the site of healthcare delivery (n=51, 93%) with the majority of these focused on shifting care away from the hospital setting to the home (n=32). The remaining reviews focused on shifting care from the inpatient to the outpatient or day stay setting (e.g. outpatient versus inpatient management for acute pulmonary embolism) (n=6); from the hospital to primary or community care organisations (e.g.,

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primary care asthma clinics) (n=4); from hospital to a therapeutic community (e.g., for mental health care) (n=2); provision of care in at site (e.g., pre-hospital versus in-hospital thrombolysis) (n=4), or provision of care in schools (e.g., for mental health and health equity) (n=3). A small number of reviews in this category looked at changes to other aspects of the healthcare environment, including the physical or sensory environment (n=1) (rooming in services for pregnant mothers), outreach services (n=1) (mobile screening clinics for maternal and child health), and transportation services (n=1) (helicopter emergency medical services for adults with major trauma) and centralization of services (n=1) (for gynaecological cancer).

Ten reviews (18%) in this category focused on maternal and child health, five (9%) focused on mental health and five (9%) focused on cardiovascular disease, while the remainder focused on a range of chronic and complex conditions and lifestyle and preventive care (Supplementary file 3). There was one Cochrane review containing no included studies on home- -based phototherapy for the management of non-haemolytic jaundice in infants.

3. Who provides care and how the healthcare workforce is managed

There were 80 systematic reviews included in this category, 18 (23%) were Cochrane reviews and 31 (39%) were published in 2016-2017. Of 1408 primary studies in this category, 802 (57%) were randomised controlled trials.

Most reviews in this category explored substituting medical for appropriately trained nursing care (n=27, 34%), or extending the scope of pharmacists' practice beyond dispensing services to provision of assessments, diagnosis and education (n=23, 29%). A

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small number of reviews also looked at self-management versus usual care, with a large focus on management of chronic conditions.

Many of the reviews did not focus on a specific health condition (n=17, 21%) but were focused on changes to workforce roles regardless of condition (Supplementary file 3). For those that did focus on a specific health condition, the largest number was concerned with role expansion to care for patients with different types of chronic disease or multimorbidity (n=8, 10%). There was one Cochrane review with no included studies on advanced trauma life support training and role expansion of hospital health professionals and ambulance crews on patient mortality and morbidity.

4. Co-ordination of care and management of care processes

There were 122 systematic reviews included in this category, 28 (23%) were Cochrane reviews and 52 (43%) were published in 2016-2017. Of 2554 primary studies in this category, 1619 (63%) were randomised controlled trials.

The delivery arrangements in this category included transition care arrangements (e.g., hospital to home, from primary to specialist care, or from paediatric to adult services), integrated care models for a range of chronic and complex diseases, early supported discharge to home (e.g., for mild to moderate stroke or COPD) and multidisciplinary or interdisciplinary care teams for specific diseases or conditions (e.g., geriatric consultation teams in acute hospitals, collaborative care for depression and anxiety). Other delivery arrangements were care pathways (e.g., critical care pathways for head and neck cancer surgery), disease management for a range of conditions (e.g., prenatal, dementia and mental illness, intellectual disability), and case management (e.g., intensive case

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management for heart failure, severe mental health, adults with medical illness and complex care needs) (Table 2).

Several reviews in this category did not focus on a particular health condition (n=17, 14%) however a few focused on co-ordination of care in cancer (n=9, 7%), diabetes (n=8, 7%), maternal and child health (n=8, 7%), cardiovascular disease (n=6, 5%), mental health (n=6, 5%) and for the terminally ill (n=6, 5%) (Supplementary file 3). We identified two empty reviews in this category. One focused on service responses for people with intellectual disabilities and epilepsy, the second focused on specialist teams for neonatal transport to neonatal intensive care units.

5. Information and communication technology systems

There were 189 systematic reviews included in this category, 34 (18%) were Cochrane reviews and 89 (47%) were published in 2016-2017. Of 4926 primary studies in this category, 2904 (59%) were randomised controlled trials.

The largest number of reviews focused on telehealth (n=162, 86%) and included a range of interventions such as telephone counselling, telemonitoring, mobile texting or applications, and Internet-based programs (e.g., cognitive behavioural therapy) (Table 2). A smaller number of reviews investigated health information systems (n=13, 7%) (e.g., paediatric track and trigger systems for hospitalized children), the use of ICT (n=13, 7%) (e.g., ICT interventions for reducing inappropriate imaging and testing) and smart home technology (n=1, 0.5%) (e.g., remote monitoring of patients discharged from hospital with heart failure).

The majority of reviews in this category focused on changes to information and communication technology systems for delivering mental health care (n=44, 23%), while 39

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(21%) focused on delivery of lifestyle changes and preventative strategies for health (n=39, 21%) (Supplementary file 3). There were two empty Cochrane reviews in this category. The first focused on the use of email for communicating results of diagnostic medical investigations to patients, the second focused on telerehabilitation for people with low vision.

6. Goal-focused reviews

There were 38 systematic reviews included in this category, including 7 (18%) Cochrane reviews and 15 (39%) published in 2016-2017. Of 1255 primary studies in this category, 869 (6%) were randomised controlled trials. A number of these reviews investigated interventions designed to address health disparities and social determinants of health (14 reviews). These covered a wide range of interventions, some targeting particular populations (e.g., for improving access for the homeless to primary care) while others focused on any intervention to reduce health disparities amongst racial and ethnic minority populations (e.g., community coalition-driven interventions, and cultural adaptations of interventions to change behavior). A further 13 reviews investigated strategies to improve medication or treatment adherence, some targeting particular conditions (e.g., pharmacy care and brief messaging to improve medication adherence in type 2 diabetes), other targeting particular medications (e.g., lipid lowering medications).

Resource use outcomes and inclusion of economic evaluation studies

Figure 3 provides a summary of included reviews published by year (excluding 2017 as the search of the available literature was not conducted for the full 2017 calendar year) including (i) number of reviews which specified cost as an outcome of interest or aimed to

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include economic evaluations, and (ii) number of reviews that included at least one primary study reporting on costs or economic evaluation. A total of 177 (32%) reviews included costs and/or economic analysis as an outcome of interest, with only 124 reporting at least one primary study including one of these economic outcomes. Resource use (including healthcare resources e.g. length of stay or number of visits to provider, non-healthcare resources e.g., transportation costs, patient and caregiver time) were collected in 161 (30%) of reviews (Table 1).

Gaps in availability of up-to-date reviews

Table 3 provides a summary of identified gaps in the availability of up-to-date systematic reviews of alternative delivery arrangements relevant to high-income countries. More than half of all included reviews were published prior to 2016 suggesting that updates may be needed for many reviews across the categories of the taxonomy. For example, 66% of reviews investigating changes to *how and when care is delivered* were published prior to 2016; only seven reviews on triage, group versus individual care or queuing strategies published since 2016 were found. 58% of reviews investigating changes to *where care is provided and changes to the healthcare environment* were published prior to 2016; only two reviews focused on changes to the physical or sensory healthcare environment or outreach services and were published in 2016 or later, and two reviews examining changes to the size of healthcare organisations or transportation services are out-of-date (i.e. published prior to 2016). 59% of reviews investigating changes in *who provides care and how the healthcare workforce is managed* were published prior to 2016 and no reviews investigating changes to the length of consultations, staffing models or movement of health workers between public and private care were identified. 54% of reviews investigating changes in how healthcare

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workers interact with each other and/or patients (i.e., *co-ordination of care and management of care processes)* were published prior to 2016 and only one (out-of-date) review focused on packages of care. 53% of reviews investigating changes in *ICT services* were published prior to 2016 with only one review on smart home technologies published in 2016 identified.

Discussion

This scoping review describes the extent, range and nature of synthesised evidence of alternative models of healthcare delivery relevant to high-income countries published in the past five years. It identified 531 reviews of interventions that involved changes to how and when care is delivered (47 reviews); where care is provided and changes to the healthcare environment (55 reviews); who provides care and how the healthcare workforce is managed (80 reviews); co-ordination of care and management of care processes (122 reviews); ICT systems (189 reviews); and reviews of interventions addressing a goal-focused question (38 reviews).

We identified variability in the distribution of systematic reviews across the categories of the Cochrane EPOC taxonomy for delivery arrangement interventions – some interventions, such as telehealth and role expansion or substitution, received substantially more attention than others. There were a number of delivery arrangement categories with few published systematic reviews, such as provision of care in a group instead of as an individual, use of triage systems for managing healthcare delivery, changes to the size of healthcare organisations or length of consultations, use of packages of care, or smart home technologies. Since the aim of this scoping review was not to examine the extent, range and nature of primary research in this area, it is unclear whether the limited number of reviews

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on these topics is due to few primary studies or other factors. Exploring the need for, and addressing the gaps in, up-to-date reviews of alternative delivery arrangements highlighted by our review could be the focus of future work.

Technological advances over the past decade has seen a rapidly changing healthcare landscape that likely explains the large number of reviews we found in the telehealth sub-category. The intense interest in technology belies the barriers associated with their uptake and use, including the upfront and ongoing financial investment in equipment, licensing and software required [22], real or perceived privacy risks, and funding systems that do not always support the delivery of healthcare in this way [23]. They are advocated as having potential to enhance care delivery, with the promise of improved capacity for patients to be cared for at home, and improved access for those living rurally or remotely.

Over the past 10 years there has also been a proliferation of policy decisions both in Australia and elsewhere that have encouraged the development of new or expanded workforce roles to address human resource shortages[24-27]. The large number of systematic reviews in this subcategory likely reflects the extensive investment in this area over this time. In addition, there may be other drivers of role expansion for specific health workers e.g. with changes to legislation around supply of pharmaceuticals, and a growth in 'supermarket pharmacies', there is greater potential for pharmacists to take on additional non-dispensing roles.

While almost all included reviews reported on patient outcomes, only a third of reviews included resource use as an outcome and/or searched for an incorporated economic evaluation studies. Evidence about the economic impact of changes to the way in which healthcare services are organised and delivered is likely to become increasingly important to

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those making decisions about system redesign and improvement. Therefore it is important that the impact of alternative delivery arrangement interventions on these outcomes be considered in future reviews.

There are a number of strengths and limitations to this scoping review. Two authors independently screened and selected reviews, thus minimising the likelihood of omitting eligible reviews. While independent data extraction of by two review authors was not feasible due to the large number of included reviews (and is not recommended in methods guidance for scoping reviews [18]), we did take steps to optimise consistency in data extraction[16]. As this scoping review sought to map the state of the literature in this area, we did not appraise the quality of the included reviews and did not attempt to synthesise the results of the included systematic reviews. The search was limited to the last five years and only abstracts published on PDQ-Evidence and filtered by the 'intervention' category were included. We used the Cochrane EPOC taxonomy for delivery arrangement interventions to map the extent, range and nature of systematic review evidence about alternative models of care delivery but categorisation was not always straightforward. This was because interventions could sometimes be categorised to more than one category (e.g. information technology used to improve coordination of care). In these instances the review team discussed the categorisation of reviews and an audit trail of this process was prepared (Supplementary file 2).

Finally, this review focused on changes in how, when and where healthcare is organised and delivered, and who delivers care and thus excluded consideration of alternatives focused on changes to financial arrangements (e.g. changes to how funds are collected, insurance schemes, purchasing of services, use of incentives/disincentives), governance arrangements

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(changes in rules or processes that determine authority and accountability), and implementation strategies (aimed at bringing about changes in behaviour of healthcare professionals or organisations). Mapping the synthesised evidence focused on these interventions relevant to high-income countries could be described in future scoping reviews.

CONCLUSION

A substantial body of evidence about the effects of a wide range of delivery arrangements is available to inform health system improvements. Most of the available evidence focuses on alternative information and communication technology systems and care coordination models. This scoping review provides a map of the extent, range and nature of available synthesised evidence and identifies gaps where research efforts could be directed, i.e. in updating out-of-date reviews or conducting reviews where no reviews currently exist.

CONFLICTS OF INTEREST

None to declare.

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AUTHORS' CONTRIBUTIONS

The study conception and overall design was conceived by RB and DAO. RLJ, DAO and PP designed the data extraction tool and RLJ, PP, KR and JN all assisted in piloting. RLJ wrote the first draft of this protocol and RB, DAO, PP, KR, JN, SC and SS critically reviewed the manuscript, contributed improvements and approved the final version.

PATIENT AND PUBLIC INVOLVEMENT

No patient involved.

DATA STATEMENT

All data is presented in the manuscript and supplementary material.

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Table 1 Review characteristics

Review characteristics (n=531)	Count (%)
Year of publication	
2012	50 (9%)
2013	79 (15%)
2014	67 (12.5%)
2015	111 (21%)
2016	216 (41%)
2017*	8 (1.5%)
Cochrane reviews	125 (24%)
Included primary studies (all designs) per review (Mean (SD)) [range]	23 (37) [0-463]
Reviews including randomised controlled trials	245 (46%)
Health conditions/ populations	
Common chronic diseases (e.g. diabetes, chronic obstructive pulmonary disease, heart failure, chronic kidney failure, asthma, musculoskeletal conditions)	106 (20%)
Cancer	21 (4%)
Critically or terminally ill	16 (3%)
Patients undergoing lifestyle and prevention interventions	53 (10%)
Patients undergoing surgical interventions (including preoperative care and safety checklists)	18 (3%)
Mental Health conditions	67 (12%)
Older adults and aged care	17 (3%)
Non-communicable diseases (e.g., viral hepatitis, HIV, TB)	17 (3%)
Maternal and child health	38 (7%)
Outcomes reported	
Patient outcomes (health status and/or health behaviours e.g., mortality, morbidity, cure rates)	492 (93%)
Quality of care (e.g. adherence to recommended practice)	62 (12%)
Access and/or utilisation of healthcare services (e.g., waiting time to receive care, readmission rates, length of stay in a facility)	178 (34%)
Resource use (including healthcare resources, non-healthcare resources e.g., transportation costs, patient and caregiver time)	161 (30%)
Impacts on equity	30 (6%)
Social outcomes (e.g., poverty, unemployment)	15 (3%)
Healthcare provider outcomes (e.g., wellbeing, fatigue, stress, satisfaction)	68 (13%)
Adverse effects	93 (18%)
Reviews incorporating economic evaluation studies	177 (33%)

**Incomplete*

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Table 2: Summary of included reviews organised according to the Cochrane EPOC Taxonomy of delivery arrangement interventions

Delivery arrangement by EPOC Taxonomy category and subcategory	EPOC Definition	No of reviews (no. of Cochrane reviews	No of primary studies (RCTs)	No of empty reviews	Types of interventions (see Supplementary file 2 for detail)
How and when care is delivered (n= 47)					
Queuing strategies	A reduction or increase in time to access a healthcare intervention, for example managed waiting lists, managing ER wait time	7 (2)	112 (22)	1	- Emergency department (ED) visit reduction programs - Improving patient flow and quality of care in the ED - Interventions to reduce waiting times for elective surgical procedures - Patient initiated clinics for patients with chronic or recurrent conditions managed in secondary care
Group versus individual care	Providing care to groups versus individual patients	5 (1)	134 (124)	0	- Group clinics (chronic conditions, antenatal care)
Quality and safety systems	Essential standards for quality of healthcare, and reduction of poor outcomes related to unsafe healthcare	33 (11)	774 (246)	0	- Immediate versus deferred delivery of the preterm baby with suspected foetal compromise for improving outcomes - Implementation of guidelines and evidence-based care - Improving integrated care models in chronic diseases - Interventions to increase breastfeeding uptake - Medication reconciliation interventions at hospital - Patient safety interventions - Promoting hand hygiene - Promoting use of guidelines and evidence-based medicine - Reducing disparities in health and health care - Reducing exposure to ionizing radiation from medical imaging - Reducing medication over-prescription (antibiotic use, opioid prescription, administration errors in children and adults, inappropriate prescribing in elderly) - Using interpreters for non-English speakers on the delivery of palliative care (cancer)
Triage	Management of patients attending a healthcare facility, or contacting a healthcare professional by phone, and receiving advice or being referral to an appropriate service	2 (0)	65 (2)	0	- Improving patient flow and quality of care in the ED - Pharmacist involvement in care for patients with chronic disease
Where care is provided and changes to the healthcare environment (n=55)					
Environment	Changes to the physical or sensory healthcare environment, by adding or altering equipment or layout, providing music, art	1 (1)	1 (1)	0	- Environmental interventions to increase breastfeeding uptake while mothers are in hospital
Outreach services	Visits by health workers to different locations, for example involving specialists, generalists, mobile units	1 (1)	2 (2)	0	- Mobile clinics for women's and children's health
Site of service delivery	Changes in where care is provided, for example home vs. healthcare facility, inpatient vs outpatient,	51 (20)	956 (320)	1	- Alternatives to hospitalisations: outpatient management, quick diagnostic units, hospital-at-home, observation units (for induction of labour,

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Delivery arrangement by EPOC Taxonomy category and subcategory	EPOC Definition	No of reviews (no. of Cochrane reviews	No of primary studies (RCTs)	No of empty reviews	Types of interventions (see Supplementary file 2 for detail)
	specialised vs. non-specialised facility, walk in clinics, medical day hospital, mobile units				intravenous antibiotic therapy for cystic fibrosis, cardiac arrest, kidney dialysis, COPD, psychosis, paediatric care.) - ED-based interventions (for managing alcohol misuse, domestic violence, palliative care) - Home visiting (for pregnancy, child health and maltreatment, social determinants of health, partner violence) - Home-based prevention and rehabilitation - The patient centred medical home - Pre-hospital intervention for sepsis - Reaching youth with out-of-facility services (HIV and reproductive health) - School-based health centres for mental health, social determinants of health - Therapeutic communities for mental health - Waiting room-based interventions to prevent STD
Size of organizations	Increasing or decreasing the size of health service provider units	1 (1)	5 (0)	0	- Centralisation, specialisation and increasing volume of services to promote quality (e.g. cancer care and surgery)
Transportation services	Arrangements for transporting patients from one site to another	1 (1)	38 (0)	0	- Helicopter emergency medical services for adults with major trauma
Who provides care and how the workforce is managed (n= 80)					
Role expansion or task shifting	Expanding tasks undertaken by a cadre of health workers or shifting tasks from one cadre to another, to include tasks not previously part of their scope of practice	65 (12)	1110 (586)	1	- Advanced practice nursing in older people and in long-term care - Advanced trauma life support training for hospital health professional and ambulance crews - Carer involvement in cognition-based interventions for people with dementia - Community-based health worker interventions - Interventions to increase breastfeeding - Nurse-physician substitution - Peer-led interventions (e.g., in mental health) - Pharmacist involvement in care for patients with chronic conditions - Primary care-led provision of care (e.g., GP's working in ED) - Radiographers in advanced roles
Self-management	Shifting or promoting the responsibility for healthcare or disease management to patients or their families	15 (6)	298 (216)	0	- Patient navigation (breast cancer) - Promoting self-management (in chronic diseases, specifically HIV, diabetes foot care, COPD, asthma, children with epilepsy, anxiety, MS, IBS; self-administration of medication in the hospital, oral anticoagulation, home uterine monitoring for detecting preterm labour) - Reducing medication and over-prescription (antibiotic use, opioid prescription, administration errors in children and adults, inappropriate prescribing in elderly)
Co-ordination of care and management of care processes (n=122)					
Integrated healthcare systems	Consolidating the provision of different healthcare services to one (or simply fewer) facilities	16 (3)	406 (258)	0	- Integrated care models for various conditions
Shared	Sharing healthcare decision making	14 (5)	487 (393)	0	- Educational interventions for patients and carers

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Delivery arrangement by EPOC Taxonomy category and subcategory	EPOC Definition	No of reviews (no. of Cochrane reviews	No of primary studies (RCTs)	No of empty reviews	Types of interventions (see Supplementary file 2 for detail)
decision making	responsibilities among different individuals, potentially including the patient.				- Improving healthcare professionals skills (e.g. communication in cancer, performance in nursing homes, recognition and management of deteriorating patients, genetic education) - Promoting adoption of Shared Decision Making - Reducing medication and over prescription - Shared decision making in pregnancy and delivery, treatment in older people and cancer screening
Packages of care	Introduction, modification, or removal of packages of services designed to be implemented together for a particular diagnosis/disease, e.g. tuberculosis management guidelines, newborn care protocols	1 (1)	5 (5)	0	- Care delivery models/disease management
Case management	Introduction, modification or removal of strategies to improve the coordination and continuity of delivery of services i.e. improving the management of one "case" (patient)	14 (4)	375 (260)	0	- Advance care planning (e.g., haemodialysis patients, palliative care, end-of-life interventions) - Case management in chronic diseases, specifically CVD, diabetes type 2, cancer, childhood obesity, haemophilia, mental health, multi-morbidities, chronic viral hepatitis - Outpatient case management
Disease management	Programs designed to manage or prevent a chronic condition using a systematic approach to care and potentially employing multiple ways of influencing patients, providers or the process of care	16 (3)	298 (169)	1	- Adolescent-specific prenatal interventions on improving attendance and reducing harm during and after birth - Care delivery models/disease management - Chronic Disease Management – asthma - Improving healthcare professionals skills - Outpatient management of cardio-metabolic risk factor control in people with diabetes
Care pathways	Aim to link evidence to practice for specific health conditions and local arrangements for delivering care.	8 (2)	99 (24)	0	- Advanced care planning - Care delivery models/disease management - Critical Care - Interventions to improve linkage with or retention in HIV services - Rapid response systems to reduce hospital mortality
Teams	Creating and delivering care through a multidisciplinary team of healthcare workers.	22 (4)	398 (229)	1	- Multidisciplinary team care for dementia and other mental health conditions, older adults, epilepsy, asthma, HIV, hearth failure, chronic cough in children, antenatal care., chronic diseases management, specifically CVD, diabetes type 2, cancer, childhood obesity, haemophilia, multi-morbidities, chronic viral hepatitis. - Team interventions to promote work participation in people with regional musculoskeletal pain - Multidisciplinary team care in. chronic disease - Multidisciplinary team neonatal care
Communication between providers	Systems or strategies for improving the communication between health care providers	6 (2)	105 (44)	0	- Improving clinical communication in hospitals, between primary and secondary care Improving patient handovers from hospital to primary care and vice versa
Transition of care	Interventions to improve transition from one care provider to another	7 (0)	138 (26)	0	- Transition from paediatric to adult care settings or services
Discharge planning	An individualised plan of discharge to facilitate the transfer of a patient	18 (4)	243 (211)	0	- Early supported discharge planning (acute stroke, COPD, older adults, children with cancer and

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Delivery arrangement by EPOC Taxonomy category and subcategory	EPOC Definition	No of reviews (no. of Cochrane reviews	No of primary studies (RCTs)	No of empty reviews	Types of interventions (see Supplementary file 2 for detail)
	from hospital to a post-discharge setting				febrile neutropenia) - Fast-track surgery programs (liver surgery) - Providing written information to reduce re-admissions in heart failure - Transitional care management after hospital discharge to reduce 30-day readmission rates
Information and communication technology systems (n=189)					
Health information systems	Health record and health management systems to store and manage patient health information, for example electronic patient records, or systems for recalling patients for follow-up or prevention	13 (4)	718 (118)	0	- Health notes vs EMR in pregnancy - Interventions to improve attendance of appointments - Paediatric track and trigger systems for hospitalised children - Patient safety interventions that use technology - Recall intervals (for dental visits, women with history of gestational diabetes, TB appointments - Reminder interventions to improve treatment adherence - The use of medical scribes in healthcare settings
The use of information and communication technology	Technology-based methods to transfer healthcare information and support the delivery of care	13 (1)	627 (250)	0	- Computerised clinical decision support to enable patient-centred care (nutrition informatics, advice on drug dosage) - Medication organization devices - Medication reconciliation interventions in hospital - Multimedia educational interventions for consumers about prescribed and over-the-counter medications - Patient portals - IT interventions for reducing inappropriate imaging and testing (e.g. cardiac, low-back pain imaging, lab tests ordering by GPs) - IT interventions for reducing medication use? and over-prescription - Serious games for professional training and patient education (e.g. chronic diseases, mental health)
Smart home technologies	Electronic assistive technologies	1 (0)	48 (9)	0	- Remote monitoring (e.g. after recent hospital discharge with heart failure, in older adults, asthma)
Telehealth	Exchange of healthcare information from one site to another via electronic communication	162 (29)	3533 (2527)	2	- Self-care applications - Social networks and social media - Telecoaching (telephone counselling, peer support programs, automated telephone messaging, web-based programs e.g., cognitive behavioural therapy for mental health conditions, coaching for chronic disease) - Telehealth (email communication, mobile phone messaging, mobile phone technology, mobile technology, or range of intervention types) - Telemedicine (screening, telerehabilitation, telemonitoring)
Goal-focused reviews (n=38)					
Interventions to address social determinants of health		14 (2)	319 (123)	0	- Culturally appropriate prevention and care (indigenous populations, racial-ethnic minorities, low socio-economic populations) - Eliminating repeat unintended pregnancy in teenagers - Improving access to healthcare for homeless people - Interventions to address social determinants of

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Delivery arrangement by EPOC Taxonomy category and subcategory	EPOC Definition	No of reviews (no. of Cochrane reviews	No of primary studies (RCTs)	No of empty reviews	Types of interventions (see Supplementary file 2 for detail)
					health for minority populations (ethnic and race disparities)
Improving medication adherence		11 (2)	654 (551)	0	- Interventions aimed at improving medication adherence (e.g. chronic diseases, specifically diabetes, HIV, CVD; in ethnic minorities)
Addressing multimorbidity in primary care		1 (1)	18 (18)	0	- Interventions addressing multi-morbidity in primary care
Preventing readmissions		1	42 (42)	0	- Interventions for preventing unplanned 30-day hospital readmissions
Reducing inappropriate imaging and testing		3	24 (6)	0	- Interventions for reducing inappropriate imaging and testing
Meeting family needs of the critically ill		1	14 (1)	0	- Meeting family needs of critically ill patients in an ICU
Communicating contraceptive effectiveness		1 (1)	7 (7)	0	- Communicating contraceptive effectiveness
Improving adherence to treatment		2	38 (35)	0	- Improving adherence to treatment in children with chronic diseases and adult heart transplant patients
Interventions to increase retention in health care services		1 (1)	11 (9)	0	- Interventions to increase retention in mental health services
Interventions to increase vaccine uptake		3	128 (77)	0	- Interventions to increase vaccine uptake in children and the elderly
Total		**531**	**12,230 (6911)**	**7**	

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Table 3. Gaps in availability of up-to-date systematic reviews of alternative delivery arrangements

Delivery arrangement	Count (%) of out-of-date[1] reviews per category	Sub-categories where new or updated reviews may be needed
1. How and when care is delivered	31/47 (66%)	- Triage - only 2 reviews identified; 1 out-of-date[2] - Group versus individual care - 5 reviews identified; 3 out-of-date[2] - Queuing strategies - 7 reviews identified; 3 out-of-date[2]
2. Where care is provided and changes to the healthcare environment	32/55 (58%)	- Environment - only 1 review identified; published 2016 - Outreach services - only 1 review identified; published 2016 - Size of organisations - only 1 review identified; out-of-date[2] - Transportation services - only 1 review identified; out-of-date[2]
3. Who provides care and how the healthcare workforce is managed	48/80 (59%)	No reviews identified on: - Length of consultations – no reviews - Staffing models – no reviews - Movement of health workers between public and private care – no reviews
4. Co-ordination of care and management of care processes	65/122 (54%)	- Packages of care – only 1 review identified; out-of-date[2] - Communication between providers - 6 reviews identified; 5 out-of-date[2] - Transition of care - 7 reviews identified; 3 out-of-date[2] - Care pathways - 8 reviews identified; 4 out-of-date[2]
5. Information technology and communication systems	100/189 (53%)	- Smart home technologies - only 1 review identified; published 2016

1. published before 2016; 2 percentage of reviews in subcategory published before 2016

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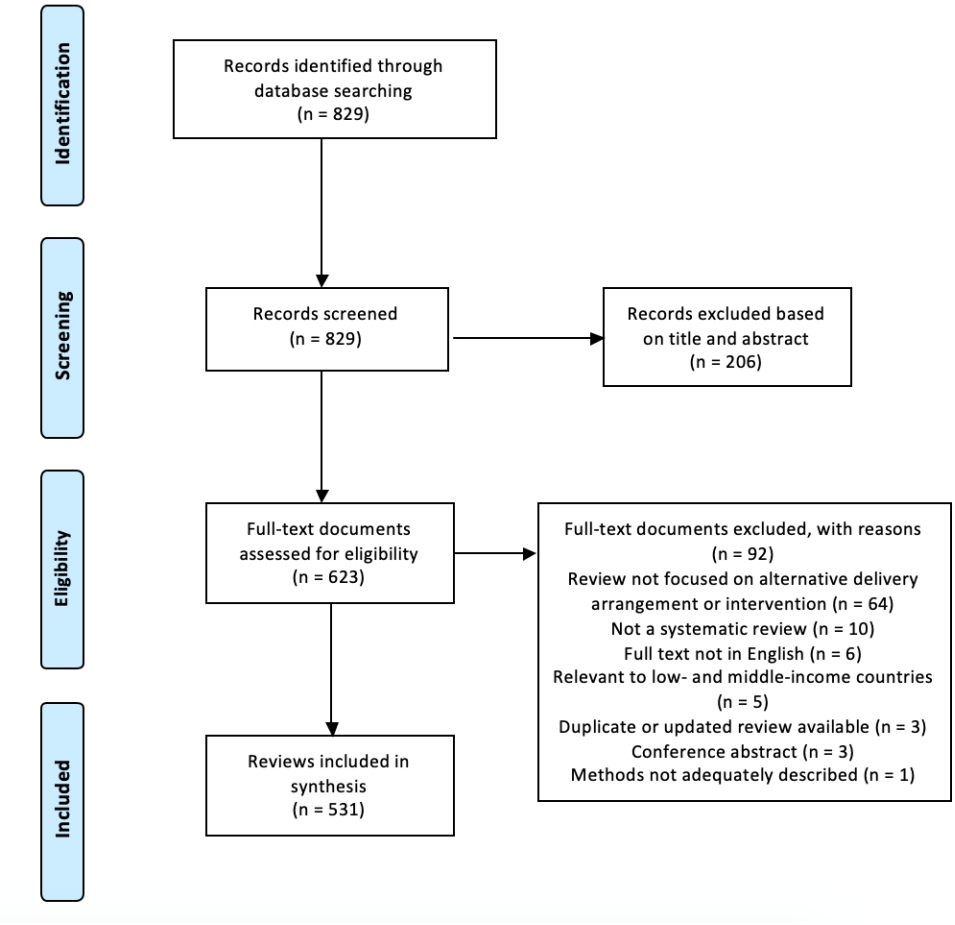
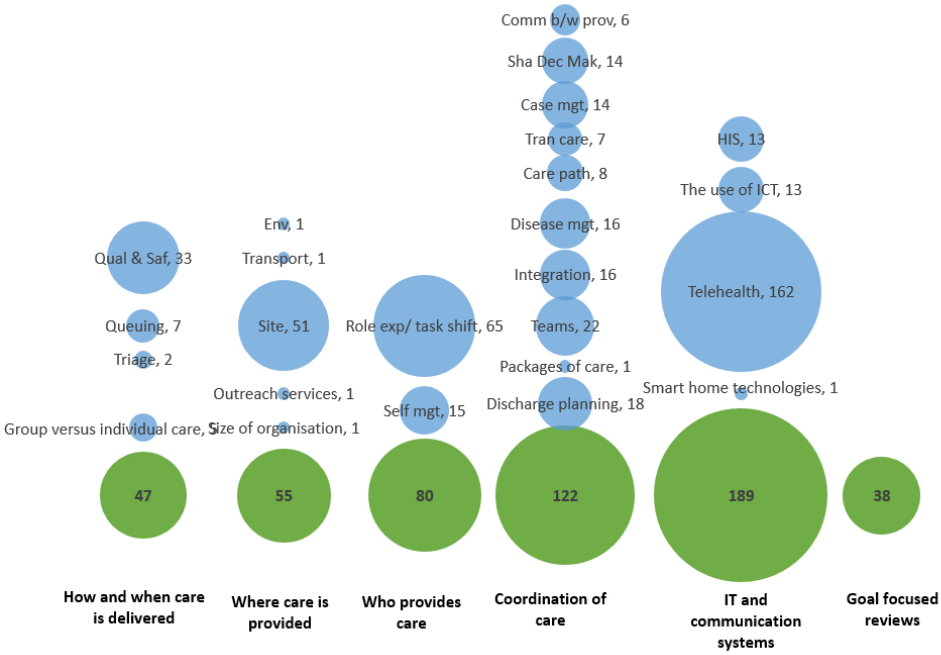
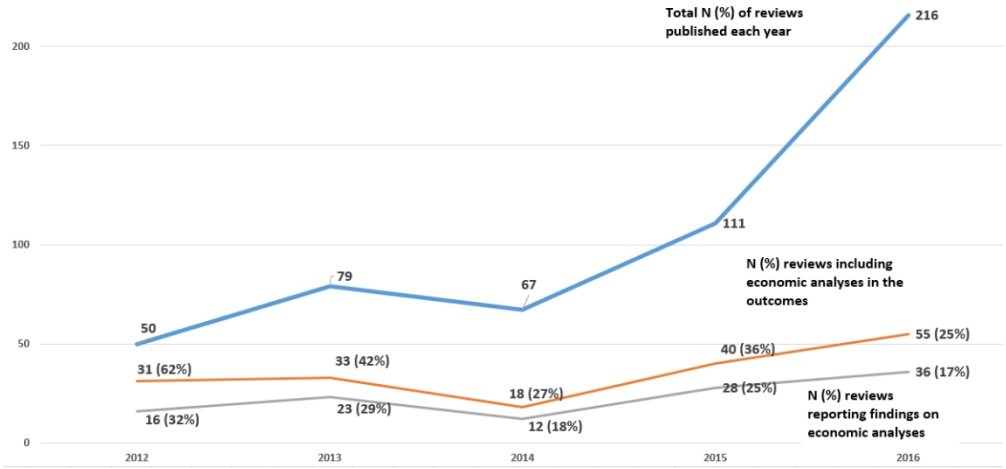


Figure 1. PRISMA Flow Diagram



Number of included reviews organised according to the Cochrane EPOC taxonomy of delivery arrangement interventions



Summary of included reviews by year of publication (2012-2016) and incorporating economic analyses

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Alternative service models for delivery of healthcare services in high-income countries: a scoping review of systematic reviews

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ABSTRACT

Introduction Costs associated with the delivery of healthcare services are growing at an unsustainable rate. There is a need for health systems and healthcare providers to consider the economic impacts of the service models they deliver and to determine if alternative models may lead to improved efficiencies without compromising quality of care. The aim of this protocol is to describe a scoping review of the extent, range and nature of available synthesised research on alternative delivery arrangements for health systems relevant to high-income countries published in the last 5 years.

Design We will perform a scoping review of systematic reviews of trials and economic studies of alternative delivery arrangements for health systems relevant to high-income countries published on 'Pretty Darn Quick' (PDQ)-Evidence between 1 January 2012 and 20 September 2017. All English language systematic reviews will be included. The Cochrane Effective Practice and Organisation of Care taxonomy of health system interventions will be used to categorise delivery arrangements according to: how and when care is delivered, where care is provided and changes to the healthcare environment, who provides care and how the healthcare workforce is managed, co-ordination of care and management of care processes and information and communication technology systems. This work is part of a 5-year Partnership Centre for Health System Sustainability aiming to investigate and create interventions to improve health-system-performance sustainability.

Ethics and dissemination No primary data will be collected, so ethical approval is not required. The study findings will be published and presented at relevant conferences.

Strengths and limitations of this study

- A high-level synthesis of the available evidence for alternative models of health service delivery is much needed and will be a useful resource for decision makers involved in health system planning, health system performance, sustainability initiatives and future research directions.
- We have followed published methodological guidance in planning our methods for conducting this scoping review, and we will additionally perform independent double data extraction to enhance the robustness of our findings where consistency of extraction is <90%.
- The search date will be limited to the last 5 years to retrieve useful, up-to-date reviews of alternative delivery arrangements relevant to high-income countries.
- Limiting the search date to the last 5 years means it is possible that we may not capture delivery arrangements included in out-of-date systematic reviews (published prior to 2012).
- Systematic reviews that are awaiting classification in 'Pretty Darn Quick'-Evidence will not be assessed as part of this review.

BACKGROUND

The provision of sustainable, appropriate healthcare is an ongoing challenge for health systems worldwide. There are many drivers of increasing healthcare costs. They include growing pressure from an ageing population,[1 2] growth in the prevalence of chronic and preventable diseases, increasing availability of (more expensive) clinical tests and treatments,[3] medicalisation of risk factors and active screening of people who are well,[4 5] lowering of diagnostic and intervention thresholds for high prevalence conditions[6–8] and changing community expectations.[9 10] In addition, high-income countries are experiencing increasing inflationary pressures and workforce shortages.[11–15] In order to be sustainable, health systems and providers must be able to endure and adapt to these growing pressures by delivering services that maintain a high quality of care while providing better value for money.[16] In practice, this means health systems and providers need to consider the effectiveness and economic impact of existing service models, and also determine if there are alternative

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models that might lead to improved efficiencies without compromising the quality of care and patient outcomes.

There are examples of models of service delivery that have been adopted in practice that offer modest benefits for patients when compared with usual care, but where the economic impact is uncertain (eg, early discharge from hospital and care at home),[17] or not known (eg, mid-wife led models of care).[18] In addition, some alternative delivery arrangements have been implemented despite uncertainty about effects on patient care and economic impact (eg, primary care physicians providing care in emergency departments)[19] and, in some cases, effectiveness is later shown to be low and associated costs, high (eg, rapid exchange of operating room air to reduce infection rates).[20] For this reason, efforts that aim to manage expenditure need to focus not just on benefits to patients, but on the value of the delivery arrangement relative to the cost. This distinction is important, as high-cost models of care may still be good value if they deliver high levels of benefit to patients, while low-cost models of care may have no value if they provide little or no benefit.[21] In 2017, the Australian Productivity Commission released a report identifying that there are considerable efficiencies to be gained through identifying enablers and barriers to more efficient models of care, and that eliminating financial reward for delivery of services where there is clear evidence of a lack of efficacy or cost effectiveness, or where the benefits do not justify the associated costs should be part of future health planning.[22]

Alternative models of service delivery offer an opportunity for healthcare providers to deliver healthcare services in different and potentially more cost-effective ways through lower cost- providers, locations and formats of delivery. Examples include changing the site of the service delivery from a more expensive to a less expensive option, providing care in a group setting rather than to individuals, substituting the care that is provided by a highly trained or specialised health worker to care provided by a less specialised or lay health worker, or using technology to deliver care (eg, telemedicine). Provision of services in this way may lead to the same, and in some cases better, outcomes for patients without compromising the quality of care. However, these alternative models may also increase costs, so they must undergo robust economic evaluations that not only take into account improvements in patient and carer outcomes, but also consider the benefit and costs to the health system as a whole.

A scoping review provides a rapid method of mapping key concepts within a research area and provides an overview of the main sources and types of evidence available.[23] It is most useful when the research question is complex or has not been reviewed comprehensively before. A number of reviews of alternative delivery models have been published in the past 5 years. Most reviews have focused on the delivery of a single test or treatment for a particular disease or condition,[24 25] or a single delivery arrangement-type such as chronic disease programmes,[26] multidisciplinary care or integrated care interventions.[27] As such, these reviews do not adequately summarise the volume and scope of existing synthesised research on alternative delivery arrangements. A recent Cochrane overview has focused on delivery arrangements relevant to low-income countries.[28] However, low-income countries struggle with different health system demands, including a predominance of communicable diseases and resource constraints and limited access to new technologies and other resources. Therefore, the findings of this overview may be less applicable to high-income countries (for eg, it includes delivery arrangements for HIV/AIDS, malaria, childhood diarrhoea, pneumonia and vaccination and antenatal care).

To the best of our knowledge, no scoping review or overview of alternative delivery arrangements for health systems relevant to high-income countries has been conducted to date. This work is likely to be useful for decision makers by mapping the availability of existing synthesised evidence, including where economic analysis of alternative delivery arrangements exists and in highlighting gaps for future research. The proposed scoping review forms part of 5-year Partnership Centre for Health System Sustainability funded by the Australian National Health and Medical Research Council and other partners and aims to investigate and create interventions to improve health system performance sustainability.[29] This scoping review complements a systematic review by the Partnership Centre, currently under way, that will review the sustainability of interventions, improvement efforts and change strategies in the health system through an examination of trial data published in the last 5 years.[16]

Objectives

This scoping review aims to describe the extent, range and nature of available systematic reviews of alternative delivery arrangements for health systems relevant to high-income countries published in the last 5 years. A time-frame of 5 years was chosen to ensure that the review contained evidence and data about effects that are up-to-date, reliable and ready to implement. A secondary aim is to identify gaps in the availability of up-to-date systematic reviews of alternative delivery arrangements needed to inform health system sustainability initiatives and future research directions.

METHODS AND ANALYSIS

Protocol development

The protocol for this scoping review is underpinned by the methodological framework first suggested by Arksey and O'Malley,[30] and further described by Levac and colleagues.[31] This framework emphasises transparency of the protocol development and scoping review process to increase the reliability of the findings.

Criteria for considering studies for this review

We will include all English language systematic reviews examining the effects of alternative delivery arrangements

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for health systems relevant to high-income countries published between 1 January 2012 and 20 September 2017. Alternative delivery arrangements include changes to how and when care is delivered, where care is provided and changes to the healthcare environment, who provides care and how the workforce is managed, co-ordination of care and management of care processes and information and communication technology systems.

For inclusion, systematic reviews must assess the effects of alternative delivery arrangements of relevance to high-income countries (as classified by the World Bank for the 2017 fiscal year),[32] have a methods section with explicit inclusion criteria, and report at least one of the following outcomes: patient outcomes (health and health behaviours), quality of care, access and/or utilisation of healthcare services, resource use, impacts on equity and/or social outcomes, healthcare provider outcomes and adverse effects. We will consider for inclusion systematic reviews in any setting, including hospital (inpatient or outpatient care, acute or subacute), primary care, long-term care facilities and the community.

Search methods for identifying studies

We will search the 'Pretty Darn Quick' (PDQ)-Evidence for systematic reviews published between 1 January 2012 and 20 September 2017. PDQ-Evidence is a database of evidence for decisions about health systems derived from the Epistomonikos database of systematic reviews. It includes the following databases: Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effectiveness, MEDLINE via PubMed, EMBASE, CINAHL, PsycINFO, Latin American and Caribbean Health Sciences Literature, Joanna Briggs Institute Database of Systematic Reviews and Implementation Reports, Evidence for Policy and Practice Information and Co-ordinating Centre Evidence Library and the Campbell Collaboration online library. The 'intervention' publication filter will be used to exclude systematic reviews of non-intervention studies. An example of the search method has been provided as an online supplementary file.

Study selection

Two review authors will independently screen the titles and abstracts retrieved by the search for inclusion and code as 'retrieve' (potentially eligible or unclear) or 'do not retrieve' (ineligible). We will retrieve the full text reports of potentially eligible and unclear titles and abstracts. Two (of a team of four) review authors will independently screen the full text reports and identify systematic reviews for inclusion and exclusion. We will record the reasons for exclusion of ineligible systematic reviews. We will resolve disagreements regarding eligibility through discussion, and if consensus is not achieved, by involving a third review author. We will prepare a Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow chart summarising the search and selection process and the number of articles reviewed at each stage.

Data extraction and management

We will extract descriptive data on systematic review characteristics (year, authors, journal, number and design of included studies), delivery arrangement category and subcategory, target population, setting and target health issue/s. Outcome categories and the main effects searched for by systematic review authors will also be collected (patient outcomes, quality of care, access and/or utilisation of healthcare services, resource use, impacts on equity and/or social outcomes, healthcare provider outcomes, adverse effects and economic analysis, where reported). The research team will develop, pilot and refine a data extraction form[31] (preliminary version of the data extraction form is presented in table 1).

As we anticipate a large volume of included studies, four review authors will be involved in the data extraction process. Initially, all four will independently extract data and populate the data extraction form for 10 systematic reviews and discrepancies will be discussed to ensure the process for extraction is consistent. The remaining systematic reviews will then be divided between reviewers. While independent data extraction of included studies by two review authors is not routinely recommended in method guidance for scoping reviews,[31] we will have a second reviewer allocated to extract a random sample of one third of included systematic reviews to assess the level of consistency and determine the accuracy of our process. Any disagreement between reviewer extraction processes will be resolved through discussion until consensus is reached. If the mean agreement in data extraction across this subset of systematic reviews is >90%, no further checks will be conducted. The data extraction process is illustrated in figure 1.

Collating and summarising results

We will categorise the delivery arrangements according to the Cochrane Effective Practice and Organisation of Care (EPOC) taxonomy of health system interventions.[33] This taxonomy is useful for organising and characterising health system interventions according to conceptual, functional and/or practical similarities. The delivery arrangement domain of the taxonomy classifies interventions based on changes to the following:

- How and when care is delivered.
- Where care is provided and changes to the healthcare environment.
- Who provides care and how the healthcare workforce is managed.
- Co-ordination of care and management of care processes and
- Information and communication technology systems.

In addition, we will use a category titled 'multiple (goal-focused)' to categorise systematic reviews that include all relevant delivery arrangements from across the above categories to address a specific problem or goal (eg, interventions for enhancing medication adherence).

We will summarise our findings quantitatively by presenting a numerical count of reviews in each category

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Table 1 Preliminary version of the data extraction form

Study ID	Author, year	Brief description of intervention /objective	Place published	EPOC Delivery arrangement strategy	Sub-category	Number and type of trials included	Target population	Setting	Target health issue/s	Patient outcomes (health and health behaviours for example, mortality, cure rates)	Quality of care (systems or processes for improving quality of care for example, timeout before surgery)	Resource use	Impacts on equity	Social outcomes (eg, poverty, unemployment)	Access, utilisation (eg, re-admission rates, length of stay)	Healthcare provider outcomes (eg, overall well-being, fatigue, stress, satisfaction)	Adverse effects	Economic analyses
ID1																		
ID2																		
ID3																		

EPOC, Effective Practice and Organisation of Care.

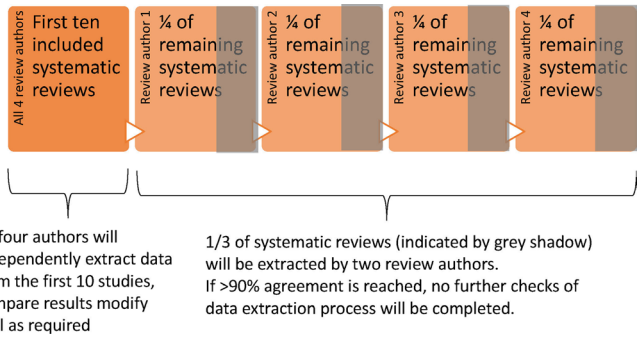

Figure 1 Data extraction process for included systematic reviews. All four authors will extract data from the first 10 systematic reviews. The remaining systematic reviews will be divided between the four review authors, and each author will have 1/3 of his/her studies reviewed by a second author to assess the level of agreement. If >90% agreement is reached, no further checks of data extraction process will be completed.

and visually using bubble charts to represent the quantity and range of systematic reviews across the delivery arrangement categories and to highlight gaps in the available synthesised evidence. Bubble charts allow the reader to see an overview of the spread of data across and within EPOC categories.[34] We will also describe the extent, range and nature of available systematic reviews using a narrative synthesis. This process will allow for identification of gaps in the availability of up-to-date systematic reviews and areas of delivery arrangements where the evidence is limited. Specifically, results will be used to (1) quantify the extent, range and nature of delivery strategies reported in systematic reviews, (2) quantify the number of systematic reviews where an economic analysis of the arrangement was reported and (3) determine the gaps and suggest delivery arrangements where future systematic reviews might be of use.

Patient and public involvement

The Consumers Health Forum of Australia, a representative advocate body for consumers in healthcare, have had oversight in the development and design of the protocol for this scoping review. Specifically, two members of the forum participated in stakeholder workshops during the design of the scoping review. The results will be disseminated among all stakeholders of the Partnership Grant, including consumer representatives.

CONCLUSION

This scoping review will describe the volume and scope of available up-to-date systematic reviews of alternative delivery arrangements relevant to high-income countries, and identify gaps in the synthesised evidence, needed to inform health system planning, health system sustainability initiatives and future research directions.

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ETHICS AND DISSEMINATION

As no primary data will be collected, ethical approval is not required. The study findings will be disseminated via reports, manuscript in a peer-reviewed journal and via conference presentations.

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Contributors The study conception and overall design was conceived by RB and DAO. RLJ, DAO and PP designed the data extraction tool and RLJ, PP, KR and JN all assisted in piloting. RLJ wrote the first draft of this protocol and RB, DAO, PP, KR, JN, SC and SS critically reviewed the manuscript, contributed improvements and approved the final version.

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Supplementary file 2

Delivery arrangement by EPOC Taxonomy category and subcategory	EPOC Definition	No of SRs	Intervention details
How and when care is delivered (n= 47)			
Queuing strategies	A reduction or increase in time to access a healthcare intervention, for example managed waiting lists, managing ER wait time.	7	- ED visit reduction programs (1, 2) - Improving patient flow and quality of care in the ED (3, 4) - Interventions to reduce waiting times for elective surgical procedures (5) - Patient initiated clinics for patients with chronic or recurrent conditions managed in secondary care (6, 7)
Group versus individual care	Providing care to groups versus individual patients	5	- Group clinics (chronic conditions, antenatal care) (8-12)
Quality and Safety	Essential standards for quality of healthcare, and reduction of poor outcomes related to unsafe healthcare	33	- Immediate versus deferred delivery of the preterm baby with suspected foetal compromise for improving outcomes (13) - Implementation of guidelines and evidence-based (14, 15) - Integrated care models (chronic diseases, specifically CVD, diabetes type 2, cancer, childhood obesity, haemophilia, mental health, multi-morbidities, chronic viral hepatitis) (16) - Interventions to increase breastfeeding (17) - Medication reconciliation interventions at hospital (18) - Patient safety interventions (in dentistry, acute care, ED; using safety check list, interventions to reduce wrong-site surgery, involvement in National Surgical Quality Improvement Program, incidence and error reporting at ICU, use of patient portals and EMR to improve safety of surgical procedures and medication prescription) (19-24) - Promoting hand hygiene (25) - Promoting use of guidelines and evidence-based medicine (26-29) - Reducing disparities in health and health care (30) - Reducing exposure to ionizing radiation from medical imaging (31) - Reducing medication and over-prescription (antibiotic use, opioid prescription, administration errors in children and adults, inappropriate prescribing in elderly) (32-44) - Using interpreters for non-English speakers on the delivery of palliative care (cancer) (45)
Triage	Management of patients attending a healthcare facility, or contacting a healthcare professional by phone, and receiving advice or being referral to an appropriate service	2	- Improving patient flow and quality of care in the ED (46) - Pharmacist involvement in care for patients with chronic disease (heart failure and acute coronary syndrome, chronic kidney disease, HIV, cancer, mental disease), lifestyle changes (immunization, obesity, alcohol, smoking) (47)
Where care is provided and changes to the healthcare environment (n=55)			
Environment	Changes to the physical or sensory healthcare environment	1	Interventions to increase breastfeeding uptake (48)
Outreach services	Visits by health workers to different locations, for example involving specialists, generalists, mobile units	1	Mobile clinical for women's and children's health (49)
Site of service	Changes in where care is provided, for example home vs.	51	- Alternatives to hospitalisations: outpatient management, quick diagnostic units, hospital-at-home, observation units (for induction of

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delivery	healthcare facility, inpatient vs outpatient, specialized vs. non-specialized facility, walk in clinics, medical day hospital, mobile units		labour, intravenous antibiotic therapy for cystic fibrosis, cardiac arrest, kidney dialysis, COPD, psychosis, paediatric care) (50-78) - ED based interventions (for managing alcohol misuse, domestic violence, palliative care) (79-81) - Home visiting (for pregnancy, child health and maltreatment, social determinants of health, partner violence) (82-87) - Home based prevention and rehabilitation (88-92) - Integrated care models (for chronic diseases, specifically CVD, diabetes type 2, cancer, childhood obesity, haemophilia, mental health, multi-morbidities, chronic viral hepatitis) (93) - Pre-hospital intervention in sepsis (94) - Reaching youth with out-of-facility services (HIV and reproductive health) (95) - School-based health centres for mental health, social determinants of health (96, 97) - Therapeutic communities for mental health (98, 99) - Waiting room based intervention to prevent STD (100)
Size of organizations	Increasing or decreasing the size of health service provider units	1	- Centralisation, specialisation and increasing volume of services to promote quality (e.g. cancer care and surgery) (101)
Transportation services	Arrangements for transporting patients from one site to another	1	- Helicopter emergency medical services for adults with major trauma (102)
Who provides care and how the healthcare workforce is managed (n= 80)			
Role expansion or task shifting	Expanding tasks undertaken by a cadre of health workers or shifting tasks from one cadre to	65	- Advanced practice nursing in older people and in long-term care (103, 104) - Advanced trauma life support training for hospital health professional and ambulance crews (105, 106) - Carer involvement in cognition-based interventions for people with dementia (107) - Community-based health worker interventions (e.g. to improve chronic disease management, care among vulnerable population, preventing adolescent pregnancies, management of urgent, low-acuity illnesses and injuries) (108-110) - Interventions to increase breastfeeding (111) - Nurse-physician substitution (preoperative assessment and anaesthesia for elective surgical patients, care and early Dis plan in chronic diseases, prescribing, endoscopy, patient navigation, managing anxiety, patient education, abortion and maternity care, dental care) (112-136) - Peer-led interventions (e.g. mental health, adolescent lifestyles, paediatric chronic diseases) (137-141) - Pharmacist involvement in care for patients with chronic disease (heart failure and acute coronary syndrome, chronic kidney disease, HIV, cancer, mental disease), lifestyle changes (immunization, obesity, alcohol, smoking) (142-164) - Primary care-led provision of care (e.g. non-urgent care in ED, end-of-life care) (165, 166) - Radiographers in advanced roles (167)
Self-management	Shifting the provision of care to patients or their families	15	- Patient navigation (breast cancer) (168) - Promoting self-management (e.g. chronic diseases, specifically HIV, diabetes foot care, COPD, asthma, children with epilepsy, anxiety, MS, IBS; self-administration of medication in the hospital, oral anticoagulation, home uterine monitoring for detecting preterm labour) (169-181) - Reducing medication and over-prescription (antibiotic use, opioid prescription, administration errors in children and adults, inappropriate prescribing in elderly) (182)
Co-ordination of care and management of care processes (n=122)			
Integrated healthcare systems	Bringing together delivery, management and organisation of services related to diagnosis,	16	- Integrated care models (e.g. chronic diseases, specifically CVD, diabetes type 2, cancer, childhood obesity, haemophilia, mental health, multi-morbidities, chronic viral hepatitis) (183-198)

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	treatment, care, rehabilitation and health promotion		
Shared decision making	A collaborative process that allows patients and their providers to make health care **decisions** together, taking into account the best scientific evidence available, as well as the patient's values and preferences	14	- Educational intervention for patients and carers (end-of-life care, paediatric care) (199, 200) - Improving healthcare professionals skills (e.g. communication in cancer, performance in nursing homes, recognition and management of deteriorating patients, genetic education) (201) - Promoting adoption of Shared Decision Making (202, 203) - Reducing medication and over prescription (antibiotic use, opioid prescription, administration errors in children and adults, inappropriate prescribing in elderly) (204) - Shared decision making in pregnancy and delivery, treatment in older people and cancer screening (205-212)
Packages of care	Integrated packages of care such as the Integrated Management of Childhood Illness (IMCI)	1	- Care delivery models/disease management (e.g. in dementia and other mental health conditions, elderly inpatients, epilepsy, asthma, HIV, hearth failure, chronic cough in children, antenatal care) (213)
Case management	Use of individuals, often specially trained nurses, to coordinate care for patients with multiple or complex needs	14	- Advance care planning (e.g., haemodialysis patients, palliative care, end-of-life interventions) (214-217) - Integrated care models (e.g. chronic diseases, specifically CVD, diabetes type 2, cancer, childhood obesity, haemophilia, mental health, multi-morbidities, chronic viral hepatitis) (218) - Outpatient case management (e.g. complex care needs, dementia and other mental disorders, CVD) (219-227)
Disease management	Programs designed to manage or prevent a chronic condition using a systematic approach to care and potentially employing multiple ways of influencing patients, providers or the process of care	16	- Adolescent-specific prenatal interventions on improving attendance and reducing harm during and after birth (228) - Care delivery models/disease management (e.g. in dementia and other mental health conditions, elderly inpatients, epilepsy, asthma, HIV, hearth failure, chronic cough in children, antenatal care) (229-235) - Chronic Disease Management – asthma (236) - Improving healthcare professionals skills (e.g. communication in cancer, performance in nursing homes, recognition and management of deteriorating patients, genetic education) (237-242) - Outpatient management of cardio-metabolic risk factor control in people with diabetes (243)
Care pathways	Strategies to link evidence to practice for specific health conditions. These strategies detail the local structure, systems and time-frames to address recommendations	8	- Advanced care planning (244) - Care delivery models/disease management (245) - Critical Care path (e.g. head and neck cancer surgery, after discharge from an ICU) (246, 247) - Interventions to improve linkage with or retention in HIV services (248-250) - Rapid response systems to reduce hospital mortality (251)
Teams	Care provided by teams or interdisciplinary collaboration	22	- Care delivery models/disease management (e.g. in dementia and other mental health conditions, elderly inpatients, epilepsy, asthma, HIV, hearth failure, chronic cough in children, antenatal care) (252) - Integrated care models (e.g. chronic diseases, specifically CVD, diabetes type 2, cancer, childhood obesity, haemophilia, mental health, multi-morbidities, chronic viral hepatitis) (253) - Interventions to promote work participation in people with regional musculoskeletal pain (254) - Multidisciplinary team care (e.g. chronic care, specifically RA, mental illness and crisis resolution, chronic kidney disease; trauma in elderly, palliative care in cancer, acute care, secondary fracture prevention, geriatric care, rehabilitation, end of life care, paediatric feeding disorders) (255-272) - Multidisciplinary team care (neonatal care) (273)
Communication between providers	Systems or strategies for communication between health care providers	6	- Improving clinical communication in hospitals, between primary and secondary care (274-277) - Improving patient handovers from hospital to primary care and vice versa (278, 279)
Transition of care	Interventions to improve transition from one care	7	- Transition from paediatrics to adults care (e.g. diabetes, mental health, RMDs, special health care needs) (280-286)

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	provider to another		
Discharge planning	Systems for planning the discharge of patients from facilities	18	- (Early) supported Dis plan (e.g. acute stroke, COPD, elderly patients, children with cancer and febrile neutropenia) (287-298) - Fast-track surgery programs (liver surgery) (299-301) - Providing written information to reduce re-admissions in heart failure (302) - Transitional care management after hospital discharge to reduce 30-days readmission rates (303, 304)
Information and communication technology (n=189)			
Health information systems	Health record and health management systems to store and manage patient health information, for example electronic patient records, or systems for recalling patients for follow-up or prevention	13	- Health notes vs EMR in pregnancy (305, 306) - Interventions to improve attendance of appointments (307-309) - Interventions to increase vaccine uptake (elderly, children) (310) - Paediatric track and trigger systems for hospitalised children (311) - Patient safety interventions (312) - Recall intervals (dental visits, women with history of gestational diabetes, TB appointments) (313-315) - Reminder interventions to improve treatment adherence (316) - The Use of Medical Scribes in Health Care Settings (317)
The use of information and communication technology	Technology based methods to transfer healthcare information and support the delivery of care.	13	- Computerized clinical decision support to enable patient-centred care (nutrition informatics, advice on drug dosage) (318) - Medication organization devices (319-321) - Medication reconciliation interventions at hospital (322) - Multimedia educational interventions for consumers about prescribed and over-the-counter medications (323) - Patient portals (324, 325) - Reducing inappropriate imaging and testing (e.g. cardiac, low-back pain imaging, lab tests ordering by GPs) (326) - Reducing medication and over-prescription (antibiotic use, opioid prescription, administration errors in children and adults, inappropriate prescribing in elderly) (327) - Serious games for professional training and patient education (e.g. chronic diseases, mental health) (328, 329) - Telehealth (range of intervention types) (330)
Smart home technologies	Electronic assistive technologies	1	- Remote monitoring (e.g. after recent hospital discharge with heart failure, in elderly, asthma) (331)
Telemedicine	Exchange of healthcare information from one site to another via electronic communication	162	- Self-care apps (332-352) - Social media (353) - Social networks (354-356) - Telecoaching (357-359) - Telecoaching (automated telephone messaging) (360-362) - Telecoaching (peer support programs) (363) - Telecoaching (telephone counselling) (364-373) - Telecoaching (web-based programs) (374-422) - Telehealth (423) - Telehealth (email communication) (424-426) - Telehealth (mobile phone messaging) (427-437) - Telehealth (mobile phone technology) (438, 439) - Telehealth (mobile phone) (440) - Telehealth (mobile technology) (441) - Telehealth (range of intervention types) (442-464) - Telehealth (telemonitoring)(465-473) - Telemedicine (474-486) - Telemedicine (screening) (487, 488) - Telemedicine (tele-reahabilitation) (489-493)
Goal-focused reviews (n=38)			
Interventions to address social determinants of		14	- Culturally appropriate prevention and care (494-502) - Eliminating repeat unintended pregnancy in teenagers (503) - Improving access for homeless (504) - Interventions to address social determinants of health (505-507)

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health			
Improving medication adherance		11	- Improving medication adherence (e.g. chronic diseases, specifically diabetes, HIV, CVD; in ethnic minorities) (508-518)
Addressing multimorbidity in primary care		1	- Addressing multimorbidity in primary care (519)
Preventing readmissions		1	- Preventing 30-Day Hospital Readmissions (520)
Reducing inappropriate imaging and testing		3	- Reducing inappropriate imaging and testing (e.g. cardiac, low-back pain imaging, lab tests ordering by GPs) (521-523)
Meeting family needs of the critically ill		1	- Meeting family needs of critically ill patients in an ICU (524)
Communicating contraceptive effectiveness		1	- Communicating contraceptive effectiveness (525)
Improving adherence to treatment		2	- Improving adherence to treatment (children with chronic diseases, adult heart transplant patients) (526, 527)
Interventions to increase retention in mental health services		1	- Interventions to increase retention in mental health services (528)
Interventions to increase vaccine uptake (elderly, children)		3	- Interventions to increase vaccine uptake (elderly, children) (529-531)
Total		531	

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Supplementary file 3

Table: Summary of health conditions represented in included reviews organised by EPOC Taxonomy of delivery arrangement interventions

EPOC Taxonomy category and health condition	No. of Reviews
How and when care is delivered (n=47)	
Acute respiratory infections	2
Aging (general)	3
Asthma	1
Chronic conditions (multiple included in review or multi-morbidity)	4
Chronic non-cancer pain	1
Critically ill	2
Diabetes	1
Human immunodeficiency virus (HIV)	1
Maternal and child health	7
Mental health	1
Musculoskeletal conditions	1
Oral health	1
Surgery (including preoperative care & safety checklists)	4
Terminally ill	1
No specific health condition targeted	17
Where care is provided and changes to the healthcare environment (n=55)	
Aging (general)	2
Asthma	1
Cancer	2
Chronic conditions (multiple included in review or multi-morbidity)	1
Chronic kidney disease	2
Chronic obstructive pulmonary disease (COPD)	3
Critically ill	1
Cardiovascular disease (CVD)	5
Cystic fibrosis	1

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Human immunodeficiency virus (HIV)	1
Lifestyle & Prevention (immunisations, and prevention programs targeting physical activity, drug and alcohol, diet, smoking)	4
Major trauma	1
Maternal and child health	10
Mental health	5
Musculoskeletal conditions	2
Sexual and reproductive health	1
Surgery (including preoperative care & safety checklists)	1
Terminally ill	2
No specific health condition targeted	10
Who provides care and how the healthcare workforce is managed (n=80)	
Acute respiratory infections	1
Ageing	4
Asthma	2
Bowel conditions	1
Cancer	4
Chronic conditions (multiple included in review or multi-morbidity)	8
Chronic kidney disease	1
Chronic obstructive pulmonary disease (COPD)	1
Cardiovascular disease (CVD)	6
Dementia	1
Diabetes	2
Human immunodeficiency virus (HIV)	2
Lifestyle & Prevention (immunisations, and prevention programs targeting physical activity, drug and alcohol, diet, smoking)	4
Major trauma	2
Maternal and child health	5
Mental health	6
Multiple sclerosis	1
Musculoskeletal conditions	1
Oral health	3

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Sexual and reproductive health	2
Surgery (including preoperative care & safety checklists)	5
Terminally ill	1
No specific health condition targeted	17
Coordination of care and management of care processes (n=122)	
Acute respiratory infections	1
Ageing	7
Asthma	2
Cancer	9
Chronic conditions (multiple included in review or multi-morbidity)	7
Chronic kidney disease	2
Chronic viral hepatitis	1
Chronic obstructive pulmonary disease (COPD)	2
Critically ill	2
Cardiovascular disease (CVD)	6
Dementia	7
Diabetes	8
Epilepsy	2
Haemophilia	1
Human immunodeficiency virus (HIV)	4
Intellectual disability	1
Lifestyle & Prevention (immunisations, and prevention programs targeting physical activity, drug and alcohol, diet, smoking)	1
Major trauma	1
Maternal and child health	8
Mental health	9
Musculoskeletal conditions	4
Surgery (including preoperative care & safety checklists)	4
Terminally ill	6
No specific health condition targeted	27
Information and communication technology systems (n=189)	
Ageing	1

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Amyotrophic lateral sclerosis	1
Asthma	3
Bowel conditions	2
Cancer	4
Chronic conditions (multiple included in review or multi-morbidity)	16
Chronic kidney disease	1
Chronic obstructive pulmonary disease (COPD)	2
Cardiovascular disease (CVD)	9
Dementia	2
Diabetes	15
Eye care	3
Human immunodeficiency virus (HIV)	6
Inflammatory bowel disease	1
Lifestyle & Prevention (immunisations, and prevention programs targeting physical activity, drug and alcohol, diet, smoking)	39
Maternal and child health	5
Mental health	44
Multiple sclerosis	1
Musculoskeletal conditions	3
Sexual and reproductive health	2
Surgery (including preoperative care & safety checklists)	4
Tuberculosis	1
No specific health condition targeted	24
Goal-focused reviews (n=38)	
Cancer	2
Chronic conditions (multiple included in review or multi-morbidity)	4
Critically ill	1
Cardiovascular disease (CVD)	5
Diabetes	4
Human immunodeficiency virus (HIV)	1
Lifestyle & Prevention (immunisations, and prevention programs targeting physical activity, drug and alcohol, diet, smoking)	5

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Maternal and child health	3
Mental health	2
Musculoskeletal conditions	1
Sexual and reproductive health	1
No specific health condition targeted	9
Total	**531**

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Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	pp.1,2,6
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	p. 2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	pp.4-6
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	p.6
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	p.7
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	pp.7-8
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	pp.8
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	pp.8-9
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	pp.8-9
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	p.9
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	pp.9-10
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	n/a
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	p.10

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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	p.10-11
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	pp.11-17
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	n/a
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	pp.11-17
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	pp.11-17
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	pp.18-20
Limitations	20	Discuss the limitations of the scoping review process.	pp.20-21
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	p.19, 20-21
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	p. 6, 22

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. ;169:467–473. doi: 10.7326/M18-0850

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Identifying alternative models of healthcare service delivery to inform health system improvement: a scoping review of systematic reviews

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Identifying alternative models of healthcare service delivery to inform health system improvement: a scoping review of systematic reviews

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Abstract

Objective: To describe available evidence from systematic reviews of alternative healthcare delivery arrangements relevant to high-income countries to inform decisions about healthcare system improvement.

Design: Scoping review of systematic reviews.

Data sources: Systematic reviews of interventions indexed in PDQ-Evidence.

Eligibility Criteria: All English language systematic reviews evaluating the effects of alternative delivery arrangements relevant to high-income countries, published between 1st January 2012 and 20th September 2017. Eligible reviews had to summarise evidence on at least one of the following outcomes: patient outcomes, quality of care, access and/or utilisation of healthcare services, resource use, impacts on equity and/or social outcomes, healthcare provider outcomes or adverse effects.

Data extraction and synthesis: Journal, publication year, number and design of primary studies, populations/ health conditions represented and types of outcomes were extracted.

Results: Of 829 retrieved records, 531 reviews fulfilled our inclusion criteria. Almost all (93%) reviews reported on patient outcomes while only about one third included resource use as an outcome of interest. Just over a third (n=189, 36%) of reviews focused on alternative information and communications technology interventions (including 162 reviews on telehealth). About one quarter (n=122, 23%) of reviews focused on alternative care co-ordination interventions. 15% (n=80) of reviews examined interventions involving changes to who provides care and how the healthcare workforce is managed. Few reviews investigated the effects of interventions involving changes to how and when care is delivered (n=47, 9%) or interventions addressing a goal-focused question (n=38, 7%).

Conclusions: A substantial body of evidence about the effects of a wide range of delivery arrangements is available to inform health system improvements. The lack of economic evaluations in the majority of systematic reviews of delivery arrangements means that the value of many of these models is unknown. This scoping review identifies evidence gaps that would be usefully addressed by future research.

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Article summary

Strengths and limitations of this study

- We have followed published methodological guidance for conducting this scoping review
- The search was limited to a five-year period (2012-2017) to retrieve up-to-date reviews of alternative delivery arrangements relevant to high-income countries
- As this scoping review sought to map the state of the literature in this area, we did not appraise the quality of the included reviews and did not attempt to synthesise the effects of healthcare delivery arrangements in the included systematic reviews
- Systematic reviews that were awaiting classification in 'Pretty Darn Quick (PDQ)'-Evidence at the moment of search were not captured in the search

Background

The last century has seen a continuous growth in investment in the health systems of high-income countries [1]. This has contributed to significant improvements in population health and a reduction in demand for medical care of communicable diseases, but a proportional increase in demand for the management of chronic and complex conditions [2, 3]. In addition, advances in medical technology, and more population based screening and management of disease risk factors have increased the scope of healthcare services [4-8]. Taken together, this has fuelled the inflation of healthcare costs [1]. The cost of delivering healthcare in most high income countries is now considered unsustainable and is expected to be unaffordable by the middle of the 21st century without major reforms [1].

A challenge for healthcare systems and funders is how to deliver high-value, effective care while slowing (and where possible reversing) the rate of increase in costs. This requires an understanding of the effectiveness and economic impact of current service models, and a

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determination of whether there are alternative models of healthcare delivery that might lead to improved efficiencies without compromising the quality and outcomes of care.

The value of a given model of healthcare service delivery is based upon its ratio of benefits and harms relative to its cost [9, 10]. In an ideal health system, healthcare resources should be allocated across interventions and population groups to generate the highest possible overall level of population health at the lowest cost. In practice, this means reallocating resources away from resource intensive interventions that have little or no benefit and redistributing to cost-effective and/or resource-wise interventions to enhance the allocative efficiency of health systems. Reconfiguring the way healthcare is delivered may be one method for improving the allocation of finite healthcare resources.

There are a number of different ways that healthcare delivery may be modified, including changing the location that healthcare is delivered (e.g., hospital to home), providing care in a group setting rather than to individuals, substituting care provided by one health professional to care provided by an alternative appropriately trained healthcare professional or lay person, or using technology to assist with the provision of care (e.g. telehealth). Provision of services in alternative ways such as this may lead to similar, and in some cases better, outcomes for patients. However, they may also modify the costs (or shift them to other stakeholders) or the demand for service due to more liberal access. Therefore, in addition to effectiveness, robust economic evaluations of alternative models of care delivery are required to inform decisions about the allocation of funding based on their relative value. High cost models that deliver benefits to patients may still be good value, while low-cost models of care that provide little or no benefit may have limited value [9].

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Numerous systematic reviews summarising the effects of alternative models of care delivery have been published to date. Almost all have focused on changes in the delivery of healthcare for a single condition [11], a change to the scope of practice of a single type of health professional role in a specific setting [12], or a single delivery arrangement type such as chronic disease programs [13], multidisciplinary care, or integrated care interventions [14]. A Cochrane overview of alternative delivery arrangements relevant to low-income countries was recently published [15]. Given the differences between low-income and high-income countries in terms of service demands and access to specialist care and technologies, the findings of this overview may have less relevance or applicability to service delivery in high-income countries. No similar study of alternative delivery arrangements relevant to high-income countries has been published to date.

The aim of this scoping review was to describe the extent, range and nature of available systematic reviews of alternative delivery arrangements for health systems relevant to high-income countries published in the last five years. A timeframe of five years was chosen to ensure that the review contained evidence and data about effects that are most up-to-date, reliable and potentially ready to implement. A secondary aim was to identify gaps in the availability of up-to-date systematic reviews of alternative delivery arrangements needed to inform health system sustainability initiatives and future research directions.

This review forms part of a five-year Partnership Centre for Health Systems Sustainability, funded by the Australian National Health and Medical Research Council (NHMRC) and other partners. The Partnership Centre is a collaborative of investigators, system leaders, expert advisors, system implementation partners, and funding partners from around Australia and

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aims to investigate and create interventions to improve health system performance sustainability (https://www.healthsystemsustainability.com.au/).

METHODS

Protocol

The protocol for this scoping review has been published [16] (Supplementary file 1). It was informed by the methodological framework that emphasises transparency of the scoping review process to increase the reliability of the findings[17,18]. Scoping reviews such as this are particularly useful for systematically mapping research findings across a body of research evidence that is heterogeneous and/or complex in nature. We reported our scoping review according to the PRISMA for Scoping Reviews (PRISMA-ScR) statement [17].

Criteria for considering reviews for inclusion

All English language systematic reviews examining the effects of alternative delivery arrangements for health systems relevant to high-income countries published in the last five years were included. Alternative delivery arrangements include changes to the method of how and when care is delivered, where care is provided and changes to the healthcare environment, who provides care and how the workforce is managed, co-ordination of care and management of care processes, and information and communication technology (ICT) systems [18].

For inclusion, systematic reviews needed to assess the effects of alternative delivery arrangements of relevance to high-income countries (as classified by the World Bank for the 2017 fiscal year) [19], have a methods section with explicit inclusion criteria, and report at

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least one of the following outcomes: patient outcomes (health status, health behaviours), quality of care, access and/ or utilisation of healthcare services, resource use, impacts on equity and/ or social outcomes, healthcare provider outcomes, or adverse effects. As the primary aim of the review was to describe the extent, range and nature of available evidence syntheses published in this area, we included systematic reviews containing trials with or without economic studies as well as systematic reviews containing trials with or without other study designs (e.g. interrupted time series, controlled before-after studies etc). This is because trials addressing questions about the effects of health system interventions may be difficult to implement and are often not available. Systematic reviews that included interventions in any setting were included and encompassed hospital (inpatient or outpatient care, acute or subacute), primary care, long-term care facilities/ residential care and the community.

Search methods for identifying reviews

'Pretty Darn Quick' (PDQ)-Evidence was searched to identify systematic reviews of interventions to improve the organisation of healthcare services published between 1st January 2012 and 20th September 2017. PDQ-Evidence is a database of evidence for decisions about health systems derived from the Epistomonikos database of systematic reviews. PDQ-Evidence includes the following databases: Cochrane Database of Systematic Reviews (CDSR), Database of Abstracts of Reviews of Effectiveness (DARE), MEDLINE via PubMed, EMBASE, CINAHL, PsycINFO, Latin American and Caribbean Health Sciences Literature (LILACS), JBI Database of Systematic Reviews and Implementation Reports, Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre) Evidence Library, and the Campbell Collaboration online library. The 'intervention'

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publication filter was used to include only systematic reviews that included studies of interventions, and excluded diagnostic (impact and accuracy), prognostic, prediction (diagnostic and prognostic) and qualitative systematic reviews.

Selection of reviews

Two review authors (RJ, SC) independently screened the titles and abstracts and coded as 'retrieve' (potentially eligible or unclear) or 'do not retrieve' (ineligible). At least two of four review authors (RJ, PP, JN, KR) independently screened the full text reports for inclusion. The reason for exclusion of ineligible systematic reviews was recorded. Disagreements were resolved through discussion or involvement of a third review author (DOC or RB). A PRISMA flow diagram was developed to summarise the search and selection process (Figure 1).

Data extraction and management

Data was extracted on systematic review characteristics (year of publication, authors, number and design of included studies, journal), population, health condition/s (where reported), types of outcomes of interest (namely, patient outcomes, quality of care, access and/ or utilisation of healthcare services, resource use, impacts on equity, social outcomes, healthcare provider outcomes, adverse effects), and whether reviews included economic analyses. Microsoft Excel software was used to manage the data. A data extraction form was piloted and refined [20]. Review authors involved in data extraction (RJ, PP, JN, KR) independently extracted data from the first ten included reviews and discussed their findings to ensure consistency. Consistency of extraction was also performed independently by two review authors (RJ, PP) for a third of included reviews to ensure data collection was robust and to determine level of agreement. As the mean agreement across review authors

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was 93% a single review author independently extracted the data from the remaining included reviews.

Collating and summarising results

Delivery arrangements were categorised using the Cochrane Effective Practice and Organisation of Care (EPOC) taxonomy of health system interventions[18] which characterizes interventions according to conceptual, functional and/or practical similarities. The delivery arrangement domain of the taxonomy classifies interventions into five categories (and related subcategories) based on changes to the following:

1. how and when care is delivered;
2. where care is provided and changes to the healthcare environment;
3. who provides care and how the healthcare workforce is managed;
4. co-ordination of care and management of care processes; and
5. ICT systems.

To this taxonomy we added a category of goal-focused reviews. This was used to categorise systematic reviews that summarised a range of alternative care delivery models across two or more EPOC categories.

As this was a scoping review, rather than an overview of systematic reviews designed to synthesise the results of the included systematic reviews, a critical appraisal of the quality of the included systematic reviews was not conducted.

We summarised our findings quantitatively by presenting a numerical count of reviews in each delivery arrangement category, visually using a bubble chart to display the quantity

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and range of reviews across categories, and also using a narrative synthesis. We reported the number of Cochrane reviews in each category given that Cochrane reviews are considered to have higher methodological quality compared to non-Cochrane reviews.[21, 22] We also reported the total number of primary studies (of any design) included in the systematic reviews in each category and separately a number of randomised trials in which the model of care was rigorously tested.

RESULTS

Results of search

The search yielded 829 citations. After title and abstract screening, 623 full text reports were retrieved and assessed for eligibility. 92 full text reports were excluded and 531 systematic reviews were included (Figure 1). The citations of included reviews are in Supplementary file 2.

Description of included reviews

Of the 531 systematic reviews, 125 (24%) were Cochrane reviews. A total of 12,230 individual studies were included across all systematic reviews, and these included 6,911 randomised controlled trials. 106 (20%) reviews focused on common chronic diseases (e.g., diabetes, chronic obstructive pulmonary disease, heart failure, chronic kidney failure, asthma, musculoskeletal conditions) and 53 (10%) reviews focused on patients undergoing lifestyle and prevention interventions. Over 90% of reviews examined the effects of alternative delivery arrangements on patient outcomes (e.g. mortality, morbidity). Approximately one third of reviews reported access and/ or utilisation of healthcare services as outcomes. One third of reviews included economic evaluation studies. Only 12% of

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reviews included quality of care measures as outcomes and only 6% and 3% of reviews reported impacts of alternative delivery arrangements on equity and social outcomes, respectively (Table 1).

Figure 2 provides an overview of the 531 systematic reviews, organised according to the Cochrane EPOC taxonomy. The greatest number of reviews focused on changes to ICT systems used by healthcare organisations to manage the delivery of healthcare (n=189). The majority of these focused on telehealth interventions (n=162). The fewest number of reviews (excluding goal-focused) were concerned with changes to how and when healthcare is delivered (n=47). The reviews relating to each category are described in more detail below.

1. How and when care is delivered

Of the 47 systematic reviews included in this category, 14 (30%) were Cochrane reviews. A total of 1085 primary studies were included in systematic reviews for this category, including 394 (36%) randomised controlled trials.

Systematic reviews in this category included a number of quality and safety initiatives (e.g., use of safety checklists to reduce wrong site surgery), alternative methods for queuing patients (e.g., patient-initiated clinics in chronic disease, strategies to reduce waiting times for elective surgery procedures). Many of the reviews in this category were not focused on a specific health condition (n=17, 36%), but where they were, the greatest number of reviews related to maternal and child health (n=7, 15%) (Supplementary file 3). Few systematic reviews examined group versus individual care (n=5, 11%) (e.g., group antenatal care for pregnant women), or triage strategies (n=2, 4%) (e.g., improving patient flow the emergency

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department). There was one Cochrane review focused on walk-in clinics versus physician offices and emergency rooms for urgent care and chronic disease management that did not find any eligible trials.

2. Where care is provided and changes to the healthcare environment

There were 55 systematic reviews included in this category. Of 1002 primary studies in this category, 323 (32%) were randomised controlled trials.

Most reviews investigated changes to the site of healthcare delivery (n=51, 93%) with the majority of these focused on shifting care away from the hospital setting to the home (n=32). The remaining reviews focused on shifting care from the inpatient to the outpatient or day stay setting (e.g. outpatient versus inpatient management for acute pulmonary embolism) (n=6); from the hospital to primary or community care organisations (e.g., primary care asthma clinics) (n=4); from hospital to a therapeutic community (e.g., for mental health care) (n=2); provision of care in at site (e.g., pre-hospital versus in-hospital thrombolysis) (n=4), or provision of care in schools (e.g., for mental health and health equity) (n=3). A small number of reviews in this category looked at changes to other aspects of the healthcare environment, including the physical or sensory environment (n=1) (rooming in services for pregnant mothers), outreach services (n=1) (mobile screening clinics for maternal and child health), and transportation services (n=1) (helicopter emergency medical services for adults with major trauma) and centralization of services (n=1) (for gynaecological cancer).

Ten reviews (18%) in this category focused on maternal and child health, five (9%) focused on mental health and five (9%) focused on cardiovascular disease, while the remainder

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focused on a range of chronic and complex conditions and lifestyle and preventive care (Supplementary file 3). One Cochrane review on home-based phototherapy for the management of non-haemolytic jaundice in infants found no eligible trials.

3. Who provides care and how the healthcare workforce is managed

There were 80 systematic reviews included in this category, 18 (23%) were Cochrane reviews. Of 1408 primary studies in this category, 802 (57%) were randomised controlled trials.

Most reviews in this category explored substituting medical for appropriately trained nursing care (n=27, 34%), or extending the scope of pharmacists' practice beyond dispensing services to provision of assessments, diagnosis and education (n=23, 29%). A small number of reviews also looked at self-management versus usual care, with a large focus on management of chronic conditions.

Many of the reviews did not focus on a specific health condition (n=17, 21%) but were focused on changes to workforce roles regardless of condition (Supplementary file 3). For those that did focus on a specific health condition, the largest number was concerned with role expansion to care for patients with different types of chronic disease or multimorbidity (n=8, 10%). One Cochrane review with on advanced trauma life support training and role expansion of hospital health professionals and ambulance crews on patient mortality and morbidity did not locate any studies that satisfied the eligibility criteria.

4. Co-ordination of care and management of care processes

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There were 122 systematic reviews included in this category, 28 (23%) were Cochrane reviews. Of 2554 primary studies in this category, 1619 (63%) were randomised controlled trials.

The delivery arrangements in this category included transition care arrangements (e.g., hospital to home, from primary to specialist care, or from paediatric to adult services), integrated care models for a range of chronic and complex diseases, early supported discharge to home (e.g., for mild to moderate stroke or COPD) and multidisciplinary or interdisciplinary care teams for specific diseases or conditions (e.g., geriatric consultation teams in acute hospitals, collaborative care for depression and anxiety). Other delivery arrangements were care pathways (e.g., critical care pathways for head and neck cancer surgery), disease management for a range of conditions (e.g., prenatal, dementia and mental illness, intellectual disability), and case management (e.g., intensive case management for heart failure, severe mental health, adults with medical illness and complex care needs) (Table 2).

Several reviews in this category did not focus on a particular health condition (n=17, 14%) however a few focused on co-ordination of care in cancer (n=9, 7%), diabetes (n=8, 7%), maternal and child health (n=8, 7%), cardiovascular disease (n=6, 5%), mental health (n=6, 5%) and for the terminally ill (n=6, 5%) (Supplementary file 3). We identified two reviews that reported they did not locate any studies that met eligibility criteria. One focused on service responses for people with intellectual disabilities and epilepsy, the second focused on specialist teams for neonatal transport to neonatal intensive care units.

5. Information and communication technology systems

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There were 189 systematic reviews included in this category, 34 (18%) were Cochrane reviews. Of 4926 primary studies in this category, 2904 (59%) were randomised controlled trials.

The largest number of reviews focused on telehealth (n=162, 86%) and included a range of interventions such as telephone counselling, telemonitoring, mobile texting or applications, and Internet-based programs (e.g., cognitive behavioural therapy) (Table 2). A smaller number of reviews investigated health information systems (n=13, 7%) (e.g., paediatric track and trigger systems for hospitalized children), the use of ICT (n=13, 7%) (e.g., ICT interventions for reducing inappropriate imaging and testing) and smart home technology (n=1, 0.5%) (e.g., remote monitoring of patients discharged from hospital with heart failure).

The majority of reviews in this category focused on changes to information and communication technology systems for delivering mental health care (n=44, 23%), while 39 (21%) focused on delivery of lifestyle changes and preventative strategies for health (n=39, 21%) (Supplementary file 3). There were two empty Cochrane reviews in this category. The first focused on the use of email for communicating results of diagnostic medical investigations to patients, the second focused on telerehabilitation for people with low vision.

6. Goal-focused reviews

There were 38 systematic reviews included in this category, including 7 (18%) Cochrane reviews. Of 1255 primary studies in this category, 869 (6%) were randomised controlled trials. A number of these reviews investigated interventions designed to address health disparities and social determinants of health (14 reviews). These covered a wide range of

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interventions, some targeting particular populations (e.g., for improving access for the homeless to primary care) while others focused on any intervention to reduce health disparities amongst racial and ethnic minority populations (e.g., community coalition-driven interventions, and cultural adaptations of interventions to change behavior). A further 13 reviews investigated strategies to improve medication or treatment adherence, some targeting particular conditions (e.g., pharmacy care and brief messaging to improve medication adherence in type 2 diabetes), other targeting particular medications (e.g., lipid lowering medications).

Resource use outcomes and inclusion of economic evaluation studies

Figure 3 provides a summary of included reviews published by year (excluding 2017 as the search of the available literature was not conducted for the full 2017 calendar year) including (i) number of reviews which specified cost as an outcome of interest or aimed to include economic evaluations, and (ii) number of reviews that included at least one primary study reporting on costs or economic evaluation. A total of 177 (32%) reviews included costs and/or economic analysis as an outcome of interest, with only 124 reporting at least one primary study including one of these economic outcomes. Resource use (including healthcare resources e.g. length of stay or number of visits to provider, non-healthcare resources e.g., transportation costs, patient and caregiver time) were collected in 161 (30%) of reviews (Table 1).

Discussion

This scoping review describes the extent, range and nature of synthesised evidence of alternative models of healthcare delivery relevant to high-income countries published in the

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past five years. It identified 531 reviews of interventions that involved changes to how and when care is delivered (47 reviews); where care is provided and changes to the healthcare environment (55 reviews); who provides care and how the healthcare workforce is managed (80 reviews); co-ordination of care and management of care processes (122 reviews); ICT systems (189 reviews); and reviews of interventions addressing a goal-focused question (38 reviews).

We identified variability in the distribution of systematic reviews across the categories of the Cochrane EPOC taxonomy for delivery arrangement interventions – some interventions, such as telehealth and role expansion or substitution, received substantially more attention than others. There were a number of delivery arrangement categories with few published systematic reviews, such as provision of care in a group instead of as an individual, use of triage systems for managing healthcare delivery, changes to the size of healthcare organisations or length of consultations, use of packages of care, or smart home technologies. Since the aim of this scoping review was not to examine the extent, range and nature of primary research in this area, it is unclear whether the limited number of reviews on these topics is due to few primary studies or other factors.

Technological advances over the past decade has seen a rapidly changing healthcare landscape that likely explains the large number of reviews we found in the telehealth sub-category. The intense interest in technology belies the barriers associated with their uptake and use, including the upfront and ongoing financial investment in equipment, licensing and software required [23], real or perceived privacy risks, and funding systems that do not always support the delivery of healthcare in this way [24]. They are advocated as having

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potential to enhance care delivery, with the promise of improved capacity for patients to be cared for at home, and improved access for those living rurally or remotely.

Over the past 10 years there has also been a proliferation of policy decisions both in Australia and elsewhere that have encouraged the development of new or expanded workforce roles to address human resource shortages.[25-28] The large number of systematic reviews in this subcategory likely reflects the extensive investment in this area over this time. In addition, there may be other drivers of role expansion for specific health workers e.g. with changes to legislation around supply of pharmaceuticals, and a growth in 'supermarket pharmacies', there is greater potential for pharmacists to take on additional non-dispensing roles.

While almost all included reviews reported on patient outcomes, only a third of reviews included resource use as an outcome and/or searched for an incorporated economic evaluation studies. Evidence about the economic impact of changes to the way in which healthcare services are organised and delivered is likely to become increasingly important to those making decisions about system redesign and improvement. The lack of economic evaluations in the majority of systematic reviews of delivery arrangements means that the value of many of these models is unknown.Therefore it is important that the impact of alternative delivery arrangement interventions on these outcomes be considered in future reviews.

There are a number of strengths and limitations to this scoping review. Two authors independently screened and selected reviews, thus minimising the likelihood of omitting eligible reviews. While independent data extraction of by two review authors was not feasible due to the large number of included reviews (and is not recommended in methods

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guidance for scoping reviews [20]), we did take steps to optimise consistency in data extraction[16]. As this scoping review sought to map the state of the literature in this area, we did not appraise the quality of the included reviews and did not attempt to synthesise the results of the included systematic reviews. The search was limited to the last five years and only abstracts published on PDQ-Evidence and filtered by the 'intervention' category were included. We used the Cochrane EPOC taxonomy for delivery arrangement interventions to map the extent, range and nature of systematic review evidence about alternative models of care delivery but categorisation was not always straightforward. This was because interventions could sometimes be categorised to more than one category (e.g. information technology used to improve coordination of care). In these instances the review team discussed and reached consensus on the categorisation of reviews (see Supplementary file 2). Due to the nature of delays between publication, indexing by databases, and capture allocation to the 'intervention' category by PDQ-Evidence, there may be eligible systematic reviews published during our search period but not captured in our search. Since the date of our last search we have identified 31 systematic reviews indexed in PDQ-Evidence that are potentially eligible for this scoping review. Given this modest volume (5% of current total), addition of this evidence is unlikely to substantially alter the conclusions.

Finally, this review focused on changes in how, when and where healthcare is organised and delivered, and who delivers care and thus excluded consideration of alternatives focused on changes to financial arrangements (e.g. changes to how funds are collected, insurance schemes, purchasing of services, use of incentives/disincentives), governance arrangements (changes in rules or processes that determine authority and accountability), and implementation strategies (aimed at bringing about changes in behaviour of healthcare

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professionals or organisations). Mapping the synthesised evidence focused on these interventions relevant to high-income countries could be described in future scoping reviews.

The findings of this review raise questions that could be investigated in future research. These include exploring to what extent have identified systematic reviews informed policy decisions in Australia and elsewhere? To what extent have decisions to undertake systematic reviews of delivery arrangements been driven by the needs of decision-makers versus other motivations? And how can the alignment between review production and the needs of decision-makers be improved? Priority setting approaches that engage both health policy makers and researchers/ producers of reviews are likely to increase the availability of reviews relevant to policy and reduce unnecessary duplication of effort. Exploring the need for, and addressing the gaps in, reviews of alternative delivery arrangements highlighted by our review could also be the focus of future work.

The results of the scoping review have informed a Delphi survey to prioritise the most promising alternatives for further investigation. The survey was delivered in two rounds to an Australian panel of policy, clinician, manager, consumer and academic representatives. The next steps include conducting (or updating where relevant) systematic reviews of delivery arrangements ranked as important to the panel, and undertaking pilot evaluations (including economic) of high priority, promising alternative delivery arrangements in collaboration with healthcare system partners.

CONCLUSION

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A substantial body of evidence about the effects of a wide range of delivery arrangements is available to inform health system improvements. Most of the available evidence focuses on alternative information and communication technology systems and care coordination models. This scoping review provides a map of the extent, range and nature of available synthesised evidence and identifies gaps where research efforts could be directed, i.e. in updating out-of-date reviews or conducting reviews where no reviews currently exist.

CONFLICTS OF INTEREST

None to declare.

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AUTHORS' CONTRIBUTIONS

The study conception and overall design was conceived by RB and DAO. RLJ, DAO and PP designed the data extraction tool and RLJ, PP, KR and JN all assisted in piloting. RLJ wrote the first draft of this protocol and RB, DAO, PP, KR, JN, SC and SS critically reviewed the manuscript, contributed improvements and approved the final version.

PATIENT AND PUBLIC INVOLVEMENT

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The Australian NHMRC Partnership Centre for Health Systems Sustainability brings together researchers, policy-makers, providers, clinicians and consumers, the latter represented by the Consumers Health Forum of Australia. Consumers have a voice in setting the objectives of the Partnership Centre and were consulted when framing the scope of this review.

DATA STATEMENT

All data is presented in the manuscript and supplementary material.

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Table 1 Review characteristics

Review characteristics (n=531)	Count (%)
Year of publication	
2012	50 (9%)
2013	79 (15%)
2014	67 (12.5%)
2015	111 (21%)
2016	216 (41%)
2017*	8 (1.5%)
Cochrane reviews	125 (24%)
Included primary studies (all designs) per review (Mean (SD)) [range]	23 (37) [0-463]
Reviews including randomised controlled trials	245 (46%)
Health conditions/ populations	
Common chronic diseases (e.g. diabetes, chronic obstructive pulmonary disease, heart failure, chronic kidney failure, asthma, musculoskeletal conditions)	106 (20%)
Cancer	21 (4%)
Critically or terminally ill	16 (3%)
Patients undergoing lifestyle and prevention interventions	53 (10%)
Patients undergoing surgical interventions (including preoperative care and safety checklists)	18 (3%)
Mental Health conditions	67 (12%)
Older adults and aged care	17 (3%)
Non-communicable diseases (e.g., viral hepatitis, HIV, TB)	17 (3%)
Maternal and child health	38 (7%)
Outcomes reported	
Patient outcomes (health status and/or health behaviours e.g., mortality, morbidity, cure rates)	492 (93%)
Quality of care (e.g. adherence to recommended practice)	62 (12%)
Access and/or utilisation of healthcare services (e.g., waiting time to receive care, readmission rates, length of stay in a facility)	178 (34%)
Resource use (including healthcare resources, non-healthcare resources e.g., transportation costs, patient and caregiver time)	161 (30%)
Impacts on equity	30 (6%)
Social outcomes (e.g., poverty, unemployment)	15 (3%)
Healthcare provider outcomes (e.g., wellbeing, fatigue, stress, satisfaction)	68 (13%)
Adverse effects	93 (18%)
Reviews incorporating economic evaluation studies	177 (33%)

**Incomplete*

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Table 2: Summary of included reviews organised according to the Cochrane EPOC Taxonomy of delivery arrangement interventions

Delivery arrangement by EPOC Taxonomy category and subcategory	EPOC Definition	No of reviews (no. of Cochrane reviews	No of primary studies (RCTs)	No of empty reviews	Types of interventions (see Supplementary file 2 for detail)
How and when care is delivered (n= 47)					
Queuing strategies	A reduction or increase in time to access a healthcare intervention, for example managed waiting lists, managing ER wait time	7 (2)	112 (22)	1	- Emergency department (ED) visit reduction programs - Improving patient flow and quality of care in the ED - Interventions to reduce waiting times for elective surgical procedures - Patient initiated clinics for patients with chronic or recurrent conditions managed in secondary care
Group versus individual care	Providing care to groups versus individual patients	5 (1)	134 (124)	0	- Group clinics (chronic conditions, antenatal care)
Quality and safety systems	Essential standards for quality of healthcare, and reduction of poor outcomes related to unsafe healthcare	33 (11)	774 (246)	0	- Immediate versus deferred delivery of the preterm baby with suspected foetal compromise for improving outcomes - Implementation of guidelines and evidence-based care - Improving integrated care models in chronic diseases - Interventions to increase breastfeeding uptake - Medication reconciliation interventions at hospital - Patient safety interventions - Promoting hand hygiene - Promoting use of guidelines and evidence-based medicine - Reducing disparities in health and health care - Reducing exposure to ionizing radiation from medical imaging - Reducing medication over-prescription (antibiotic use, opioid prescription, administration errors in children and adults, inappropriate prescribing in elderly) - Using interpreters for non-English speakers on the delivery of palliative care (cancer)
Triage	Management of patients attending a healthcare facility, or contacting a healthcare professional by phone, and receiving advice or being referral to an appropriate service	2 (0)	65 (2)	0	- Improving patient flow and quality of care in the ED - Pharmacist involvement in care for patients with chronic disease
Where care is provided and changes to the healthcare environment (n=55)					
Environment	Changes to the physical or sensory healthcare environment, by adding or altering equipment or layout, providing music, art	1 (1)	1 (1)	0	- Environmental interventions to increase breastfeeding uptake while mothers are in hospital
Outreach services	Visits by health workers to different locations, for example involving specialists, generalists, mobile units	1 (1)	2 (2)	0	- Mobile clinics for women's and children's health
Site of service delivery	Changes in where care is provided, for example home vs. healthcare facility, inpatient vs outpatient,	51 (20)	956 (320)	1	- Alternatives to hospitalisations: outpatient management, quick diagnostic units, hospital-at-home, observation units (for induction of labour,

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Delivery arrangement by EPOC Taxonomy category and subcategory	EPOC Definition	No of reviews (no. of Cochrane reviews	No of primary studies (RCTs)	No of empty reviews	Types of interventions (see Supplementary file 2 for detail)
	specialised vs. non-specialised facility, walk in clinics, medical day hospital, mobile units				intravenous antibiotic therapy for cystic fibrosis, cardiac arrest, kidney dialysis, COPD, psychosis, paediatric care.) - ED-based interventions (for managing alcohol misuse, domestic violence, palliative care) - Home visiting (for pregnancy, child health and maltreatment, social determinants of health, partner violence) - Home-based prevention and rehabilitation - The patient centred medical home - Pre-hospital intervention for sepsis - Reaching youth with out-of-facility services (HIV and reproductive health) - School-based health centres for mental health, social determinants of health - Therapeutic communities for mental health - Waiting room-based interventions to prevent STD
Size of organizations	Increasing or decreasing the size of health service provider units	1 (1)	5 (0)	0	- Centralisation, specialisation and increasing volume of services to promote quality (e.g. cancer care and surgery)
Transportation services	Arrangements for transporting patients from one site to another	1 (1)	38 (0)	0	- Helicopter emergency medical services for adults with major trauma
Who provides care and how the workforce is managed (n= 80)					
Role expansion or task shifting	Expanding tasks undertaken by a cadre of health workers or shifting tasks from one cadre to another, to include tasks not previously part of their scope of practice	65 (12)	1110 (586)	1	- Advanced practice nursing in older people and in long-term care - Advanced trauma life support training for hospital health professional and ambulance crews - Carer involvement in cognition-based interventions for people with dementia - Community-based health worker interventions - Interventions to increase breastfeeding - Nurse-physician substitution - Peer-led interventions (e.g., in mental health) - Pharmacist involvement in care for patients with chronic conditions - Primary care-led provision of care (e.g., GP's working in ED) - Radiographers in advanced roles
Self-management	Shifting or promoting the responsibility for healthcare or disease management to patients or their families	15 (6)	298 (216)	0	- Patient navigation (breast cancer) - Promoting self-management (in chronic diseases, specifically HIV, diabetes foot care, COPD, asthma, children with epilepsy, anxiety, MS, IBS; self-administration of medication in the hospital, oral anticoagulation, home uterine monitoring for detecting preterm labour) - Reducing medication and over-prescription (antibiotic use, opioid prescription, administration errors in children and adults, inappropriate prescribing in elderly)
Co-ordination of care and management of care processes (n=122)					
Integrated healthcare systems	Consolidating the provision of different healthcare services to one (or simply fewer) facilities	16 (3)	406 (258)	0	- Integrated care models for various conditions
Shared	Sharing healthcare decision making	14 (5)	487 (393)	0	- Educational interventions for patients and carers

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Delivery arrangement by EPOC Taxonomy category and subcategory	EPOC Definition	No of reviews (no. of Cochrane reviews	No of primary studies (RCTs)	No of empty reviews	Types of interventions (see Supplementary file 2 for detail)
decision making	responsibilities among different individuals, potentially including the patient.				- Improving healthcare professionals skills (e.g. communication in cancer, performance in nursing homes, recognition and management of deteriorating patients, genetic education) - Promoting adoption of Shared Decision Making - Reducing medication and over prescription - Shared decision making in pregnancy and delivery, treatment in older people and cancer screening
Packages of care	Introduction, modification, or removal of packages of services designed to be implemented together for a particular diagnosis/disease, e.g. tuberculosis management guidelines, newborn care protocols	1 (1)	5 (5)	0	- Care delivery models/disease management
Case management	Introduction, modification or removal of strategies to improve the coordination and continuity of delivery of services i.e. improving the management of one "case" (patient)	14 (4)	375 (260)	0	- Advance care planning (e.g., haemodialysis patients, palliative care, end-of-life interventions) - Case management in chronic diseases, specifically CVD, diabetes type 2, cancer, childhood obesity, haemophilia, mental health, multi-morbidities, chronic viral hepatitis - Outpatient case management
Disease management	Programs designed to manage or prevent a chronic condition using a systematic approach to care and potentially employing multiple ways of influencing patients, providers or the process of care	16 (3)	298 (169)	1	- Adolescent-specific prenatal interventions on improving attendance and reducing harm during and after birth - Care delivery models/disease management - Chronic Disease Management – asthma - Improving healthcare professionals skills - Outpatient management of cardio-metabolic risk factor control in people with diabetes
Care pathways	Aim to link evidence to practice for specific health conditions and local arrangements for delivering care.	8 (2)	99 (24)	0	- Advanced care planning - Care delivery models/disease management - Critical Care - Interventions to improve linkage with or retention in HIV services - Rapid response systems to reduce hospital mortality
Teams	Creating and delivering care through a multidisciplinary team of healthcare workers.	22 (4)	398 (229)	1	- Multidisciplinary team care for dementia and other mental health conditions, older adults, epilepsy, asthma, HIV, hearth failure, chronic cough in children, antenatal care., chronic diseases management, specifically CVD, diabetes type 2, cancer, childhood obesity, haemophilia, multi-morbidities, chronic viral hepatitis. - Team interventions to promote work participation in people with regional musculoskeletal pain - Multidisciplinary team care in. chronic disease - Multidisciplinary team neonatal care
Communication between providers	Systems or strategies for improving the communication between health care providers	6 (2)	105 (44)	0	- Improving clinical communication in hospitals, between primary and secondary care Improving patient handovers from hospital to primary care and vice versa
Transition of care	Interventions to improve transition from one care provider to another	7 (0)	138 (26)	0	- Transition from paediatric to adult care settings or services
Discharge planning	An individualised plan of discharge to facilitate the transfer of a patient	18 (4)	243 (211)	0	- Early supported discharge planning (acute stroke, COPD, older adults, children with cancer and

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Delivery arrangement by EPOC Taxonomy category and subcategory	EPOC Definition	No of reviews (no. of Cochrane reviews	No of primary studies (RCTs)	No of empty reviews	Types of interventions (see Supplementary file 2 for detail)
	from hospital to a post-discharge setting				febrile neutropenia) - Fast-track surgery programs (liver surgery) - Providing written information to reduce re-admissions in heart failure - Transitional care management after hospital discharge to reduce 30-day readmission rates
Information and communication technology systems (n=189)					
Health information systems	Health record and health management systems to store and manage patient health information, for example electronic patient records, or systems for recalling patients for follow-up or prevention	13 (4)	718 (118)	0	- Health notes vs EMR in pregnancy - Interventions to improve attendance of appointments - Paediatric track and trigger systems for hospitalised children - Patient safety interventions that use technology - Recall intervals (for dental visits, women with history of gestational diabetes, TB appointments - Reminder interventions to improve treatment adherence - The use of medical scribes in healthcare settings
The use of information and communication technology	Technology-based methods to transfer healthcare information and support the delivery of care	13 (1)	627 (250)	0	- Computerised clinical decision support to enable patient-centred care (nutrition informatics, advice on drug dosage) - Medication organization devices - Medication reconciliation interventions in hospital - Multimedia educational interventions for consumers about prescribed and over-the-counter medications - Patient portals - IT interventions for reducing inappropriate imaging and testing (e.g. cardiac, low-back pain imaging, lab tests ordering by GPs) - IT interventions for reducing medication use? and over-prescription - Serious games for professional training and patient education (e.g. chronic diseases, mental health)
Smart home technologies	Electronic assistive technologies	1 (0)	48 (9)	0	- Remote monitoring (e.g. after recent hospital discharge with heart failure, in older adults, asthma)
Telehealth	Exchange of healthcare information from one site to another via electronic communication	162 (29)	3533 (2527)	2	- Self-care applications - Social networks and social media - Telecoaching (telephone counselling, peer support programs, automated telephone messaging, web-based programs e.g., cognitive behavioural therapy for mental health conditions, coaching for chronic disease) - Telehealth (email communication, mobile phone messaging, mobile phone technology, mobile technology, or range of intervention types) - Telemedicine (screening, telerehabilitation, telemonitoring)
Goal-focused reviews (n=38)					
Interventions to address social determinants of health		14 (2)	319 (123)	0	- Culturally appropriate prevention and care (indigenous populations, racial-ethnic minorities, low socio-economic populations) - Eliminating repeat unintended pregnancy in teenagers - Improving access to healthcare for homeless people - Interventions to address social determinants of

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Delivery arrangement by EPOC Taxonomy category and subcategory	EPOC Definition	No of reviews (no. of Cochrane reviews	No of primary studies (RCTs)	No of empty reviews	Types of interventions (see Supplementary file 2 for detail)
					health for minority populations (ethnic and race disparities)
Improving medication adherence		11 (2)	654 (551)	0	- Interventions aimed at improving medication adherence (e.g. chronic diseases, specifically diabetes, HIV, CVD; in ethnic minorities)
Addressing multimorbidity in primary care		1 (1)	18 (18)	0	- Interventions addressing multi-morbidity in primary care
Preventing readmissions		1	42 (42)	0	- Interventions for preventing unplanned 30-day hospital readmissions
Reducing inappropriate imaging and testing		3	24 (6)	0	- Interventions for reducing inappropriate imaging and testing
Meeting family needs of the critically ill		1	14 (1)	0	- Meeting family needs of critically ill patients in an ICU
Communicating contraceptive effectiveness		1 (1)	7 (7)	0	- Communicating contraceptive effectiveness
Improving adherence to treatment		2	38 (35)	0	- Improving adherence to treatment in children with chronic diseases and adult heart transplant patients
Interventions to increase retention in health care services		1 (1)	11 (9)	0	- Interventions to increase retention in mental health services
Interventions to increase vaccine uptake		3	128 (77)	0	- Interventions to increase vaccine uptake in children and the elderly
Total		**531**	**12,230 (6911)**	**7**	

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Figure 1. PRISMA Flow Diagram

Figure 2. Number of included reviews organised according to the Cochrane EPOC taxonomy of delivery arrangement interventions

Figure 3. Summary of included reviews by year of publication (2012-2016) and incorporating economic analyses

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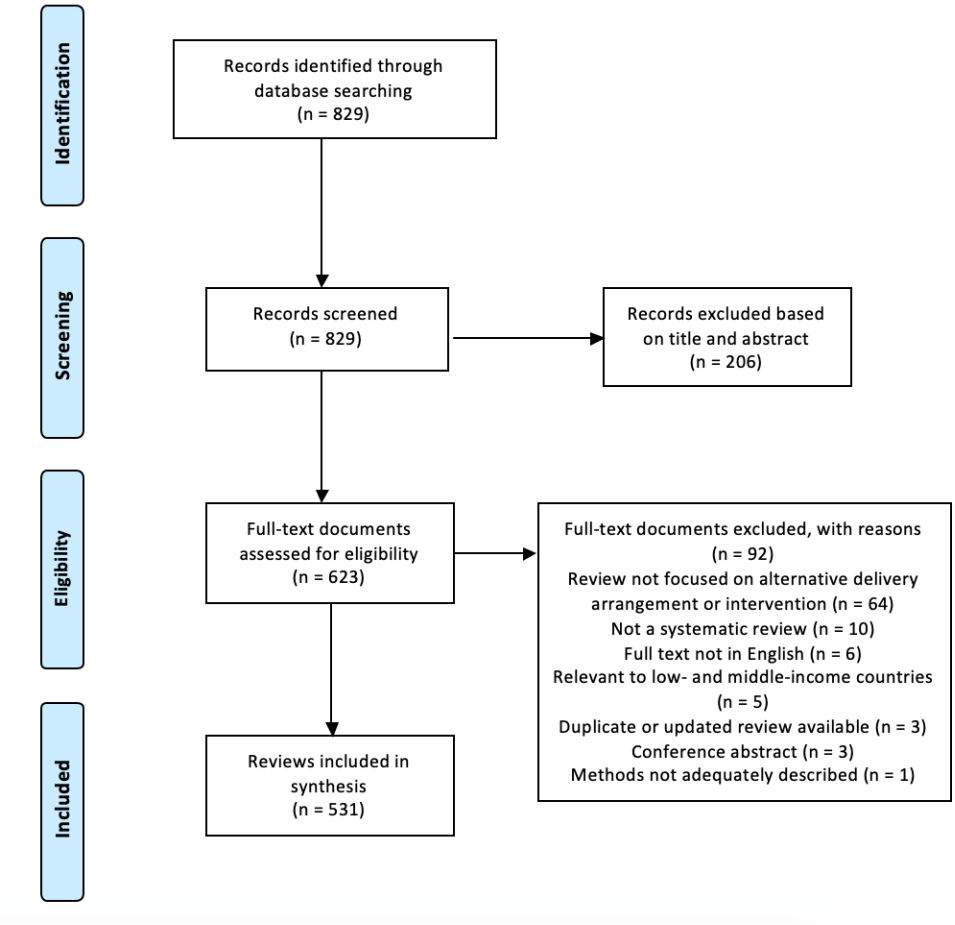
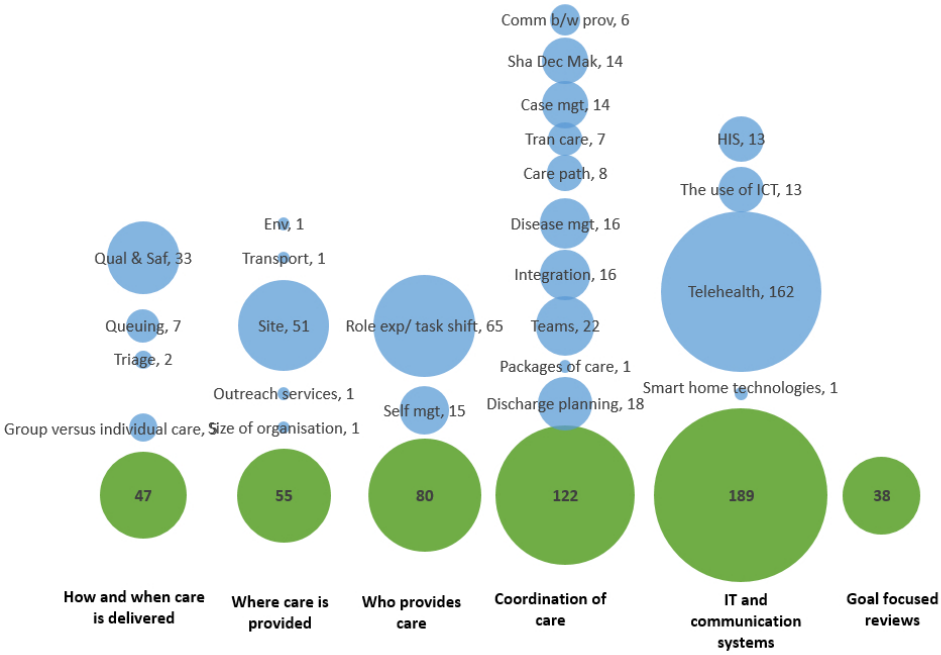
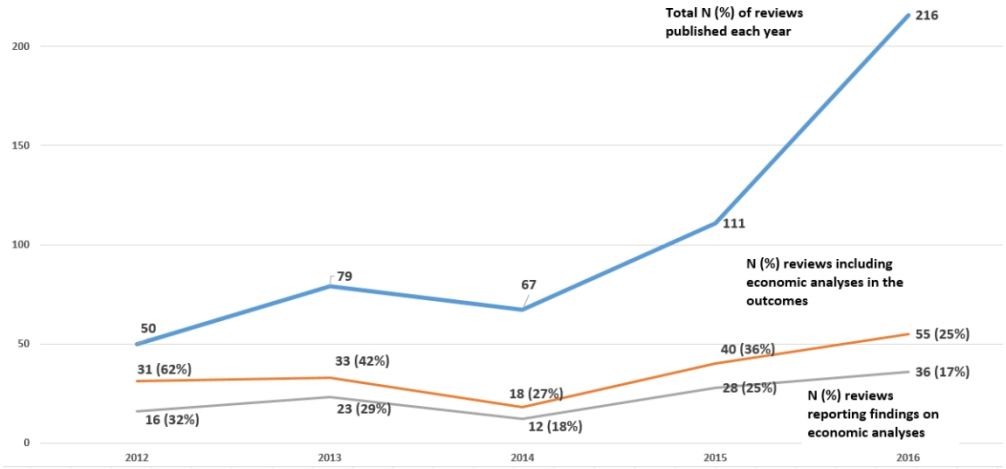


Figure 1. PRISMA Flow Diagram



Number of included reviews organised according to the Cochrane EPOC taxonomy of delivery arrangement interventions



Summary of included reviews by year of publication (2012-2016) and incorporating economic analyses

Open access Protocol

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Alternative service models for delivery of healthcare services in high-income countries: a scoping review of systematic reviews

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ABSTRACT

Introduction Costs associated with the delivery of healthcare services are growing at an unsustainable rate. There is a need for health systems and healthcare providers to consider the economic impacts of the service models they deliver and to determine if alternative models may lead to improved efficiencies without compromising quality of care. The aim of this protocol is to describe a scoping review of the extent, range and nature of available synthesised research on alternative delivery arrangements for health systems relevant to high-income countries published in the last 5 years.

Design We will perform a scoping review of systematic reviews of trials and economic studies of alternative delivery arrangements for health systems relevant to high-income countries published on 'Pretty Darn Quick' (PDQ)-Evidence between 1 January 2012 and 20 September 2017. All English language systematic reviews will be included. The Cochrane Effective Practice and Organisation of Care taxonomy of health system interventions will be used to categorise delivery arrangements according to: how and when care is delivered, where care is provided and changes to the healthcare environment, who provides care and how the healthcare workforce is managed, co-ordination of care and management of care processes and information and communication technology systems. This work is part of a 5-year Partnership Centre for Health System Sustainability aiming to investigate and create interventions to improve health-system-performance sustainability.

Ethics and dissemination No primary data will be collected, so ethical approval is not required. The study findings will be published and presented at relevant conferences.

Strengths and limitations of this study

- A high-level synthesis of the available evidence for alternative models of health service delivery is much needed and will be a useful resource for decision makers involved in health system planning, health system performance, sustainability initiatives and future research directions.
- We have followed published methodological guidance in planning our methods for conducting this scoping review, and we will additionally perform independent double data extraction to enhance the robustness of our findings where consistency of extraction is <90%.
- The search date will be limited to the last 5 years to retrieve useful, up-to-date reviews of alternative delivery arrangements relevant to high-income countries.
- Limiting the search date to the last 5 years means it is possible that we may not capture delivery arrangements included in out-of-date systematic reviews (published prior to 2012).
- Systematic reviews that are awaiting classification in 'Pretty Darn Quick'-Evidence will not be assessed as part of this review.

BACKGROUND

The provision of sustainable, appropriate healthcare is an ongoing challenge for health systems worldwide. There are many drivers of increasing healthcare costs. They include growing pressure from an ageing population,[1 2] growth in the prevalence of chronic and preventable diseases, increasing availability of (more expensive) clinical tests and treatments,[3] medicalisation of risk factors and active screening of people who are well,[4 5] lowering of diagnostic and intervention thresholds for high prevalence conditions[6–8] and changing community expectations.[9 10] In addition, high-income countries are experiencing increasing inflationary pressures and workforce shortages.[11–15] In order to be sustainable, health systems and providers must be able to endure and adapt to these growing pressures by delivering services that maintain a high quality of care while providing better value for money.[16] In practice, this means health systems and providers need to consider the effectiveness and economic impact of existing service models, and also determine if there are alternative

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models that might lead to improved efficiencies without compromising the quality of care and patient outcomes.

There are examples of models of service delivery that have been adopted in practice that offer modest benefits for patients when compared with usual care, but where the economic impact is uncertain (eg, early discharge from hospital and care at home),[17] or not known (eg, mid-wife led models of care).[18] In addition, some alternative delivery arrangements have been implemented despite uncertainty about effects on patient care and economic impact (eg, primary care physicians providing care in emergency departments)[19] and, in some cases, effectiveness is later shown to be low and associated costs, high (eg, rapid exchange of operating room air to reduce infection rates).[20] For this reason, efforts that aim to manage expenditure need to focus not just on benefits to patients, but on the value of the delivery arrangement relative to the cost. This distinction is important, as high-cost models of care may still be good value if they deliver high levels of benefit to patients, while low-cost models of care may have no value if they provide little or no benefit.[21] In 2017, the Australian Productivity Commission released a report identifying that there are considerable efficiencies to be gained through identifying enablers and barriers to more efficient models of care, and that eliminating financial reward for delivery of services where there is clear evidence of a lack of efficacy or cost effectiveness, or where the benefits do not justify the associated costs should be part of future health planning.[22]

Alternative models of service delivery offer an opportunity for healthcare providers to deliver healthcare services in different and potentially more cost-effective ways through lower cost- providers, locations and formats of delivery. Examples include changing the site of the service delivery from a more expensive to a less expensive option, providing care in a group setting rather than to individuals, substituting the care that is provided by a highly trained or specialised health worker to care provided by a less specialised or lay health worker, or using technology to deliver care (eg, telemedicine). Provision of services in this way may lead to the same, and in some cases better, outcomes for patients without compromising the quality of care. However, these alternative models may also increase costs, so they must undergo robust economic evaluations that not only take into account improvements in patient and carer outcomes, but also consider the benefit and costs to the health system as a whole.

A scoping review provides a rapid method of mapping key concepts within a research area and provides an overview of the main sources and types of evidence available.[23] It is most useful when the research question is complex or has not been reviewed comprehensively before. A number of reviews of alternative delivery models have been published in the past 5 years. Most reviews have focused on the delivery of a single test or treatment for a particular disease or condition,[24 25] or a single delivery arrangement-type such as chronic disease programmes,[26] multidisciplinary care or integrated care interventions.[27] As such, these reviews do not adequately summarise the volume and scope of existing synthesised research on alternative delivery arrangements. A recent Cochrane overview has focused on delivery arrangements relevant to low-income countries.[28] However, low-income countries struggle with different health system demands, including a predominance of communicable diseases and resource constraints and limited access to new technologies and other resources. Therefore, the findings of this overview may be less applicable to high-income countries (for eg, it includes delivery arrangements for HIV/AIDS, malaria, childhood diarrhoea, pneumonia and vaccination and antenatal care).

To the best of our knowledge, no scoping review or overview of alternative delivery arrangements for health systems relevant to high-income countries has been conducted to date. This work is likely to be useful for decision makers by mapping the availability of existing synthesised evidence, including where economic analysis of alternative delivery arrangements exists and in highlighting gaps for future research. The proposed scoping review forms part of 5-year Partnership Centre for Health System Sustainability funded by the Australian National Health and Medical Research Council and other partners and aims to investigate and create interventions to improve health system performance sustainability.[29] This scoping review complements a systematic review by the Partnership Centre, currently under way, that will review the sustainability of interventions, improvement efforts and change strategies in the health system through an examination of trial data published in the last 5 years.[16]

Objectives

This scoping review aims to describe the extent, range and nature of available systematic reviews of alternative delivery arrangements for health systems relevant to high-income countries published in the last 5 years. A time-frame of 5 years was chosen to ensure that the review contained evidence and data about effects that are up-to-date, reliable and ready to implement. A secondary aim is to identify gaps in the availability of up-to-date systematic reviews of alternative delivery arrangements needed to inform health system sustainability initiatives and future research directions.

METHODS AND ANALYSIS

Protocol development

The protocol for this scoping review is underpinned by the methodological framework first suggested by Arksey and O'Malley,[30] and further described by Levac and colleagues.[31] This framework emphasises transparency of the protocol development and scoping review process to increase the reliability of the findings.

Criteria for considering studies for this review

We will include all English language systematic reviews examining the effects of alternative delivery arrangements

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for health systems relevant to high-income countries published between 1 January 2012 and 20 September 2017. Alternative delivery arrangements include changes to how and when care is delivered, where care is provided and changes to the healthcare environment, who provides care and how the workforce is managed, co-ordination of care and management of care processes and information and communication technology systems.

For inclusion, systematic reviews must assess the effects of alternative delivery arrangements of relevance to high-income countries (as classified by the World Bank for the 2017 fiscal year),[32] have a methods section with explicit inclusion criteria, and report at least one of the following outcomes: patient outcomes (health and health behaviours), quality of care, access and/or utilisation of healthcare services, resource use, impacts on equity and/or social outcomes, healthcare provider outcomes and adverse effects. We will consider for inclusion systematic reviews in any setting, including hospital (inpatient or outpatient care, acute or subacute), primary care, long-term care facilities and the community.

Search methods for identifying studies

We will search the 'Pretty Darn Quick' (PDQ)-Evidence for systematic reviews published between 1 January 2012 and 20 September 2017. PDQ-Evidence is a database of evidence for decisions about health systems derived from the Epistomonikos database of systematic reviews. It includes the following databases: Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effectiveness, MEDLINE via PubMed, EMBASE, CINAHL, PsycINFO, Latin American and Caribbean Health Sciences Literature, Joanna Briggs Institute Database of Systematic Reviews and Implementation Reports, Evidence for Policy and Practice Information and Co-ordinating Centre Evidence Library and the Campbell Collaboration online library. The 'intervention' publication filter will be used to exclude systematic reviews of non-intervention studies. An example of the search method has been provided as an online supplementary file.

Study selection

Two review authors will independently screen the titles and abstracts retrieved by the search for inclusion and code as 'retrieve' (potentially eligible or unclear) or 'do not retrieve' (ineligible). We will retrieve the full text reports of potentially eligible and unclear titles and abstracts. Two (of a team of four) review authors will independently screen the full text reports and identify systematic reviews for inclusion and exclusion. We will record the reasons for exclusion of ineligible systematic reviews. We will resolve disagreements regarding eligibility through discussion, and if consensus is not achieved, by involving a third review author. We will prepare a Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow chart summarising the search and selection process and the number of articles reviewed at each stage.

Data extraction and management

We will extract descriptive data on systematic review characteristics (year, authors, journal, number and design of included studies), delivery arrangement category and subcategory, target population, setting and target health issue/s. Outcome categories and the main effects searched for by systematic review authors will also be collected (patient outcomes, quality of care, access and/or utilisation of healthcare services, resource use, impacts on equity and/or social outcomes, healthcare provider outcomes, adverse effects and economic analysis, where reported). The research team will develop, pilot and refine a data extraction form[31] (preliminary version of the data extraction form is presented in table 1).

As we anticipate a large volume of included studies, four review authors will be involved in the data extraction process. Initially, all four will independently extract data and populate the data extraction form for 10 systematic reviews and discrepancies will be discussed to ensure the process for extraction is consistent. The remaining systematic reviews will then be divided between reviewers. While independent data extraction of included studies by two review authors is not routinely recommended in method guidance for scoping reviews,[31] we will have a second reviewer allocated to extract a random sample of one third of included systematic reviews to assess the level of consistency and determine the accuracy of our process. Any disagreement between reviewer extraction processes will be resolved through discussion until consensus is reached. If the mean agreement in data extraction across this subset of systematic reviews is >90%, no further checks will be conducted. The data extraction process is illustrated in figure 1.

Collating and summarising results

We will categorise the delivery arrangements according to the Cochrane Effective Practice and Organisation of Care (EPOC) taxonomy of health system interventions.[33] This taxonomy is useful for organising and characterising health system interventions according to conceptual, functional and/or practical similarities. The delivery arrangement domain of the taxonomy classifies interventions based on changes to the following:

- How and when care is delivered.
- Where care is provided and changes to the healthcare environment.
- Who provides care and how the healthcare workforce is managed.
- Co-ordination of care and management of care processes and
- Information and communication technology systems.

In addition, we will use a category titled 'multiple (goal-focused)' to categorise systematic reviews that include all relevant delivery arrangements from across the above categories to address a specific problem or goal (eg, interventions for enhancing medication adherence).

We will summarise our findings quantitatively by presenting a numerical count of reviews in each category

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Table 1 Preliminary version of the data extraction form

Study ID	Author, year	Brief description of intervention /objective	Place published	EPOC Delivery arrangement strategy	Sub-category	Number and type of trials included	Target population	Setting	Target health issue/s	Patient outcomes (health and health behaviours for example, mortality, cure rates)	Quality of care (systems or processes for improving quality of care for example, timeout before surgery)	Resource use	Impacts on equity	Social outcomes (eg, poverty, unemployment)	Access, utilisation (eg, re-admission rates, length of stay)	Healthcare provider outcomes (eg, overall well-being, fatigue, stress, satisfaction)	Adverse effects	Economic analyses
ID1																		
ID2																		
ID3																		

EPOC, Effective Practice and Organisation of Care.

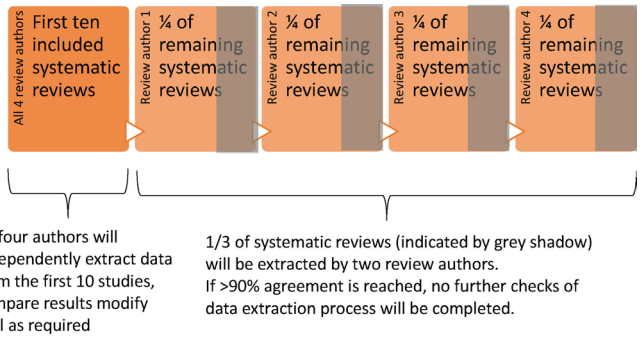

Figure 1 Data extraction process for included systematic reviews. All four authors will extract data from the first 10 systematic reviews. The remaining systematic reviews will be divided between the four review authors, and each author will have 1/3 of his/her studies reviewed by a second author to assess the level of agreement. If >90% agreement is reached, no further checks of data extraction process will be completed.

and visually using bubble charts to represent the quantity and range of systematic reviews across the delivery arrangement categories and to highlight gaps in the available synthesised evidence. Bubble charts allow the reader to see an overview of the spread of data across and within EPOC categories.[34] We will also describe the extent, range and nature of available systematic reviews using a narrative synthesis. This process will allow for identification of gaps in the availability of up-to-date systematic reviews and areas of delivery arrangements where the evidence is limited. Specifically, results will be used to (1) quantify the extent, range and nature of delivery strategies reported in systematic reviews, (2) quantify the number of systematic reviews where an economic analysis of the arrangement was reported and (3) determine the gaps and suggest delivery arrangements where future systematic reviews might be of use.

Patient and public involvement

The Consumers Health Forum of Australia, a representative advocate body for consumers in healthcare, have had oversight in the development and design of the protocol for this scoping review. Specifically, two members of the forum participated in stakeholder workshops during the design of the scoping review. The results will be disseminated among all stakeholders of the Partnership Grant, including consumer representatives.

CONCLUSION

This scoping review will describe the volume and scope of available up-to-date systematic reviews of alternative delivery arrangements relevant to high-income countries, and identify gaps in the synthesised evidence, needed to inform health system planning, health system sustainability initiatives and future research directions.

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ETHICS AND DISSEMINATION

As no primary data will be collected, ethical approval is not required. The study findings will be disseminated via reports, manuscript in a peer-reviewed journal and via conference presentations.

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Contributors The study conception and overall design was conceived by RB and DAO. RLJ, DAO and PP designed the data extraction tool and RLJ, PP, KR and JN all assisted in piloting. RLJ wrote the first draft of this protocol and RB, DAO, PP, KR, JN, SC and SS critically reviewed the manuscript, contributed improvements and approved the final version.

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Competing interests None declared.

Patient consent Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

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Supplementary file 2

Delivery arrangement by EPOC Taxonomy category and subcategory	EPOC Definition	No of SRs	Intervention details
How and when care is delivered (n= 47)			
Queuing strategies	A reduction or increase in time to access a healthcare intervention, for example managed waiting lists, managing ER wait time.	7	- ED visit reduction programs (1, 2) - Improving patient flow and quality of care in the ED (3, 4) - Interventions to reduce waiting times for elective surgical procedures (5) - Patient initiated clinics for patients with chronic or recurrent conditions managed in secondary care (6, 7)
Group versus individual care	Providing care to groups versus individual patients	5	- Group clinics (chronic conditions, antenatal care) (8-12)
Quality and Safety	Essential standards for quality of healthcare, and reduction of poor outcomes related to unsafe healthcare	33	- Immediate versus deferred delivery of the preterm baby with suspected foetal compromise for improving outcomes (13) - Implementation of guidelines and evidence-based (14, 15) - Integrated care models (chronic diseases, specifically CVD, diabetes type 2, cancer, childhood obesity, haemophilia, mental health, multi-morbidities, chronic viral hepatitis) (16) - Interventions to increase breastfeeding (17) - Medication reconciliation interventions at hospital (18) - Patient safety interventions (in dentistry, acute care, ED; using safety check list, interventions to reduce wrong-site surgery, involvement in National Surgical Quality Improvement Program, incidence and error reporting at ICU, use of patient portals and EMR to improve safety of surgical procedures and medication prescription) (19-24) - Promoting hand hygiene (25) - Promoting use of guidelines and evidence-based medicine (26-29) - Reducing disparities in health and health care (30) - Reducing exposure to ionizing radiation from medical imaging (31) - Reducing medication and over-prescription (antibiotic use, opioid prescription, administration errors in children and adults, inappropriate prescribing in elderly) (32-44) - Using interpreters for non-English speakers on the delivery of palliative care (cancer) (45)
Triage	Management of patients attending a healthcare facility, or contacting a healthcare professional by phone, and receiving advice or being referral to an appropriate service	2	- Improving patient flow and quality of care in the ED (46) - Pharmacist involvement in care for patients with chronic disease (heart failure and acute coronary syndrome, chronic kidney disease, HIV, cancer, mental disease), lifestyle changes (immunization, obesity, alcohol, smoking) (47)
Where care is provided and changes to the healthcare environment (n=55)			
Environment	Changes to the physical or sensory healthcare environment	1	Interventions to increase breastfeeding uptake (48)
Outreach services	Visits by health workers to different locations, for example involving specialists, generalists, mobile units	1	Mobile clinical for women's and children's health (49)
Site of service	Changes in where care is provided, for example home vs.	51	- Alternatives to hospitalisations: outpatient management, quick diagnostic units, hospital-at-home, observation units (for induction of

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delivery	healthcare facility, inpatient vs outpatient, specialized vs. non-specialized facility, walk in clinics, medical day hospital, mobile units		labour, intravenous antibiotic therapy for cystic fibrosis, cardiac arrest, kidney dialysis, COPD, psychosis, paediatric care) (50-78) - ED based interventions (for managing alcohol misuse, domestic violence, palliative care) (79-81) - Home visiting (for pregnancy, child health and maltreatment, social determinants of health, partner violence) (82-87) - Home based prevention and rehabilitation (88-92) - Integrated care models (for chronic diseases, specifically CVD, diabetes type 2, cancer, childhood obesity, haemophilia, mental health, multi-morbidities, chronic viral hepatitis) (93) - Pre-hospital intervention in sepsis (94) - Reaching youth with out-of-facility services (HIV and reproductive health) (95) - School-based health centres for mental health, social determinants of health (96, 97) - Therapeutic communities for mental health (98, 99) - Waiting room based intervention to prevent STD (100)
Size of organizations	Increasing or decreasing the size of health service provider units	1	- Centralisation, specialisation and increasing volume of services to promote quality (e.g. cancer care and surgery) (101)
Transportation services	Arrangements for transporting patients from one site to another	1	- Helicopter emergency medical services for adults with major trauma (102)
Who provides care and how the healthcare workforce is managed (n= 80)			
Role expansion or task shifting	Expanding tasks undertaken by a cadre of health workers or shifting tasks from one cadre to	65	- Advanced practice nursing in older people and in long-term care (103, 104) - Advanced trauma life support training for hospital health professional and ambulance crews (105, 106) - Carer involvement in cognition-based interventions for people with dementia (107) - Community-based health worker interventions (e.g. to improve chronic disease management, care among vulnerable population, preventing adolescent pregnancies, management of urgent, low-acuity illnesses and injuries) (108-110) - Interventions to increase breastfeeding (111) - Nurse-physician substitution (preoperative assessment and anaesthesia for elective surgical patients, care and early Dis plan in chronic diseases, prescribing, endoscopy, patient navigation, managing anxiety, patient education, abortion and maternity care, dental care) (112-136) - Peer-led interventions (e.g. mental health, adolescent lifestyles, paediatric chronic diseases) (137-141) - Pharmacist involvement in care for patients with chronic disease (heart failure and acute coronary syndrome, chronic kidney disease, HIV, cancer, mental disease), lifestyle changes (immunization, obesity, alcohol, smoking) (142-164) - Primary care-led provision of care (e.g. non-urgent care in ED, end-of-life care) (165, 166) - Radiographers in advanced roles (167)
Self-management	Shifting the provision of care to patients or their families	15	- Patient navigation (breast cancer) (168) - Promoting self-management (e.g. chronic diseases, specifically HIV, diabetes foot care, COPD, asthma, children with epilepsy, anxiety, MS, IBS; self-administration of medication in the hospital, oral anticoagulation, home uterine monitoring for detecting preterm labour) (169-181) - Reducing medication and over-prescription (antibiotic use, opioid prescription, administration errors in children and adults, inappropriate prescribing in elderly) (182)
Co-ordination of care and management of care processes (n=122)			
Integrated healthcare systems	Bringing together delivery, management and organisation of services related to diagnosis,	16	- Integrated care models (e.g. chronic diseases, specifically CVD, diabetes type 2, cancer, childhood obesity, haemophilia, mental health, multi-morbidities, chronic viral hepatitis) (183-198)

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	treatment, care, rehabilitation and health promotion		
Shared decision making	A collaborative process that allows patients and their providers to make health care **decisions** together, taking into account the best scientific evidence available, as well as the patient's values and preferences	14	- Educational intervention for patients and carers (end-of-life care, paediatric care) (199, 200) - Improving healthcare professionals skills (e.g. communication in cancer, performance in nursing homes, recognition and management of deteriorating patients, genetic education) (201) - Promoting adoption of Shared Decision Making (202, 203) - Reducing medication and over prescription (antibiotic use, opioid prescription, administration errors in children and adults, inappropriate prescribing in elderly) (204) - Shared decision making in pregnancy and delivery, treatment in older people and cancer screening (205-212)
Packages of care	Integrated packages of care such as the Integrated Management of Childhood Illness (IMCI)	1	- Care delivery models/disease management (e.g. in dementia and other mental health conditions, elderly inpatients, epilepsy, asthma, HIV, hearth failure, chronic cough in children, antenatal care) (213)
Case management	Use of individuals, often specially trained nurses, to coordinate care for patients with multiple or complex needs	14	- Advance care planning (e.g., haemodialysis patients, palliative care, end-of-life interventions) (214-217) - Integrated care models (e.g. chronic diseases, specifically CVD, diabetes type 2, cancer, childhood obesity, haemophilia, mental health, multi-morbidities, chronic viral hepatitis) (218) - Outpatient case management (e.g. complex care needs, dementia and other mental disorders, CVD) (219-227)
Disease management	Programs designed to manage or prevent a chronic condition using a systematic approach to care and potentially employing multiple ways of influencing patients, providers or the process of care	16	- Adolescent-specific prenatal interventions on improving attendance and reducing harm during and after birth (228) - Care delivery models/disease management (e.g. in dementia and other mental health conditions, elderly inpatients, epilepsy, asthma, HIV, hearth failure, chronic cough in children, antenatal care) (229-235) - Chronic Disease Management – asthma (236) - Improving healthcare professionals skills (e.g. communication in cancer, performance in nursing homes, recognition and management of deteriorating patients, genetic education) (237-242) - Outpatient management of cardio-metabolic risk factor control in people with diabetes (243)
Care pathways	Strategies to link evidence to practice for specific health conditions. These strategies detail the local structure, systems and time-frames to address recommendations	8	- Advanced care planning (244) - Care delivery models/disease management (245) - Critical Care path (e.g. head and neck cancer surgery, after discharge from an ICU) (246, 247) - Interventions to improve linkage with or retention in HIV services (248-250) - Rapid response systems to reduce hospital mortality (251)
Teams	Care provided by teams or interdisciplinary collaboration	22	- Care delivery models/disease management (e.g. in dementia and other mental health conditions, elderly inpatients, epilepsy, asthma, HIV, hearth failure, chronic cough in children, antenatal care) (252) - Integrated care models (e.g. chronic diseases, specifically CVD, diabetes type 2, cancer, childhood obesity, haemophilia, mental health, multi-morbidities, chronic viral hepatitis) (253) - Interventions to promote work participation in people with regional musculoskeletal pain (254) - Multidisciplinary team care (e.g. chronic care, specifically RA, mental illness and crisis resolution, chronic kidney disease; trauma in elderly, palliative care in cancer, acute care, secondary fracture prevention, geriatric care, rehabilitation, end of life care, paediatric feeding disorders) (255-272) - Multidisciplinary team care (neonatal care) (273)
Communication between providers	Systems or strategies for communication between health care providers	6	- Improving clinical communication in hospitals, between primary and secondary care (274-277) - Improving patient handovers from hospital to primary care and vice versa (278, 279)
Transition of care	Interventions to improve transition from one care	7	- Transition from paediatrics to adults care (e.g. diabetes, mental health, RMDs, special health care needs) (280-286)

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	provider to another		
Discharge planning	Systems for planning the discharge of patients from facilities	18	- (Early) supported Dis plan (e.g. acute stroke, COPD, elderly patients, children with cancer and febrile neutropenia) (287-298) - Fast-track surgery programs (liver surgery) (299-301) - Providing written information to reduce re-admissions in heart failure (302) - Transitional care management after hospital discharge to reduce 30-days readmission rates (303, 304)
Information and communication technology (n=189)			
Health information systems	Health record and health management systems to store and manage patient health information, for example electronic patient records, or systems for recalling patients for follow-up or prevention	13	- Health notes vs EMR in pregnancy (305, 306) - Interventions to improve attendance of appointments (307-309) - Interventions to increase vaccine uptake (elderly, children) (310) - Paediatric track and trigger systems for hospitalised children (311) - Patient safety interventions (312) - Recall intervals (dental visits, women with history of gestational diabetes, TB appointments) (313-315) - Reminder interventions to improve treatment adherence (316) - The Use of Medical Scribes in Health Care Settings (317)
The use of information and communication technology	Technology based methods to transfer healthcare information and support the delivery of care.	13	- Computerized clinical decision support to enable patient-centred care (nutrition informatics, advice on drug dosage) (318) - Medication organization devices (319-321) - Medication reconciliation interventions at hospital (322) - Multimedia educational interventions for consumers about prescribed and over-the-counter medications (323) - Patient portals (324, 325) - Reducing inappropriate imaging and testing (e.g. cardiac, low-back pain imaging, lab tests ordering by GPs) (326) - Reducing medication and over-prescription (antibiotic use, opioid prescription, administration errors in children and adults, inappropriate prescribing in elderly) (327) - Serious games for professional training and patient education (e.g. chronic diseases, mental health) (328, 329) - Telehealth (range of intervention types) (330)
Smart home technologies	Electronic assistive technologies	1	- Remote monitoring (e.g. after recent hospital discharge with heart failure, in elderly, asthma) (331)
Telemedicine	Exchange of healthcare information from one site to another via electronic communication	162	- Self-care apps (332-352) - Social media (353) - Social networks (354-356) - Telecoaching (357-359) - Telecoaching (automated telephone messaging) (360-362) - Telecoaching (peer support programs) (363) - Telecoaching (telephone counselling) (364-373) - Telecoaching (web-based programs) (374-422) - Telehealth (423) - Telehealth (email communication) (424-426) - Telehealth (mobile phone messaging) (427-437) - Telehealth (mobile phone technology) (438, 439) - Telehealth (mobile phone) (440) - Telehealth (mobile technology) (441) - Telehealth (range of intervention types) (442-464) - Telehealth (telemonitoring)(465-473) - Telemedicine (474-486) - Telemedicine (screening) (487, 488) - Telemedicine (tele-reahabilitation) (489-493)
Goal-focused reviews (n=38)			
Interventions to address social determinants of		14	- Culturally appropriate prevention and care (494-502) - Eliminating repeat unintended pregnancy in teenagers (503) - Improving access for homeless (504) - Interventions to address social determinants of health (505-507)

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health			
Improving medication adherance		11	- Improving medication adherence (e.g. chronic diseases, specifically diabetes, HIV, CVD; in ethnic minorities) (508-518)
Addressing multimorbidity in primary care		1	- Addressing multimorbidity in primary care (519)
Preventing readmissions		1	- Preventing 30-Day Hospital Readmissions (520)
Reducing inappropriate imaging and testing		3	- Reducing inappropriate imaging and testing (e.g. cardiac, low-back pain imaging, lab tests ordering by GPs) (521-523)
Meeting family needs of the critically ill		1	- Meeting family needs of critically ill patients in an ICU (524)
Communicating contraceptive effectiveness		1	- Communicating contraceptive effectiveness (525)
Improving adherence to treatment		2	- Improving adherence to treatment (children with chronic diseases, adult heart transplant patients) (526, 527)
Interventions to increase retention in mental health services		1	- Interventions to increase retention in mental health services (528)
Interventions to increase vaccine uptake (elderly, children)		3	- Interventions to increase vaccine uptake (elderly, children) (529-531)
Total		531	

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Supplementary file 3

Table: Summary of health conditions represented in included reviews organised by EPOC Taxonomy of delivery arrangement interventions

EPOC Taxonomy category and health condition	No. of Reviews
How and when care is delivered (n=47)	
Acute respiratory infections	2
Aging (general)	3
Asthma	1
Chronic conditions (multiple included in review or multi-morbidity)	4
Chronic non-cancer pain	1
Critically ill	2
Diabetes	1
Human immunodeficiency virus (HIV)	1
Maternal and child health	7
Mental health	1
Musculoskeletal conditions	1
Oral health	1
Surgery (including preoperative care & safety checklists)	4
Terminally ill	1
No specific health condition targeted	17
Where care is provided and changes to the healthcare environment (n=55)	
Aging (general)	2
Asthma	1
Cancer	2
Chronic conditions (multiple included in review or multi-morbidity)	1
Chronic kidney disease	2
Chronic obstructive pulmonary disease (COPD)	3
Critically ill	1
Cardiovascular disease (CVD)	5
Cystic fibrosis	1

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Human immunodeficiency virus (HIV)	1
Lifestyle & Prevention (immunisations, and prevention programs targeting physical activity, drug and alcohol, diet, smoking)	4
Major trauma	1
Maternal and child health	10
Mental health	5
Musculoskeletal conditions	2
Sexual and reproductive health	1
Surgery (including preoperative care & safety checklists)	1
Terminally ill	2
No specific health condition targeted	10
Who provides care and how the healthcare workforce is managed (n=80)	
Acute respiratory infections	1
Ageing	4
Asthma	2
Bowel conditions	1
Cancer	4
Chronic conditions (multiple included in review or multi-morbidity)	8
Chronic kidney disease	1
Chronic obstructive pulmonary disease (COPD)	1
Cardiovascular disease (CVD)	6
Dementia	1
Diabetes	2
Human immunodeficiency virus (HIV)	2
Lifestyle & Prevention (immunisations, and prevention programs targeting physical activity, drug and alcohol, diet, smoking)	4
Major trauma	2
Maternal and child health	5
Mental health	6
Multiple sclerosis	1
Musculoskeletal conditions	1
Oral health	3

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Sexual and reproductive health	2
Surgery (including preoperative care & safety checklists)	5
Terminally ill	1
No specific health condition targeted	17
Coordination of care and management of care processes (n=122)	
Acute respiratory infections	1
Ageing	7
Asthma	2
Cancer	9
Chronic conditions (multiple included in review or multi-morbidity)	7
Chronic kidney disease	2
Chronic viral hepatitis	1
Chronic obstructive pulmonary disease (COPD)	2
Critically ill	2
Cardiovascular disease (CVD)	6
Dementia	7
Diabetes	8
Epilepsy	2
Haemophilia	1
Human immunodeficiency virus (HIV)	4
Intellectual disability	1
Lifestyle & Prevention (immunisations, and prevention programs targeting physical activity, drug and alcohol, diet, smoking)	1
Major trauma	1
Maternal and child health	8
Mental health	9
Musculoskeletal conditions	4
Surgery (including preoperative care & safety checklists)	4
Terminally ill	6
No specific health condition targeted	27
Information and communication technology systems (n=189)	
Ageing	1

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Amyotrophic lateral sclerosis	1
Asthma	3
Bowel conditions	2
Cancer	4
Chronic conditions (multiple included in review or multi-morbidity)	16
Chronic kidney disease	1
Chronic obstructive pulmonary disease (COPD)	2
Cardiovascular disease (CVD)	9
Dementia	2
Diabetes	15
Eye care	3
Human immunodeficiency virus (HIV)	6
Inflammatory bowel disease	1
Lifestyle & Prevention (immunisations, and prevention programs targeting physical activity, drug and alcohol, diet, smoking)	39
Maternal and child health	5
Mental health	44
Multiple sclerosis	1
Musculoskeletal conditions	3
Sexual and reproductive health	2
Surgery (including preoperative care & safety checklists)	4
Tuberculosis	1
No specific health condition targeted	24
Goal-focused reviews (n=38)	
Cancer	2
Chronic conditions (multiple included in review or multi-morbidity)	4
Critically ill	1
Cardiovascular disease (CVD)	5
Diabetes	4
Human immunodeficiency virus (HIV)	1
Lifestyle & Prevention (immunisations, and prevention programs targeting physical activity, drug and alcohol, diet, smoking)	5

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Maternal and child health	3
Mental health	2
Musculoskeletal conditions	1
Sexual and reproductive health	1
No specific health condition targeted	9
Total	**531**

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Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	pp.1,2,6
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	p. 2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	pp.4-6
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	p.6
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	p.7
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	pp.7-8
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	pp.8
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	pp.8-9
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	pp.8-9
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	p.9
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	pp.9-10
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	n/a
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	p.10

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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	p.10-11
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	pp.11-17
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	n/a
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	pp.11-17
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	pp.11-17
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	pp.18-20
Limitations	20	Discuss the limitations of the scoping review process.	pp.20-21
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	p.19, 20-21
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	p. 6, 22

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. ;169:467–473. doi: 10.7326/M18-0850

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