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Prioritising models of healthcare service delivery for a more sustainable health system: a Delphi study of Australian health policy, clinical practice and management, academic and consumer stakeholders

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Abstract.

   Objectives.   Healthcare expenditure is growing at an unsustainable rate in developed countries. A recent scoping review identified several alternative healthcare delivery models with the potential to improve health system sustainability. Our objective was to obtain input and consensus from an expert Delphi panel about which alternative models they considered most promising for increasing value in healthcare delivery in Australia and to contribute to shaping a research agenda in the field.

   Methods.   The panel first reviewed a list of 84 models obtained through the preceding scoping review and contributed additional ideas in an open round. In a subsequent scoring round, the panel rated the priority of each model in terms of its potential to improve health care sustainability in Australia. Consensus was assumed when ≥50% of the panel rated a model as (very) high priority (consensus on high priority) or as not a priority or low priority (consensus on low priority).

   Results.   Eighty-two of 149 invited participants (55%) representing all Australian states/territories and wide expertise completed round one; 71 completed round two. Consensus on high priority was achieved for 59 alternative models; 14 were rated as (very) high priority by ≥70% of the panel. Top priorities included improving medical service provision in aged care facilities, providing single-point-access multidisciplinary care for people with chronic conditions and providing tailored early discharge and hospital at home instead of in-patient care. No consensus was reached on 47 models, but no model was deemed low priority.

   Conclusions.   Input from an expert stakeholder panel identified healthcare delivery models not previously synthesised in systematic reviews that are a priority to investigate. Strong consensus exists among stakeholders regarding which models require the most urgent attention in terms of (cost-)effectiveness research. These findings contribute to shaping a research agenda on healthcare delivery models and where stakeholder engagement in Australia is likely to be high.

What is known about the topic?   Healthcare expenditure is growing at an unsustainable rate in high-income countries worldwide. A recent scoping review of systematic reviews identified a substantial body of evidence about the effects of a wide range of models of healthcare service delivery that can inform health system improvements. Given the large number of systematic reviews available on numerous models of care, a method for gaining consensus on the models of highest priority for implementation (where evidence demonstrates this will lead to beneficial effects and resource savings) or for further research (where evidence about effects is uncertain) in the Australian context is warranted.

What does this paper add?   This paper describes a method for reaching consensus on high-priority alternative models of service delivery in Australia. Stakeholders with leadership roles in health policy and government organisations, hospital and primary care networks, academic institutions and consumer advocacy organisations were asked to identify and rate alternative models based on their knowledge of the healthcare system. We reached consensus among $\geq$70% of stakeholders that improving medical care in residential aged care facilities, providing single-point-access multidisciplinary care for patients with a range of chronic conditions and providing early discharge and hospital at home instead of in-patient stay for people with a range of conditions are of highest priority for further investigation.

What are the implications for practitioners?   Decision makers seeking to optimise the efficiency and sustainability of healthcare service delivery in Australia could consider the alternative models rated as high priority by the expert stakeholder panel in this Delphi study. These models reflect the most promising alternatives for increasing value in the delivery of health care in Australia based on stakeholders' knowledge of the health system. Although they indicate areas where stakeholder engagement is likely to be high, further research is needed to demonstrate the effectiveness and cost-effectiveness of some of these models.

Introduction

Aging populations, a growth in chronic and complex diseases and the emergence of new medical technologies are driving increased healthcare expenditure in high-income countries worldwide.[1] This increasing demand requires governments, policy makers, healthcare providers and researchers to combine efforts towards the creation of sustainable healthcare systems. Alternative ways of organising and delivering healthcare services (i.e. alternative healthcare delivery arrangements or models of care), such as care provided in alternative locations, in different formats or by alternative providers, may optimise healthcare system efficiency and sustainability, but only where such models deliver equivalent or better effects at lower costs compared with traditional delivery models.

A recent scoping review[2] synthesised the evidence for a wide range of alternative delivery models, including those harnessing information and communication technology (ICT) systems to deliver care (e.g. telehealth or telemonitoring), care coordination models among different providers (e.g. care pathways or multidisciplinary care), changes to who provides care to patients (e.g. substituting medical care for appropriately trained nursing care), changes to where care is provided (e.g. home vs hospital) and changes to how care is delivered (e.g. group vs individual prenatal care). The largest number of reviews focused on ICT ($n = 189$), with only 47 reviews focusing on changes in how and when care is delivered.

Given the large number of systematic reviews on alternative models of care identified, a method for gaining consensus on the models of highest priority for implementation (where there is evidence that this will lead to equal or better outcomes and resource savings compared with traditional models) or for further research (where evidence about effects is uncertain or there are gaps in available synthesised evidence) in the Australian context is warranted.

The aim of this study was threefold: (1) to present the results of the scoping review to an expert panel of health policy, clinical, academic and consumer stakeholders to determine whether there are additional promising models that are currently being considered or investigated in practice that are not covered in existing reviews; (2) to gain consensus on the models that require most urgent attention in Australia to optimise health system sustainability; and (3) to contribute to shaping a research agenda in the field.

Methods

Design

An online Delphi survey (e-Delphi) was used to facilitate the exchange and refinement of participant views in response to group discussion while preventing individuals from controlling the group process.[3,4]

Participants and setting

We sought participation from an expert panel of leaders from five stakeholder groups in Australia: (1) federal and state health policy makers; (2) state hospital networks; (3) state primary healthcare networks; (4) federal consumer advocacy organisations; and (5) academic research institutions. The expert panel was identified through a stakeholder analysis.[5,6] An initial list of eligible participants was obtained from stakeholders involved in the National Health and Medical Research Council of Australia Partnership Centre for Health System Sustainability,[7] and through the research team's networks. Purposeful sampling of stakeholders with recognised expertise in one of the five areas mentioned above was used with additional snowball sampling. No more than two experts from the same organisation were invited to participate to avoid imbalances in the panel.

The Dillman tailored design method was used for participant recruitment.[8] Potential participants first received a personalised email invitation. Up to three email reminders were sent at weekly intervals after the initial invitation, and telephone contact was sought where no response to emails was achieved. We aimed for a participation rate of at least 70% for each round to ensure credibility and validity of the results.[3,9]

Survey instrument

We conducted two Delphi rounds: one open round followed by one scoring round. The open round comprised two parts (nine pages in total): Part 1 included four questions relating to respondents' characteristics (organisation type, current role in the organisation, seniority of the position and jurisdiction) and Part 2 presented 84 delivery arrangements identified from Cochrane reviews included in our scoping review.[2] Because the scoping review focused on published systematic reviews, we were aware that there may have been additional assessments of alternative delivery arrangements that our scoping review did not capture. Therefore, in this round we asked participants whether they were aware of additional relevant models to consider. Participants were asked to identify up to four additional alternative models, and brief justifications were encouraged.

We used the Cochrane Effective Practice and Organisation of Care (EPOC) taxonomy of health system interventions to organise the delivery arrangements based on their conceptual or practical similarity.[10] The taxonomy classifies interventions into five subgroups based on changes to: (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) coordination of care and management of care processes; and (5) ICT system. A sixth subgroup was added to categorise interventions that include delivery arrangements from across the above categories to address a specific problem or goal (e.g. interventions for enhancing medication adherence).

Each suggested delivery arrangement was standardised to reflect what the alternative delivery arrangement involved (e.g. rehabilitation at home), the relevant comparator where this was provided (e.g. in-patient hospital rehabilitation) and the target population (e.g. for patients with total hip replacement). The same or similar interventions were combined to ensure the length of the survey remained manageable. For example, 'home vs in-patient rehabilitation for total hip replacement' and 'early discharge hospital-in-home vs in-patient stay for patients with chronic obstructive pulmonary disease' were combined and listed in Part 2 of the open round survey as 'early supported discharge and rehabilitation at home vs in-patient stay', with the relevant populations listed at the end. In total, 84 delivery arrangements from 126 Cochrane reviews were included in part two of the first survey (Supplementary File S1; Table S1).

Interventions within each subgroup were further categorised according to the direction of effects for key outcomes of interest (e.g. patient outcomes, quality of care), the certainty of evidence and the potential for resource savings (Box 1). Conceptually similar models with different effects were not combined.

The survey used in Round 2 (scoring round) contained an updated list of delivery arrangements (original plus the additional ones proposed by participants in Round 1) and these were organised in EPOC categories using standardised wording (nine pages, 7–12 questions per page). Participants were asked to score the priority of each model in terms of its potential to improve health care sustainability in Australia on a five-point Likert scale (1, not a priority; 5, highest priority) or 'I don't know [what priority to assign]'. Participants were invited to provide free text comments supporting their rating (Supplementary File S2; Table S2).

Box 1.   Categories of interventions based on direction and certainty of evidence

1. Interventions with beneficial effects on one or more outcomes (moderate- to high-certainty evidence), no harmful effects and evidence of cost savings
2. Interventions with beneficial effects on one or more outcomes (moderate- to high-certainty evidence), no harmful effects, but with uncertain effects regarding costs
3. Interventions with beneficial effects on one or more outcomes (moderate- to high-certainty evidence), no harmful effects, but more costly
4. Interventions with uncertain effects (low- or very low-certainty evidence) on outcomes of interest, including costs
5. Interventions with harmful or no beneficial effects (moderate- to high-certainty evidence), regardless of costs

Participants were allowed to skip questions and return to incomplete surveys at a later date or time. The survey instrument was piloted before use among a group of senior staff and researchers at one healthcare organisation.

Procedure

Qualtrics Survey Software was used to administer the survey. The study was conducted between June and November 2018. Ethics approval was obtained from Monash University Human Ethics Committee (Study ID 12598).

We reported our Delphi study according to the Guidance on Conducting and Reporting Delphi Studies (CREDES) recommendations,[11] the Good Practice in the Conduct and Reporting of Survey Research[12] and the Checklist for Reporting Results of Internet E-Surveys (CHERRIES; Supplementary Table S3).[13]

Data analysis

Descriptive statistics were used to report respondent demographic characteristics and their rating of delivery arrangements. We considered consensus was achieved when ≥50% of the panel rated a delivery arrangement as high or highest priority (indicating consensus on high priority) or as not a priority or low priority (indicating consensus of low priority). Strong consensus was assumed when ≥70% of the panel voted high or low priority. All other scores were regarded as not having reached consensus. Analyses were conducted separately on each of the 106 delivery arrangements.

Results

Response rate and final Delphi panel

In all, 149 experts were invited to participate. Eighty-two respondents (55%) completed the Round 1 survey (Table 1). Fifty-three (36%) did not respond to our initial invitation or reminders and 14 (9%) withdrew after commencing Round 1 (Fig. 1). Respondents from Round 1 were invited to complete Round 2. An additional 10 experts were recommended for the panel after the first round was closed and were invited to participate in the second round. Seventy-one respondents completed the second survey (77% response rate).

Table 1.   Jurisdictions and expertise of the Delphi panel at Rounds 1 and 2

Each respondent could indicate multiple organisation types, roles and jurisdictions. Data are presented as *n* (%)

	Round 1 (*n* = 82)	Round 2 (*n* = 71)
Organisation		
Primary care (e.g. Primary Health Network)	12 (15)	11 (15)
Hospital care	31 (38)	26 (37)
Health policy	25 (30)	22 (31)
Health funding	11 (13)	10 (14)
Consumer advocacy	4 (5)	4 (6)
Academia	31 (38)	26 (37)
Current role		
Clinician	28 (34)	25 (35)
Manager	34 (41)	32 (45)
Policy maker/planner	30 (37)	25 (35)
Academic/researcher	42 (51)	37 (51)
Consumer	2 (2)	2 (3)
Level of responsibility		
Junior	1 (1)	0 (0)
Operational management[A]	8 (10)	10 (14)
Senior management[B]	73 (89)	61 (86)
Jurisdiction		
National	27 (33)	21 (30)
New South Wales	24 (29)	21 (30)
Northern Territories	2 (2)	2 (3)
Queensland	9 (11)	8 (11)
South Australia	6 (7)	4 (6)
Tasmania	9 (11)	9 (13)
Victoria	12 (15)	14 (19)
Western Australia	7 (9)	5 (7)
Australian Capital Territory	3 (4)	3 (4)

[A]Decisions about process and short-term operational goals.
[B]Strategic and investment decisions for middle- and long-term objectives.
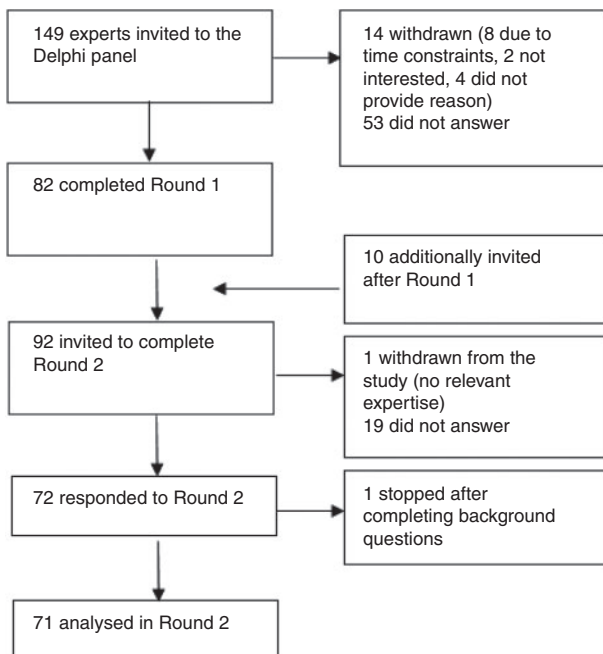
Fig. 1.   Flowchart of the process to form the Delphi panel.

Experts represented all Australian states and territories and a wide range of expertise (Table 1). Respondents were affiliated with hospital networks (37%), academic institutions (37%), health policy or government organisations (31%), primary health networks (15%), health funding organisations (14%) and consumer advocacy organisations (6%). Sixty-one respondents (86%) reported senior level expertise (i.e. in a position to influence strategic and investment decisions for middle- and long-term objectives).

Results of Round 1 (open round): additional delivery arrangements

In Round 1, 82 respondents made a total of 256 suggestions of additional delivery arrangements not identified in the preceding scoping review. The most common suggestions related to the category 'ICT systems' (*n* = 70), followed by 'who provides care and how the healthcare workforce is managed' category (*n* = 56). Twenty-three suggestions were deemed out of scope due to not being concerned with how care is delivered but rather, for example, how it is financed (e.g. fee-for-service vs capitation) or governed (e.g. changes in rules or processes that determine authority and accountability), lifestyle and prevention interventions (not in scope unless delivered in alternative ways), environmental interventions (e.g. plastic recycling) or changing the nature of care rather than how it is delivered (e.g. delayed antibiotic prescriptions, reduced opioid prescriptions).

The 84 delivery arrangements derived from the scoping review were combined with respondent suggestions from Round 1 to form 106 delivery arrangements for Round 2 (Supplementary File S2; Table S2).

Results of Round 2 (scoring round): prioritisation

Fourteen delivery arrangements were rated as 'high priority' or 'very high priority' by ≥70% of the panel (Table 2). Of these, three alternatives were rated as high priority by >80% of the panel. Two constituted different forms of collocation and coordination of care for older adults living in residential aged care facilities and the third was the provision of multidisciplinary care for a range of chronic conditions.

Another 45 delivery arrangements reached consensus among 50–69% of the panel as 'high priority' or 'very high priority' (Supplementary Table S4). No consensus was reached by the panel on the remaining 47 delivery arrangements (Supplementary Table S5). No delivery arrangement from the list was deemed low priority by the panel. For 33 arrangements, <20% of respondents indicated 'I don't know' or left the response option blank. Few respondents (7%) provided reasons for their priority ratings in the free-text fields.

Sixteen respondents indicated that one or more of the listed delivery arrangements was already in use in Australia. 'Day surgery vs in-patient (overnight stay) surgery for age-related cataract, hernia and other procedures' was the most frequently reported delivery arrangement currently already in use in Australia (*n* = 8 respondents), followed by 'early supported discharge and rehabilitation at home vs in-patient stay' (*n* = 5).

Discussion

The findings of this study demonstrate that consensus exists among experts across different stakeholder groups regarding

Table 2.   Results of the Delphi study

Alternative delivery arrangements rated as high or very high priority by ≥70% of panel. COPD, chronic obstructive pulmonary disease; ED, emergency department; EPOC, Effective Practice and Organisation of Care; GP, general practitioner; IV, intravenous; ICT, information and communication technology; ICU, intensive care unit; OT, occupational therapist

Overall ranking	Cochrane EPOC taxonomy category	Intervention	No. respondents (%)
1	Where care is provided and changes to the healthcare environment	Primary care (allied health and GPs) and hospital services (nurses and specialists) providing services or colocated in residential care facilities vs hospital (in- or out-patient) for elderly (e.g. IV antibiotics)	61 (86)
2	Coordination of care and management of care processes	Collaboration between GP, hospital and nursing home vs usual care for the frail elderly residents of aged care facilities (to reduce ED presentations)	58 (82)
3	Coordination of care and management of care processes	Multidisciplinary care, including allied health professionals (single point access) vs usual care for depression, low back pain management, osteoarthritis, neonatal care, severe mental illness, children with asthma, other chronic conditions and patients with complex needs	57 (80)
4	Coordination of care and management of care processes	Discharge planning tailored to the individual patient, including referral to supportive health services (e.g. smoking cessation programs, community allied health) vs conventional hospital discharge	56 (79)
5	ICT	Telehealth vs usual care for direct patient care delivered by clinicians (e.g. physicians, OTs, speech pathologists) through online videoconferencing or telephone to support management of acute stroke, geriatric care, paediatric care, emergency and ICU support for rural and remote areas and for the delivery of oncology, dermatology, asthma, heart failure, maternity care, smoking cessation support and contraception use counselling to all areas	56 (79)
6	Where care is provided and changes to the healthcare environment	Early supported discharge and rehabilitation at home vs in-patient stay for patients with stroke, COPD, heart failure, joint replacements, postoperative care, palliative care, end-of-life care, elderly discharged from acute care, children with cancer and febrile neutropenia, infant jaundice, physiotherapy, intravenous and antibiotic therapy for cystic fibrosis, haemodialysis, meningitis and pyelonephritis	54 (76)
7	Goal focused	Preventing 30-day hospital readmissions (e.g. telephone follow-up after discharge, specialised pharmacotherapeutic counselling, self-management focused education programs)	54 (76)
8	Where care is provided and changes to the healthcare environment	Home vs in-patient chemotherapy for cancer patients	52 (73)
9	Coordination of care and management of care processes	Integrated care models vs usual care for chronic viral hepatitis, cancer, children with medical complexity, COPD, oral care in diabetes, chronic kidney disease and end-stage kidney disease, other chronic diseases	52 (73)
10	Coordination of care and management of care processes	Continuity of care (shared care and interdisciplinary teams) vs usual care in the follow-up of patients with cancer, women with chronic pelvic pain, pregnancy (caseload midwifery), chronic diseases	52 (73)
11	Coordination of care and management of care processes	Home support programs vs usual care for carers of older people discharged from acute medical units to reduce carer burden	51 (72)
12	How and when care is delivered	Centralised liaison coordinator vs usual practice to streamline access and flow to the correct pathway of care to reduce waiting times for in-patient, ED and out-patient services	50 (70)
13	Coordination of care and management of care processes	Stepped care model approach to mental health that links multidisciplinary mental health hospital services to primary care	50 (70)
14	Coordination of care and management of care processes	Care coordination vs usual care (e.g. in primary care for chronic disease, in acute care for people with complex needs, post-acute/long-term care coordination for patients in rehabilitation, between residential care facilities, GPs and hospitals, maternity care, children with chronic and complex problems)	50 (70)

14 alternative delivery arrangements that could be promising for increasing value in the delivery of health care in Australia. The highest-ranked delivery arrangements focus on populations that have chronic and/or complex care needs and use a significant amount of healthcare resources. This study demonstrated feasibility of a novel prioritisation process that combined synthesised research evidence with stakeholder priorities. The extent of stakeholder engagement in this study means these models are likely to have high engagement and interest. This is one stage in the larger program of research to inform the implementation of high-value service delivery models that address local priorities.

Bringing medical care closer to residential aged care facilities and improving coordination of care was rated as the highest-priority delivery arrangement. Older Australians living in residential aged care constitute 9–18% of all emergency department presentations in their age group[14] and are more likely to require hospitalisation.[15,16] An interim report by the Australian Royal Commission into Aged Care Quality and Safety[17] urged the aged

care sector to consider 'different care models…and a stronger, closer interface with the acute healthcare sector'. Several alternative models of care for aged care residents have been trialled in recent years in Australia and other high-income countries,[18–23] but the evidence about the effects of these models has not been synthesised.

The next highest-rated model of care was providing a single point of access to multidisciplinary care for people with multiple conditions. This speaks to the need to overcome the fragmentation and duplication of care for people with multimorbidity.[24] Single-point-access multidisciplinary care can be challenging because care involving multiple health professionals is logistically complex, and the composition of a multidisciplinary team may need to change over time as the patient's condition changes.[25] For this priority, the effectiveness and cost-effectiveness of such interventions are uncertain.[26–28]

Delphi experts also prioritised interventions focused on better-coordinated, supported and earlier hospital discharge, as well as several other interventions to improve coordination, continuity and integration of care. There is moderate certainty evidence that tailored discharge planning and some models of early supported discharge reduce resource use without compromising patient outcomes for selected groups of patients.[29,30] Relevant to the context of early discharge, home support for carers has also been rated as a high priority, but evidence around its effects is uncertain.[31–34] Telehealth applications for health care delivery were also rated as promising for improving sustainability. Most of the current evidence assesses the effects of these interventions on patient outcomes, whereas cost savings are often implied but rarely investigated.[35–38] A review comparing chemotherapy at home to other settings has found little or no difference in patient quality of life or adverse events, but certainty of evidence has not been assessed and no conclusions could be drawn about the cost-effectiveness of this model of care.[39] Further, evidence suggests stepped care versus usual care for anxiety may lead to modest beneficial effects on anxiety symptoms, whereas findings for depression outcomes were mixed.[40,41] The cost-effectiveness of stepped care for both anxiety and depression outcomes was uncertain.[40,41] Consultation liaison may improve patients' mental health outcomes,[42] but the effect on healthcare costs, as well as on patient outcomes and costs in other contexts, is uncertain.[43–47]

The results of this Delphi study are shaped by the composition of the panel, including their tacit knowledge, interests and expertise. Where consensus was not reached, our findings should not be perceived as evidence that these arrangements have no importance, because these interventions may still be of relevance for specific contexts or conditions. Interestingly, the results of the Delphi study showed that some models with evidence of beneficial effects did not reach consensus (e.g. group prenatal care), whereas other models where evidence is scarce received high rating. This may point to knowledge gaps or misalignment of research effort with stakeholders' priorities, but also highlight broader challenges of evaluating the effectiveness and cost-effectiveness of alternative models of care in health systems. Stakeholders assessed the presented evidence in their local context and considered factors beyond the evidence about effects (e.g. unmet need, feasibility and acceptability). None of the models had consensus of 'not a priority', which may be explained, in part, by study procedures (models were prioritised

using a Likert scale rather than ranked) and the fact that sources of information were published reviews (usually done when there is interest in the topic) and Delphi panel input.

The findings of our study should be interpreted in view of several limitations. To make the survey manageable, only delivery arrangements identified in Cochrane systematic reviews published in the past 5 years were included in Round 1, possibly resulting in several promising delivery arrangements being omitted from the initial list. However, we collected over 250 additional suggestions from respondents in Round 1 that led to an extensive list of relevant models. To reduce the burden on Delphi participants, conceptually similar alternative models were combined to form a single alternative delivery arrangement. This inevitably led to some loss of detail, which, in turn, may have affected participants' ability to prioritise. We purposely did not limit the Delphi study to alternative models that have evidence of better or equal effects compared with usual care. Our approach allowed us to identify priority areas for both potential implementation as well as areas where future research is needed. Although a three-round Delphi survey was initially planned, in view of the large number of models that were rated as high priority in Round 2, we decided that a third round was unlikely to meaningfully add to the results. Finally, although a balanced expert panel in terms of geographical and sector representation was sought, imbalances in the panel, with notable underrepresentation of consumers and primary health networks, may have influenced the findings.

In conclusion, a strong consensus exists among policy makers, health service managers, clinicians and consumer leaders regarding the potential for 14 alternative models of care to improve the sustainability of Australia's health system. Improving arrangements for medical service provision in residential care facilities, providing single-point-access multidisciplinary care for a range of complex conditions and providing tailored early discharge and hospital-at-home instead of in-patient stay were rated the three highest priorities. Although the prioritised alternative models indicate areas where stakeholder engagement is likely to be high, further research is needed to demonstrate the effectiveness and cost-effectiveness of some of these models.

Conflict of interest

The authors declare no conflicts of interest.

Acknowledgement

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