




BMJ Open Facilitators and barriers to implementation of Alberta family integrated care (FICare) in level II neonatal intensive care units: a qualitative process evaluation substudy of a multicentre cluster-randomised controlled trial using the consolidated framework for implementation research

Pilar Zanoni ¹, Natalie V Scime ², Karen Benzies ^{1,2,3},
Deborah A McNeil,^{1,2,4} Kelly Mrklas,^{2,5} Alberta FICare in Level II NICU Study Team

To cite: Zanoni P, Scime NV, Benzies K, *et al.* Facilitators and barriers to implementation of Alberta family integrated care (FICare) in level II neonatal intensive care units: a qualitative process evaluation substudy of a multicentre cluster-randomised controlled trial using the consolidated framework for implementation research. *BMJ Open* 2021;**11**:e054938. doi:10.1136/bmjopen-2021-054938

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2021-054938>).

Received 27 June 2021
Accepted 27 September 2021



© Author(s) (or their employer(s)) 2021. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

Correspondence to

Karen Benzies;
benzies@ucalgary.ca

ABSTRACT

Objective To evaluate the barriers and facilitators to implementing Alberta Family Integrated Care (AB-FICare [2019 Benzies]), a model of care for integrating parents into level II neonatal intensive care units (NICUs) care teams, from the perspective of healthcare providers (HCP) and hospital administrators.

Design Qualitative process evaluation substudy.

Setting Ten level II NICUs in six cities across Alberta, Canada.

Participants HCP and hospital administrators (n=32) who were involved in the cluster-randomised controlled trial of AB-FICare in level II NICUs.

Methods Post-implementation semi-structured interviews were conducted via phone or in-person. The Consolidated Framework for Implementation Research was used to develop interview guides, code transcripts and analyse data.

Results Key facilitators to implementation of AB-FICare included (1) a receptive *implementation climate*, (2) *compatibility* of the intervention with individual and organisational practices, (3) *available resources* and *access to knowledge and information* for HCP and hospital administrators, (4) engagement of *key stakeholders* across the organisation, (5) engagement of and outcomes for *intervention participants*, and (6) *reflecting and evaluating* on implementation progress and patient and family outcomes. Barriers were (1) *design quality and packaging* of the intervention, (2) *relative priority* of AB-FICare in relation to other initiatives, and (3) *learning climate* within the organisation. Mixed influences on implementation depending on contextual factors were coded to eight constructs: *intervention source*, *cost*, *peer pressure*, *external policy and incentives*, *staff needs and resources*, *structural characteristics*, *organisational incentives and rewards*, and *knowledge, beliefs and attitudes*.

Strengths and limitations of this study

- We used an implementation science framework, standardised codebook, and theoretically based operational definitions to evaluate facilitators and barriers to implementation of an innovative, psycho-educational model of care in neonatal intensive care units (NICU).
- The results of this substudy were intended to inform the future scale and spread of Alberta FICare in a province-wide integrated health system. Thus, rather than between group differences, we were interested in actual or perceived influences on implementation across all sites in the Alberta FICare cluster-randomised controlled trial.
- Care should be taken in drawing conclusions from constructs with a lower volume of data.
- Coding to reveal the presence and nature of interactions between constructs, although useful for implementation planning, were beyond the scope of our research question.
- Sites were a mix of urban and regional areas serving a diverse population, which supports the transferability of our findings to other level II NICUs.

Conclusions The characteristics of an organisation and the implementation process had largely positive influences, which can be leveraged for implementation of AB-FICare in the NICU. We recommend site-specific consultations to mitigate barriers and assess how swing factors might impact implementation given the local context, with the goal that strategies can be put in place to manage their influence on implementation.

Trial registration number NCT02879799.

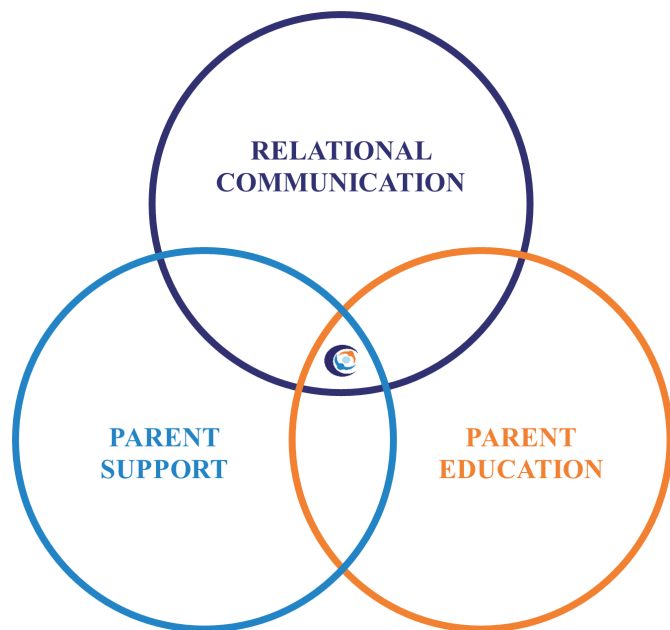


Figure 1 Alberta FICare model of care. FICare, Family Integrated Care.

INTRODUCTION

Family-centred care (FCC) is a recommended practice in paediatric care,¹ broadly defined as ‘an approach to healthcare that is respectful of and responsive to individual families’ needs and values’ (p 105).² FCC is particularly important in highly technological neonatal intensive care units (NICU) where opportunities for parents to be involved in their infants’ care may be limited. Despite wide adoption of FCC in NICU, its concepts remain poorly understood^{3–8} and difficult to operationalise.⁹ Heterogeneity in both FCC implementation in the NICU and outcomes are reported internationally.^{10–17}

Family Integrated Care (FICare) espouses FCC principles and, by design, integrates families as part of their infant’s care team starting at admission. Founded on Humane Neonatal Care in Estonia, FICare was developed for level III NICUs, which provide care for the sickest infants. FICare demonstrated positive outcomes in a matched control pilot study¹⁸ and international cluster-randomised controlled trial (cRCT).¹⁹ In collaboration with clinical, policy, parent, and research stakeholders, FICare was adapted and implemented in level II NICUs in Alberta, Canada. Alberta FICare (2019 Karen Benzies; AB-FICare) is an actionable, psychoeducational model of care with strategies and practical tools in three components: (1) Relational Communication; (2) Parent Education, and (3) Parent Support (see figure 1). Components are detailed elsewhere.²⁰

AB-FICare empowers parents to sequentially build their knowledge, skills, and confidence to care for their infant, with support and education from healthcare providers (HCP).

We conducted a pragmatic²¹ cRCT²² in 10 level II NICUs with mothers of preterm infants born 6–8 weeks early, or between 32 weeks and 0 days (32⁰) and 34⁶ weeks gestation.

We found that AB-FICare was associated with improved infant, maternal, and health system outcomes compared with standard care.²⁰ We used a ‘train-the-trainer’ model at intervention sites to educate HCP about AB-FICare. Despite quarterly site visits for fidelity audits, delivery of training booster doses, and the tracking of policy and practice changes that could influence outcomes, AB-FICare uptake varied by site resources, such as physician provider model (neonatologist vs community paediatrician), availability of equipment and technology, staffing composition, and context (ie, regional or urban site).

Understanding key factors influencing implementation is essential for the spread and sustainability of multifaceted behavioural interventions, which are often more complex and resource-intensive than single component interventions.²³ The objective of this study was to describe key influences on the implementation of AB-FICare. The research question was: from the perspectives of HCP and hospital administrators in level II NICUs, what were the barriers and facilitators to implementing AB-FICare?

METHODS

Design

This qualitative substudy was a process evaluation of the cRCT.²² We used the Consolidated Framework for Implementation Research (CFIR), which was developed from a synthesis of 19 healthcare sector implementation models, theories, and frameworks.²⁴ CFIR is comprised of 39 constructs across five domains: (1) Intervention Characteristics, (2) Outer Setting, (3) Inner Setting, (4) Characteristics of Individuals, and (5) Process.²⁴ CFIR can be applied to post-implementation research through a series of steps by informing data collection, coding data, and determining the influence of each construct on implementation. We prepared this manuscript following the COnsolidated criteria for REporting Qualitative research (COREQ) guidelines.²⁵

Setting and sample

This study was conducted in Alberta, Canada, which has a single, publicly funded integrated healthcare system, Alberta Health Services (AHS). AHS serves a demographically diverse population of 4.4 million.²⁶ This integrated system has many standardised structures and processes, which are advantageous to cRCTs including Strategic Clinical Networks²⁷ that support healthcare system innovation.

Participants

Multidisciplinary HCP and administrators in NICU were purposively sampled from six urban and four regional NICUs. They were contacted via email or in person and provided written informed consent.

Data collection

Two female evaluation consultants with graduate degrees and qualitative research expertise were contracted

to conduct individual telephone or in-person interviews; two participants from one site requested a joint interview. Participants had no prior relationship with the interviewers. Interviews were conducted between October 2017 and July 2018 and lasted 30–90 min. Interviewers used a CFIR-informed, semi-structured interview guide that was individualised by group (AB-FICare or Standard Care; see online supplemental files 1 and 2, respectively). Prior to interviews, sites had recruited at least 55% of cRCT participants. Interviews were digitally audio-recorded, deidentified, transcribed verbatim by a professional transcriptionist, and reviewed for accuracy. Participants completed a brief demographic questionnaire.

Data analysis

We used the CFIR framework²⁴ to guide data analysis (see online supplemental file 3). First, the CFIR codebook was adapted to the cRCT context. Second, interview excerpts were coded by assigning one or more constructs to each statement. Third, a valence (+ or –) and strength rating (0, 1 or 2; see online supplemental table S1) were assigned to each statement. Fourth, construct ratings were assigned at the unit level by calculating the percentage of statements with a positive or negative valence (regardless of strength) and applying ‘majority rules’ to determine each construct as a facilitator, barrier, swing factor (influence dependent on context) or neutral (no effect). Finally, overall construct ratings across all sites were assigned using the same majority rules criterion. Coding and assignment of valence and strength ratings were completed manually. Valence and strengths were entered into STATA V.15 (StataCorp, College Station, TX) to assign unit-level and overall construct ratings. We used SPSS V.25 (IBM Corp, Armonk, NJ) for descriptive statistics.

Patient and public involvement

Patients, parents, and members of the public were not directly involved in this study; however, the AB-FICare model was designed through collaboration between clinical, policy, parent, and research stakeholders.

RESULTS

Participant characteristics

Of 56 individuals invited to participate, 19 were unavailable or could not be scheduled, 3 were ineligible and 2 refused. The final sample included 32 participants (see table 1). Complete demographic information was available for 29 participants. Of these, participants had a mean age of 47.2 years (SD=10.2) and experience in healthcare (mean=23.07 years, SD=10.8) and NICU (mean=17.9 years, SD=11.0).

Factors associated with AB-FICare implementation

Table 2 displays overall ratings and exemplar quotes for key barriers and facilitators. See online supplemental

Table 1 Participant characteristics (n=32)

Characteristic	N	%
Group		
AB-FICare	16	50.0
Standard Care	16	50.0
Sex		
Male	7	20.6
Female	25	79.4
Discipline*		
Clinicians	18	56.3
Hospital administrators	12	37.5

*Discipline information was missing for two participants. AB-FICare, Alberta Family Integrated Care.

table S2 for frequencies and summary ratings by CFIR domain and constructs by group and site.

Intervention characteristics

Facilitators

Evidence Strength and Quality: Participants from all sites spoke of empirical evidence for FICare as a facilitator. To support adoption of AB-FICare, they described a need for evidence of the positive impact of this model of care on infant, maternal, and health system outcomes.

Relative Advantage: AB-FICare was perceived to have a clear advantage relative to Standard Care as a means ‘to make parents truly partners’ (SC-U3-ID5&6). Participants perceived that AB-FICare could (1) improve parental mental health, (2) improve parental confidence and parent–infant relationship, and (3) enhance parent–provider relationships. Participants described AB-FICare as providing a formalised process to operationalise FCC:

“I think it provides a big advantage because it gave us a formal mechanism of implementing the kind of approach overall to fit babies and their families (into care) that we felt was the correct one.” (FICare-U4-ID3)

Adaptability: Participants perceived AB-FICare as befitting the NICU context and recognised its adaptability to meet individual parental needs.

Trialability: Participants described the intervention as an extension of their current care model.

Complexity: HCP did not view AB-FICare as a complex intervention; with sufficient training it was a natural enhancement to existing practices.

Barriers

Design Quality and Packaging: Participants from AB-FICare sites remarked that, as initially provided, the volume of information was overwhelming and covered the theory but lacked concrete instructions about operationalisation. Discrepancies between what participants were given and what they believed they needed to practice AB-FICare required frequent follow-up with study staff to obtain clarification.

Table 2 Exemplar quotes and summary ratings by domain for key barriers and facilitators

Construct	Overall rating	Exemplar quotes
Domain: INTERVENTION CHARACTERISTICS		
Design quality and packaging	-	<p>"So that was when (AB-FICare researchers) came to the site. We had a lot of questions. It was presented but it wasn't really there to tell you how you can roll it out or how you are going to implement it. It was just all this is what FICare is, this is the feedback we got from the parents, this is the study that was done. We just felt like we needed more information on how are we going to start this." (FICare-R3-ID6)</p>
Domain: INNER SETTING		
Implementation climate	+	<p>"We've had a lot of staff turnover and I've seen a lot of staff come and go in 40 years. I know even for myself my beliefs and what I do is quite different than I did 40 years ago, because you have to be adaptable, and you have to see the wisdom in the change. And sometimes that's not always there." (FICare-U5-ID2)</p> <p>"I think it would be that culture shift. I think for my staff to be willing to, in the sense of their words 'give up' some of those skills and abilities — and they're not giving them up — but you know, to give those tasks more to parents and to take on a role more of supporting, mentoring and educating parents, it's a bit different than just doing it. So I think it would be that culture shift that would be the big one for them. They're very historical, they're very tied to traditions, they're historical, you know that kind of thing." (SC-R1-ID4)</p>
Compatibility	+	<p>"Just from observing during rounds, we have witnessed more parents doing rounds which is something new but it doesn't really impact... like at the end of the day I'm still getting the same information that I need to get, just from a different person." (FICare-U4-ID7)</p> <p>"We had tried to incorporate in the past, but had difficulty succeeding, doing bedside rounding at a specific time, because then everybody knows when decisions are being made and it gives the parents an opportunity to be there for that process. I find we kind of work in our own silos a bit right now." (SC-R1-ID2)</p>
Relative priority	-	<p>"If we had a (group parent education) session booked, that didn't always take priority. Often times the education sessions would be cancelled because something else would come up, because once again, being in the smaller area you might only have one social worker, for instance, for the majority of the hospital. So if it's coming down to just a little blitz education session, sometimes that gets put to the back burner while other things take priority." (FICare-R3-ID5)</p> <p>"Summer is never a good time to implement anything." (SC-U3-ID5&6)</p>
Learning climate	-	<p>"The education pieces that I see for us aren't necessarily so much on AB-FICare; a lot of it would be more sort of on the clinical side of things." (FICare-U6-ID6)</p> <p>"I would say we've had a lot of changes over the last little while, so people are kind of tired of change at this point." (SC-U3-ID2)</p>
Available resources	+	<p>"I do think it was a bit of a struggle in terms of time, to be able to implement some of the parent education piece and my clinical piece. It was good that we had AB-FICare but we didn't really have the FTE to support it in terms of clinicians I would say. There were times when I had to cancel some of the parent education sessions in order to see babies." (FICare-R4-ID4)</p> <p>"We definitely need those supports for the parent who is socially struggling. I think it should be a given that anyone participating in this had free parking, honestly. At our hospitals right now it's a ridiculous price. I'm not sure what can be done about meals for mothers who are socially marginalized and who need that kind of support or childcare for mothers who have kids in an age group where they're having issues." (SC-R1-ID1)</p>
Access to knowledge and information	+	<p>"I think education would be a big component, including what it is and why it's seen as important, and what the benefits of it are. I think that would be important for all the different disciplines that work within the NICU." (FICare-U6-ID6)</p> <p>"Then you need to go through the frontline staff and have different modules to engage them, so online modules for their education would be helpful. Some of them will need classes, some of them will need pod talks in the NICU." (SC-U2-ID1)</p>

Continued

Table 2 Continued

Construct	Overall rating	Exemplar quotes
Domain: PROCESS		
Key stakeholders	+	<p>"In our first meeting it was just myself, one other staff nurse, and my manager, but when they (AB-FICare researchers) came back to us, that's when we had more supports in that group. I had our dietician, pharmacist, even RT, and our patient care director there. So everybody knew what was being rolled out at our site." (FICare-R3-ID6)</p> <p>"It's not just nursing. If physicians don't participate in it, then it's just a break in the link, if they're not supportive of it or if they don't understand it." (SC-U2-ID2)</p>
Intervention participants	+	<p>"Input from the families on the impact that it's had on them would be important because we might think that it's something that's important for them, but are they getting the value out of it that we think they should? If we're doing all of this and it's making us feel better but there's not really a benefit to the families, then what do we do with that?" (FICare-U6-ID6)</p> <p>"It might be interesting to engage some different cultural backgrounds to find out how this works with the way that they see families and the family unit. It might be really interesting for AB-FICare to reach out to some of these communities and be able to talk to them and say 'This is what we're hoping to bring and how do you see this, do you see anything that would cause barriers?' In some Asian communities the mom stays home, so is there a way to engage them if they see it in a different light? Or is it breaching some religious instance? I know we can't meet every need of every single person, but I think we should at least try to be more inclusive in that." (SC-U2-ID2)</p>
Reflecting and evaluating	+	<p>"I think feedback on implementation should be at regular intervals. It should be in some kind of written form, whether it's electronic or otherwise, but there should be some documentation of family involvement and specifics around outcomes in order to try and measure exactly what's going on." (FICare-U4-ID3)</p> <p>"We need to make sure to get staff feedback and take into account how they feel it should be implemented. Because they're the frontline staff, their feedback is vital." (SC-U3-ID5&6)</p>
<p>+ (facilitator): construct had a positive influence. - (barrier): construct had a negative influence. Site and participant identification number (eg, FICare-U4-ID1) where FICare is Family Integrated Care, SC is Standard care, U indicates Urban site, and R indicates Regional site. AB-FICare, Alberta Family Integrated Care.</p>		

Swing

Intervention Source: Participants were comfortable knowing the intervention was developed externally, and acknowledged it was well presented. Some sites encountered adoption resistance despite clear added value, while others described the additional work that was required to fit implementation to their local context and daily practice.

Cost: Participants at most sites expressed concerns about implementation costs related to unit budget, staff training time reimbursement, supports for culturally adapted delivery, and tangible family supports (eg, parent lounge). Organisational supports mitigated the impact of some of these factors. Some participants remarked that existing parent-focused initiatives could be leveraged to support implementation and believed the benefits to infants and families supported a strategic investment in AB-FICare.

Outer setting

Facilitators

Family/Patient Needs and Resources: Parental desire to participate in their infant's care was a driver of AB-FICare.

"We're actually seeing some second time parents who have had babies quickly one after the other and so they're right on board. So them expecting to do this (AB-FICare) and willing and wanting to do this. I think shows that it's what they want. And it works for them." (FICare-U4-ID1)

Participants from all sites described challenges that interfered with parental ability to be present in the NICU, including childcare for older siblings, cost of hospital food and parking, and cultural and language differences. Considering these barriers, participants described AB-FICare strategies and tools as responsive to family needs. They spoke about the importance of building trusting relationships to understand previous experiences. Participants recognised parental knowledge and capacity to participate in care and negotiated mutually beneficial roles as parents developed skills and confidence.

Swing

Peer Pressure: Only one participant acknowledged peer pressure as a motivator for their unit to lead change in practice, while another rejected this notion as sounding 'competitony' (FICare-R4-ID5).

External Policy and Incentives: A participant from an open ward unit cited requirements imposed by provincial privacy acts that limited parental presence during nurse bedside shift report. There was a need for provincial supports to facilitate parental presence in the NICU, including policies, single family rooms, and other welcoming parent spaces.

Neutral

Cosmopolitanism: Staff were aware of other FICare studies through conferences, media or their networks. While

Standard Care participants expected to seek future colearning with AB-FICare sites, intervention site participants did not describe this as influencing implementation.

Inner setting

Facilitators

Networks and Communication: Participants from most sites described several modes of communication. Emails were regarded as ineffective due to volume and lack of time to access and/or respond at work. In-person communications were generally preferred. Participants noted visuals should be tailored to staff and families, and dashboards can facilitate real-time monitoring and evaluation. Informal communication with families provided staff with feedback about quality of care. Participants emphasised the importance of collaboration between management and staff, and 'open lines of communication' (SC-R2-ID1) between providers, families, and ancillary departments.

Culture: Participants described organisational and unit culture as hierarchical. This was a facilitator when the top-down approach was supported by effective leadership and change management. With high staff turnover, unit culture was critical for new hires to adopt local practices. In some ways, hierarchical culture could impede implementation, such as when frontline staff were not engaged in developing provincial policies that impacted integration of families in care.

Implementation Climate: Participants from intervention sites reported most staff and management embraced AB-FICare and there was 'pull' from Standard Care sites to begin implementation as soon as cRCT results were available. Interviewees reported that late adopters were generally individuals who have decades of NICU experience and 'are very tied to traditions (of their practice)' (SC-R1-ID4).

Tension for Change: Staff recognised parental capacity to participate in care but described a 'need for institutional and organizational supports' (SC-U1-ID4) to integrate parents, including tangible supports for families such as parking passes and processes to strengthen consistency and continuity of care.

Goals and Feedback: Participants noted that evaluation should focus on infant, family, and health system outcomes, and include feedback about progress and quality of implementation.

Compatibility: Participants from all sites perceived AB-FICare as a compatible enhancement to existing practices, and described that current FCC processes, infrastructure, and resources supported involvement of parents in care. They reported that AB-FICare aligns well with organisational and unit mission and values. Participants described minimal workflow impacts with integration of parents in bedside rounds; however, regional hospitals served by paediatricians with busy community practices were hindered from scheduling multidisciplinary rounds at a regular time to support parent presence. To better accommodate parents, some regional sites adapted by

rounding regularly with other members of the multidisciplinary team, led by a nurse practitioner.

Readiness for Implementation: Participants remarked that readiness was generally facilitated by a parent-friendly physical layout, general resources, and staff awareness. Participants at Standard Care sites perceived clear information about practice expectations and logistics, and sufficient time to educate and prepare staff as integral to implementation.

Leadership Engagement: Leadership engagement was a strong facilitator of implementation by allocating resources, setting strategic direction, being knowledgeable about the intervention, effectively managing change, and evaluating implementation progress. Continuity, consistency and visibility in leadership and commitment to the change process underpinned implementation.

Available Resources: A single room layout was perceived as optimal to promote privacy, family presence, and nurturing parent–infant interactions. Features such as breast milk fridges, comfortable furniture, and welcoming family spaces were highlighted as facilitators. Some participants expressed that a single room design may have drawbacks for parents related to a sense of NICU community. Culturally sensitive supports such as interpretation services and multimodal parent education facilitated implementation. Participants felt parent education could be strengthened with consistent use of resources, such as the Parent Education Pathway, given the frequency of infant transfers between sites. Participants from intervention sites noted there was insufficient protected time to implement all components of AB-FICare, particularly the family mentor component.

Access to Knowledge and Information: HCP described a critical need for conceptual and experiential staff education and incorporation of AB-FICare into new hire orientation for sustainability. They recommended that education be multimodal and completed on an annual basis by all staff. Managers, Clinical Nurse Educators, and Super-Users (staff specially trained to understand the evidence for AB-FICare, recognise when AB-FICare is being practiced with fidelity, support and problem solve with staff when there are challenges, and support implementation) were viewed as instrumental in facilitating staff education and answering staff questions. Participants described needing to know (1) why AB-FICare was being implemented, (2) its impact on workflow, (3) expected outcomes, and (4) change management approaches.

Barriers

Relative Priority: Participants at all sites reported change burden from competing priorities including implementation of electronic charting, renovation from open ward to single-family rooms, and/or Baby-Friendly Initiative designation (<https://breastfeedingcanada.ca/en/baby-friendly-initiative/>).

Learning Climate: Interviewees noted that provider's lack of confidence in their clinical skills may undermine implementation; however, a non-judgemental environment

provided a safe space for mistakes and learning which supported implementation. Participants also discussed constant system change as sensory overload affecting staff receptivity to change.

Swing

Organisational Incentives and Rewards: Organisational incentives and rewards had limited or no influence on implementation. Some participants believed positive feedback from parents was sufficient recognition.

Staff Needs and Resources: Participants identified a mix of barriers and facilitators related to staff needs and resources, most often about the impact on nursing staff. Facilitators included implementation efforts being delivered by respected and trusted staff members, and clear expectations of nurse and parental roles to generate acceptance. Barriers included lack of clarity about parental roles in NICU, demands on nurses' time for parent education, additional workload imposed by electronic charting, and unpredictable timing of patient rounds based on 'the whim of physicians' (SC-U2-ID2). A few participants noted that the emphasis on parental integration could be accompanied by negative staff attitudes or judgements towards parents based on parental ability to be present in the unit. Participants intimated that implementation may be met with resistance if staff believed it was coming from 'higher ups' (SC-R1-ID5) and if they were not involved in planning. Many participants remarked that changes in staffing levels and turnover was a barrier given the often-limited infrastructure to maintain ongoing training with new hires. Shift work and workload dictated that training and support often reached only full-time, day-time staff.

Structural Characteristics: Parent-oriented infrastructure such as family advisory committees and peer support were viewed as facilitators. Policies and guidelines were viewed as barriers in instances where these were inconsistent with AB-FICare recommendations. By contrast, implementing system-wide policies was viewed as a facilitator to promote consistency in practices and accountability among HCP.

Characteristics of individuals

Facilitators

Self-efficacy: Self-efficacy of HCP was influenced by past relevant work experiences or perceived competence within their current role. Participants expressed a need for practical tools to implement AB-FICare but reported confidence in their ability to deliver it based on FCC principles.

Individual Stage of Change: Participants told us about the importance of early awareness and willingness to adopt AB-FICare.

Individual Identification with Organisation: Positive group dynamics and diverse disciplines and experience facilitated implementation. Positive leadership and receptive staff attitudes supported the overall NICU mission of wanting the best for infants and their families.

Other Personal Attributes: Participants cited many staff qualities they believed were implementation facilitators: adaptability, empathy, patience, and communication skills. Many attributes centred on the ability to anticipate and respond effectively to parental needs.

Swing

Knowledge, Beliefs and Attitudes: Participants had difficulties differentiating among AB-FICare, FCC, and the level III NICU model of FICare. While many reported already doing a lot of it (AB-FICare), additional knowledge or tools were viewed as having a positive influence on implementation.

Process

Facilitators

Planning: Participants talked about the importance of a staged plan including a baseline readiness assessment, change management, sufficient time to implement, and evaluation cycles to monitor the change process.

Engaging: Participants from intervention sites noted that the appropriate individuals were engaged in implementation from the outset, including organisational leadership, management, and frontline staff from nursing, allied health professionals, and medicine. Frontline staff engagement was fuelled by 'seeing it happen, to reinforce the process' (FICare-U4-ID1).

Opinion Leaders: Staff described opinion leaders as respected individuals who were 'keen and the ones who dictate what the trend is' (FICare-R3-ID3), and who staff look to for guidance.

Formally Appointed Internal Implementation Leader: Super-Users were central to generating awareness of implementation activities. An AB-FICare leader or working group was described as vital to support implementation.

Champions: Participants described champions as passionate about FCC with strong family interaction skills, approachable and well-respected by colleagues, current on evidence-based practice, active in clinical nursing, and determined to implement and sustain positive practice change.

External Change Agent: Participants from intervention sites spoke positively about how AB-FICare research staff were a resource during implementation, providing consistent information, doing fidelity assessments, and supporting troubleshooting.

Key Stakeholders: Participants discussed the use of cRCT evidence from level II NICUs to show proof of concept and generate staff buy-in. They reported the need to engage the full spectrum of multidisciplinary providers.

Intervention Participants: Participants described the benefits of involving families in implementation. Staff gave examples of best practices to involve families in their infant's care and tailor interactions based on parental willingness and readiness to engage. There was resounding agreement that evaluation should include parent-oriented outcome and experience measures.

Reflecting and Evaluating: Regular qualitative and quantitative evaluation of the intervention and implementation was a facilitator. Some participants noted that integration of progress feedback from frontline staff would enhance evaluation and facilitate implementation.

Outcomes

Facilitators

Implementation Success: Success of implementation was perceived as AB-FICare 'becoming...a way of care now' (FICare-U4-ID1). Parental participation and confidence in rounds, ability to identify infant cues, and independence in care were cited as evidence of success.

DISCUSSION

To the best of our knowledge, we report the first application of CFIR to understanding the barriers and facilitators that influenced implementation of AB-FICare. In the Intervention Characteristics domain, *evidence strength and quality* and *relative advantage* underpinned implementation of AB-FICare from a staff buy-in perspective. This may be due to the mounting evidence of effectiveness for FICare^{18 19 28 29} and intuitive benefit for families (Dien, unpublished data, 2021).³⁰ It is unsurprising that *design quality and packaging* emerged as a barrier in our study, with several studies reporting persistent ambiguity about what provider and parent actions constitute FCC and inadequate information about the goals of FCC-informed interventions.^{5 31} In our study, some participants had difficulties differentiating between AB-FICare, FCC, and the level III NICU model of FICare. Several key swing factors appeared to capture the spectrum of views reported in the FCC literature. Previous work has reported a mix of staff attitudes towards FCC ranging from limited ability to recognise parental capacity to negotiate their role in infant care,³²⁻³⁵ and discomfort with continuous parental presence^{30 31 36} to embracing their role as parent educators and prioritising individualised care for families.³¹

In the Outer Setting domain, *family/patient needs and resources* emerged as the sole facilitator and was viewed as a main driver of implementation due to the focus on promoting parental well-being and competence in care. Our findings are consistent with published reports of family needs consistently being a central motivator for adopting FCC-informed activities.^{19 37-39} Qualitative findings from NICU staff highlight the positive impact on parental confidence, role attainment, and well-being and that these impacts are readily observable as uptake of FCC progresses.^{30 31} Previous studies have also acknowledged the initial phase of staff getting to know parents and their preferences, which in turn informs how practices need to be adapted to meet parental needs, personality traits, and cultural preferences.⁴⁰

From the Inner Setting, participants spoke about a *tension for change* to standard delivery of care models and described AB-FICare as compatible with their organisational values. The *implementation climate, leadership*

engagement, access to knowledge and information, and available resources were central implementation influences. In both the present study and past research, staff consistently highlighted the value of access to regular and accessible education and of leadership involvement, ranging from fostering preparedness to allocating implementation resources.^{30 31} Our identification of *available resources* as a facilitator appears to offer a more optimistic perspective relative to existing literature. Previous studies have generally regarded resources from a deficit standpoint, citing lack of opportunities and dedicated time for parent education,^{31 34 41} insufficient access to FCC-informed materials and policies,³⁴ and non-facilitative NICU environments.^{31 34 42 43} By contrast, participants in our study generally discussed resources from an advantage standpoint, including the availability of welcoming and well-designed spaces and inclusive family education materials and services. However, participants reported there was insufficient time to dedicate to full implementation of all components of AB-FICare. Swing factors were mostly identified in the Inner Setting domain; *staff needs and resources, structural characteristics, compatibility, and culture* could facilitate or impede implementation depending on unit context and staff member perspective.

In the Process domain, *planning and reflecting and evaluating* were considered critical. Of similar importance were the presence of motivating individuals, such as *formally appointed internal implementation leaders and champions*, who aided in sustaining implementation momentum. Existing research has emphasised the importance of planning as a time for mental and tangible preparation, and of formal and informal implementation leaders (such as mentors) for maintaining staff training and morale.³¹ Our findings in the Process domain are aligned with the literature documenting the substantial positive effects of organisational processes on healthcare quality improvement initiatives.⁴⁴

Strengths and limitations

Key strengths of our approach included the use of CFIR-informed interview guides and development of a standardised and context-adapted CFIR codebook using theoretically based operational definitions for *culture, self-efficacy, and individual stage of change*. All but one site achieved at least 75% of their target recruitment for the cRCT²⁰ prior to interviews, which suggests that staff at intervention sites had sufficient exposure to AB-FICare. The results of this substudy were intended to inform the future scale and spread of AB-FICare in a province-wide integrated health system. Therefore, rather than evaluate between group differences, we were interested in actual or perceived influences on implementation across all sites in the AB-FICare cRCT. Participating sites represented a mix of urban and regional areas serving a diverse population, supporting the transferability of our findings to other level II NICUs.

Although CFIR-guided semi-structured interview guides were used, several constructs had a lower volume

of data and conclusions related to those constructs should be drawn with caution. Possible interactions among the constructs and the relationship between constructs and intervention fidelity (as a measure of implementation success), although useful for implementation planning, were beyond the scope of our research question and represent important areas for future inquiry. Evaluating whether the influence of constructs changes over time as implementation proceeds from exploration to full implementation⁴⁵ would add to implementation science knowledge.

CONCLUSION

Our findings suggest that CFIR is a useful theoretical framework to understand the barriers and facilitators to implementation of a multicomponent intervention in NICUs. Notably, in the Inner Setting domain, contextual factors of the *implementation climate, compatibility* of the intervention with existing care practices and workflow, *available resources*, and *staff access to knowledge and information* can be leveraged to support scale and spread of AB-FICare in NICUs. Organisational processes such as engagement of *key stakeholders* across disciplines and levels of the organisational structure and *intervention participants* (families), as well as *reflecting and evaluating* on the implementation process and patient, family, and health system outcomes facilitated implementation of AB-FICare. Our findings align with reports indicating context has fundamental effects on quality improvement,^{44 46} and that site-specific consultations should occur with respect to swing factors to understand how and why these might impact implementation. Scale and spread of AB-FICare should engage clinical staff from all disciplines to codesign, tailor and champion implementation planning and execution, and support sustainability.

Author affiliations

¹Faculty of Nursing, University of Calgary, Calgary, Alberta, Canada

²Community Health Sciences, University of Calgary Cumming School of Medicine, Calgary, Alberta, Canada

³Paediatrics, University of Calgary Cumming School of Medicine, Calgary, Alberta, Canada

⁴Maternal Newborn Child and Youth Strategic Clinical Network, Alberta Health Services, Calgary, Alberta, Canada

⁵Provincial Clinical Excellence, Alberta Health Services, Calgary, Alberta, Canada

Twitter Natalie V Scime @NatalieScime and Karen Benzies @KarenBenzies

Acknowledgements The AB-FICare in Level II NICU Study Team acknowledges the contributions of Amy Fowler to study coordination; Kristen Jensen for post-implementation participant recruitment and interview coordinating; AHS Evaluation Consultants for conducting interviews and Executive Directors, Medical Directors, Patient Care Managers, Unit Managers, and frontline healthcare providers, particularly AB-FICare Super-Users, for their support of this study.

Collaborators Alberta FICare in Level II NICU Study Team: Abhay Lodha, MSc, MD, MBBS (Foothills Medical Centre, Calgary, Alberta); Karen M Benzies, PhD, RN (University of Calgary, Calgary, Alberta); Vibhuti Shah, MSc, MBBS, MD (University of Toronto, Toronto, Ontario); Khalid Aziz, MEd, MBBS, MA, MD (University of Alberta, Edmonton, Alberta); Wanrudee Isaranuwatthai, PhD (Saint Michael's Hospital, Toronto, Ontario); Jeanne Scotland, MN, NNP (Rockyview General Hospital, Calgary, Alberta); Jill Larocque, MES, NNP (Royal Alexandra Hospital, Edmonton, Alberta); Kelly Mrklas, MSc, Doctoral candidate (Alberta Health Services, Calgary, Alberta);

Christopher Naugler, MSc, MD (Calgary Lab Services, Calgary, Alberta); Radha Chari, MD (University of Alberta, Edmonton, Alberta); Henry T Stelfox, PhD, MD (Critical Care Strategic Clinical Network, Alberta Health Services, Calgary, Alberta); Harish Amin, MBBS, MRCP, FRCPC, FAAP (Alberta Children's Hospital, Calgary, Alberta); Jeffrey Hoch, PhD, MA (University of Toronto, Toronto, Ontario); Amouchou Soraisham, MBBS, MD, MSc (Foothills Medical Centre, Calgary, Alberta); Sandra Walker-Kendall, NNP, MN, BScN (Red Deer Regional Hospital Centre, Red Deer, Alberta); Dr Alberta Akierman, MBBS, FRCP (Foothills Medical Centre, Calgary, Alberta); Dr Ernest Phillipos, MBBS, MRCP, FRCPC (University of Alberta Hospital, Edmonton, Alberta).

Contributors Responsible to conceptualise the study: KB and KM. Responsible for data analysis plan: KB and DAM. Responsible for ethics applications and reporting: KB and PZ. Responsible for implementation science strategies, supported development of interview guides, and provided CFIR training to interviewers: KM. Responsible for development of adapted CFIR codebook: PZ, NVS, KB and DAM. Responsible for data coding and analysis: PZ and NVS. Responsible for writing the first draft of the manuscript: PZ and NVS. All authors have critically reviewed and approved the final version of the manuscript.

Funding This research was funded by: Alberta Innovates – Health Solutions, Partnership for Innovation in Health Services Research (PRIHS) grant number 201400399 (see <http://www.aihealthsolutions.ca/about-us/>), with in-kind support from Alberta Health Services, Covenant Health, and Faculty of Nursing, University of Calgary. The Alberta FiCare in Level II NICU Study Team has ultimate authority over all decisions related to the study, including publications. The funder of the study had no role in study design, data collection, data analysis, data interpretation or writing of the paper. KB, VS, KA, and AL had access to all the data in the study and had final responsibility to submit for publication.

Competing interests All authors have completed the ICMJE Disclosure of Interest form at <http://www.icmje.org/disclosure-of-interest/> and declare: PZ and NVS received salaries from the research grant, Alberta Innovates-Health Solutions, Partnership for Innovation in Health Services Research (PRIHS) grant number 201400399, for the submitted work; KB holds grants from the Canadian Institutes of Health Research and Alberta Children's Hospital Research Institute for follow-up studies of Alberta FiCare; KB is the founder of Liminality Innovations Inc, a social innovation company to ensure that Alberta FiCare (also known as Merge) is accessible to NICUs across Canada and internationally; PZ is supporting efforts by Liminality Innovations Inc to make Alberta FiCare (also known as Merge) accessible to NICUs across Canada and internationally. DAM and KM declare no competing interests.

Patient consent for publication Not required.

Ethics approval This study was reviewed and approved by the University of Calgary Conjoint Health Research Ethics Board (CHREB ID 15-0067), University of Alberta Health Research Ethics Board (Pro00060324), and Covenant Health Research Centre (ID 1762).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement No data are available.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

Author note PZ (MSc) is a Project Manager in the Faculty of Nursing, University of Calgary. NVS (MSc) is a Doctoral Candidate in Epidemiology, Department of Community Health Sciences, Cumming School of Medicine, University of Calgary. KB (PhD, RN) is a Professor in the Faculty of Nursing and Adjunct Research Professor in the Departments of Pediatrics and Community Health Sciences, Cumming School of Medicine, University of Calgary and a Child Health and Wellness Researcher at Alberta Children's Hospital Research Institute. DAM (PhD, RN) is Scientific Director, Maternal Newborn Child and Youth Strategic Clinical Network

at Alberta Health Services, Calgary, Adjunct Associate Professor in the Faculty of Nursing and Department of Community Health Sciences, University of Calgary and a Child Health and Wellness Researcher at Alberta Children's Hospital Research Institute, Calgary. KM (MSc) is a Doctoral Candidate in Health Services Research in the Department of Community Health Sciences, Cumming School of Medicine, University of Calgary and a Knowledge Translation Implementation Scientist with the Strategic Clinical Networks, Alberta Health Services. All members of the Alberta FiCare in Level II NICU Study Team supported the conduct of this study.

ORCID iDs

Pilar Zaroni <http://orcid.org/0000-0002-2289-125X>

Natalie V Scime <http://orcid.org/0000-0002-5811-7661>

Karen Benzie <http://orcid.org/0000-0002-9090-2395>

REFERENCES

- 1 COMMITTEE ON HOSPITAL CARE AND INSTITUTE FOR PATIENT- AND FAMILY-CENTERED CARE. Patient- and family-centered care and the pediatrician's role. *Pediatrics* 2012;129:394–404.
- 2 Davidson JE, Aslakson RA, Long AC, *et al.* Guidelines for family-centered care in the neonatal, pediatric, and adult ICU. *Crit Care Med* 2017;45:103–28.
- 3 Harrison TM. Family-centered pediatric nursing care: state of the science. *J Pediatr Nurs* 2010;25:335–43.
- 4 McGrath JM, Samra HA, Kenner C. Family-centered developmental care practices and research: what will the next century bring? *J Perinat Neonatal Nurs* 2011;25:165–70.
- 5 Kuo DZ, Houtrow AJ, Arango P, *et al.* Family-centered care: current applications and future directions in pediatric health care. *Matern Child Health J* 2012;16:297–305.
- 6 Shields L, Pratt J, Davis LM, *et al.* Family-centred care for children in hospital. *Cochrane Database Syst Rev* 2007;1:CD004811.
- 7 Coyne I. Families and health-care professionals' perspectives and expectations of family-centred care: hidden expectations and unclear roles. *Health Expect* 2015;18:796–808.
- 8 Foster M, Whitehead L, Maybee P. Parents' and health professionals' perceptions of family centred care for children in hospital, in developed and developing countries: a review of the literature. *Int J Nurs Stud* 2010;47:1184–93.
- 9 Coyne I, O'Neill C, Murphy M, *et al.* What does family-centred care mean to nurses and how do they think it could be enhanced in practice. *J Adv Nurs* 2011;67:2561–73.
- 10 Hughes M. Parents' and nurses' attitudes to family-centred care: an Irish perspective. *J Clin Nurs* 2007;16:2341–8.
- 11 Coyne I, Murphy M, Costello T, *et al.* A survey of nurses' practices and perceptions of family-centred care in Ireland. *J Fam Nurs* 2013;19:469–88.
- 12 Lee P. What does partnership in care mean for children's nurses? *J Clin Nurs* 2007;16:518–26.
- 13 Coyne I. Disruption of parent participation: nurses' strategies to manage parents on children's wards. *J Clin Nurs* 2008;17:3150–8.
- 14 Beck SA, Weis J, Greisen G, *et al.* Room for family-centered care – a qualitative evaluation of a neonatal intensive care unit remodeling project. *Journal of Neonatal Nursing* 2009;15:88–99.
- 15 Shields L, Nixon J. Hospital care of children in four countries. *J Adv Nurs* 2004;45:475–86.
- 16 Espezel HJE, Canam CJ. Parent-nurse interactions: care of hospitalized children. *J Adv Nurs* 2003;44:34–41.
- 17 Ygge BM, Lindholm C, Arnetz J. Hospital staff perceptions of parental involvement in paediatric hospital care. *J Adv Nurs* 2006;53:534–42.
- 18 O'Brien K, Bracht M, Macdonell K, *et al.* A pilot cohort analytic study of family integrated care in a Canadian neonatal intensive care unit. *BMC Pregnancy Childbirth* 2013;13 Suppl 1:S12.
- 19 O'Brien K, Robson K, Bracht M, *et al.* Effectiveness of family integrated care in neonatal intensive care units on infant and parent outcomes: a multicentre, multinational, cluster-randomised controlled trial. *Lancet Child Adolesc Health* 2018;2:245–54.
- 20 Benzie KM, Aziz K, Shah V, *et al.* Effectiveness of Alberta family integrated care on infant length of stay in level II neonatal intensive care units: a cluster randomized controlled trial. *BMC Pediatr* 2020;20:535.
- 21 Ford I, Norrie J. Pragmatic trials. *N Engl J Med* 2016;375:454–63.
- 22 Benzie KM, Shah V, Aziz K, *et al.* Family integrated care (FiCare) in level II neonatal intensive care units: study protocol for a cluster randomized controlled trial. *Trials* 2017;18:467.
- 23 Grimshaw JM, Eccles MP, Lavis JN, *et al.* Knowledge translation of research findings. *Implement Sci* 2012;7:50.

- 24 Damschroder LJ, Aron DC, Keith RE, *et al.* Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci* 2009;4:50.
- 25 Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007;19:349–57.
- 26 Government of Alberta. Population statistics, 2021. Available: <https://www.alberta.ca/population-statistics.aspx#population-estimates>
- 27 Wasylak T, Strilchuk A, Manns B. Strategic clinical networks: from pilot to practice change to planning for the future. *CMAJ* 2019;191:S54–6.
- 28 Banerjee J, Aloysius A, Mitchell K, *et al.* Improving infant outcomes through implementation of a family integrated care bundle including a parent supporting mobile application. *Arch Dis Child Fetal Neonatal Ed* 2020;105:172–7.
- 29 Patel N, Ballantyne A, Bowker G, *et al.* Family integrated care: changing the culture in the neonatal unit. *Arch Dis Child* 2018;103:415–9.
- 30 Broom M, Parsons G, Carlisle H, *et al.* Exploring parental and staff perceptions of the family-integrated care model: a qualitative focus group study. *Adv Neonatal Care* 2017;17:E12–19.
- 31 Toivonen M, Lehtonen L, Ahlqvist-Björkroth S, *et al.* Key factors supporting implementation of a training program for neonatal family-centered care - a qualitative study. *BMC Health Serv Res* 2019;19:394.
- 32 Coyne I, Cowley S. Challenging the philosophy of partnership with parents: a grounded theory study. *Int J Nurs Stud* 2007;44:893–904.
- 33 Blower K, Morgan E. Great expectations? parental participation in care. *J Child Health Care* 2000;4:60–5.
- 34 Benzies KM, Shah V, Aziz K, *et al.* The health care system is making 'too much noise' to provide family-centred care in neonatal intensive care units: Perspectives of health care providers and hospital administrators. *Intensive Crit Care Nurs* 2019;50:44–53.
- 35 Canadian Premature Babies Foundation. Premature birth in Canada: an environmental scan. research power Inc. for Canadian premature babies Foundation, 2014. Available: <https://www.cpbfb-fbpc.org/premature-birth-in-canada>
- 36 Axelin A, Ahlqvist-Björkroth S, Kauppila W, *et al.* Nurses' perspectives on the close collaboration with parents training program in the NICU. *MCN Am J Matern Child Nurs* 2014;39:260–8.
- 37 De Bernardo G, Svelto M, Giordano M, *et al.* Supporting parents in taking care of their infants admitted to a neonatal intensive care unit: a prospective cohort pilot study. *Ital J Pediatr* 2017;43:36.
- 38 Sarin E, Maria A. Acceptability of a family-centered newborn care model among providers and receivers of care in a public health setting: a qualitative study from India. *BMC Health Serv Res* 2019;19:184.
- 39 Oude Maatman SM, Bohlin K, Lilliesköld S, *et al.* Factors influencing implementation of family-centered care in a neonatal intensive care unit. *Front Pediatr* 2020;8:222.
- 40 Trajkovski S, Schmied V, Vickers M, *et al.* Neonatal nurses' perspectives of family-centred care: a qualitative study. *J Clin Nurs* 2012;21:2477–87.
- 41 Paliadelis P, Cruickshank M, Wainohu D, *et al.* Implementing family-centred care: an exploration of the beliefs and practices of paediatric nurses. *Aust J Adv Nurs* 2005;23:31–6.
- 42 Wigert H, Berg M, Hellström A-L. Health care professionals' experiences of parental presence and participation in neonatal intensive care unit. *Int J Qual Stud Health Well-being* 2007;2:45–54.
- 43 Wigert H, Berg M, Hellström A-L. Parental presence when their child is in neonatal intensive care. *Scand J Caring Sci* 2010;24:139–46.
- 44 Alexander JA, Hearld LR. The science of quality improvement implementation: developing capacity to make a difference. *Med Care* 2011;49 Suppl:S6–20.
- 45 Fixsen D, Blase K, Metz A. Implementation science. In: Wright JD, ed. *International encyclopedia of the social & behavioral sciences*. 2nd ed. Amsterdam: Elsevier, 2015: 695–702.
- 46 Coles E, Anderson J, Maxwell M, *et al.* The influence of contextual factors on healthcare quality improvement initiatives: a realist review. *Syst Rev* 2020;9:94.