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Research Article

Perceived barriers and facilitators to implementing a consensus-based same-day discharge post-percutaneous coronary intervention clinical pathway in Queensland, Australia

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ABSTRACT

Objectives: To identify perceived barriers and facilitators to an intended adoption of aconsensus-based same-day discharge (SDD) clinical guideline for patients undergoing elective percutaneous coronary intervention (PCI).
Methods: This qualitative study was conducted in six cardiac catheterisation suites of public hospitals in Queensland, Australia. Semi-structured interviews were undertaken with clinicians, patients, and carers between July and October 2024. Interviews were recorded and transcribed. Inductive content analysis was performed before themes were mapped deductively against the Theoretical Domains Framework (TDF).
Results: A total of 22 participants (doctors [n = 10], nurses [n = 8], patients [n = 2], and carers [n = 2]) participated in interviews. Six domains, including knowledge, social/professional role and identity, environmental contexts and resources, beliefs about consequences, memory, attention, and decision-making, and beliefs about capabilities, were strongly related to the factors that influenced the implementation. The findings revealed perceived main barriers to the implementation, including logistical (e.g., geographical considerations), professional (e.g., resistance to change), and hospital reimbursement models that unfavoured SDD. The main drivers were effective leadership, benchmarking among hospitals, inter-hospital consultation and collaboration, having a designated champion, and targeted education sessions for clinicians, patients, and carers.
Conclusion: Findings suggest that adopting this consensus-based SDD clinical guideline has multifactorial and interrelated influences. The identification of the barriers across various TDF domains provides opportunities to develop effective implementation strategies to facilitate SDD implementation.

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Implications for clinical practice: This study highlights the need for multifaceted approach to implementing SDD. Leaders in public health policy and organisations must consider a range of interconnected influences for effective implementation and sustained adherence.

Introduction

Percutaneous coronary intervention (PCI) is a common revascularisation procedure performed to treat narrowing or blocked coronary arteries. It remains one of the most frequently performed cardiac procedures, which represents a large volume in the modern-day management of coronary heart disease [1–3]. Same-day discharge (SDD) following elective PCI has emerged as a globally effective strategy used in healthcare systems to enhance patient flow, reduce the length of hospital stay, and decrease healthcare costs [1,2]. SDD also improves bed availability and resource allocations in hospitals while also maintains positive experiences and patient safety [2,4]. However, an international survey of interventional cardiologists suggested varying self-reported SDD practices, with significantly differing adoption rates: 14 % in the United States, 32 % in Canada, and 57 % in the United Kingdom, respectively [5]. Despite evidence of its safety and efficacy, the adoption of SDD across hospitals is not consistent. These discrepancies were attributed to varying processes and complex barriers across institutions – that can range from logistics to socio-cultural influences, which can add to the resistance to change [6,7]. In an Australian study identifying the prevalence, trends, and outcomes of SDD following elective PCI in Queensland, there was a very limited implementation of SDD, with an overall SDD prevalence of 6.5 %; however, with an increasing trend from 0.2 % in 2013 to 9.0 % in 2019 [8]. This low uptake suggests the need to explore the discrepancies in applying SDD into practice despite the presence of evidence.

Implementing new practices, such as SDD, is not straightforward as it involves multi-layered processes to navigate, encompassing attitudes, behaviours, social influences, and organisational culture that go beyond clinical efficacy [9–12]. The mix of these factors can serve as barriers or facilitators to implementing SDD that could lead to a suboptimal adoption if left unaddressed. The presence of inconsistent implementation creates a significant gap in understanding the full potential of SDD in the current practice, necessitating the need to explore the factors that can thwart or facilitate a successful implementation. Consistent with the Medical Research Council Framework for evaluating complex interventions [13], qualitative research is essential to understanding guideline implementation interventions and guiding future efforts. There is a paucity of qualitative studies on the views of clinicians and consumers regarding the implementation of the SDD guideline aimed at increasing its uptake [14]. Hence, the aim of the study was to explore perceived barriers and facilitators to an intended adoption of a consensus-based clinical pathway from the perspectives of doctors, nurses, patients, and their carers.

Methods

Study design

This qualitative study was conducted after our previous study of the development of the SDD clinical pathway [15]. We conducted interviews with clinicians and consumers to identify perceived barriers and facilitators to the implementation of the developed consensus-based SDD clinical pathway (under review for endorsement by the Queensland Cardiac Clinical Network). The Consolidated Criteria for Reporting Qualitative Research (COREQ checklist) was used to guide the writing of this manuscript [16].

Theoretical framework

Due to the multifactorial nature of adopting new practices, the adoption of a clear framework can help identify and categorise barriers and facilitators influencing the implementation process. Given this context, the Theoretical Domains Framework (TDF) [17] was used to guide a robust approach to examining the perceived barriers and facilitators in adopting SDD. The TDF [17] was seen as a logical approach to comprehensively examine the perceived barriers and facilitators to SDD across 14 domains which allow the researchers to analyse multiple dimensions that can influence the implementation and adoption of SDD.

Study setting

The study was conducted at the cardiac catheterisation suites of six public hospitals in Queensland, Australia, including two referral hospitals located in major cities and four regional acute hospitals.

Participants and recruitment

Participant recruitment involved two strategies. First, individuals who had expressed prior interest in development of the earlier SDD clinical pathway [15] were invited to participate. Additional participants were recruited through a purposive sampling [18] across the six public hospitals in Queensland, Australia. To recruit clinicians from each site, the first author (YC) approached the nurse unit managers and cardiology directors, requesting their assistance in promoting the study by sending their team members an ethics-approved invitation letter. The research team member (nurse) at each site was designated to recruit patients who had SDD and their carers. All potential participants were provided with a study information sheet and explanation regarding the purpose of the research, expectations in their participation, potential risks and benefits, and strategies in mitigating or managing risks if required. Informed consent from each participant was obtained either via email or in person for the paper-based consent forms.

Staff members who did not express interest in participating or lacked knowledge and experience in SDD practices were not considered to participate. The exclusion criteria for patients and their family members included having cognitive impairment or not willing to participate. All 22 individuals we approached consented and participated in the interviews.

Data collection

Individual interviews with doctors, nurses, patients, and their carers were conducted between July and October 2024 in a quiet room near the cardiac catheterisation suites of the hospital. Zoom (Version 5.12.9) was used for participants who could not be interviewed face to face. The interviews were performed using semi-structured guides developed following TDF (See Supplementary Material A) that allowed participants to discuss the barriers, facilitators, and other practical considerations about the adoption of our consensus-based SDD clinical pathway in clinical practice. The researcher (YC), who is an experienced qualitative researcher and past cardiac care clinician with a PhD, conducted the interviews. Contact summary was written immediately after each interview to enhance data accuracy. Member-checking [19] was conducted at the end of the interviews by ensuring what the researcher summarised was what the participant had said, and if there were any discrepancies, they were corrected.

We continued with interviews until data saturation was achieved.

This was defined as the point at which no new information was forthcoming in our study [20]. Saturation was monitored through preliminary data analysis alongside the data collection and regular team discussions. We stopped interviews once we determined in our team meeting if there were no new insights. The interviews lasted about 15 min to one hour and were recorded and transcribed using the intelligent verbatim transcription method which involves the removal of repeated words and phrases, sentence fillers and grammar errors which are common in spoken language [21,22]. Transcripts were checked for accuracy before importing to NVivo® QSR (Version 12, QSR International, Melbourne, Australia) to aid in managing qualitative data for analysis.

Data analysis

Qualitative content analysis [23] was used to analyse data from the individual interviews. While framework analysis [24] is a robust method for analysing qualitative data, we chose content analysis due to its flexibility in utilising both inductive and deductive data analysis approach [25]. Our content analysis approach ensures the themes were generated from the participants' experiences, and subsequently, aligned with the theoretical framework (TDF). The first author (YC) read the transcripts several times to ensure immersion in the data. An inductive approach was first used, which involved line-by-line coding to generate themes from the experiences and perspectives of the participants without imposing pre-determined categories. YC and another author (JP) trialled the coding of the first transcript and met to discuss any discrepancies in their coding and continued the second transcript's coding with discussions. The first author (YC) continued to code the rest of the transcripts, and JP then checked all the codes that the first author coded to ensure codes reflected with what participants had shared. After this, a deductive approach was employed by categorising the codes representing barriers and facilitators to SDD uptake onto the 14 TDF domains [17]. In the event when themes overlapped across other domains, re-categorisation was made in consensus with all researchers based on their major influence [17].

Rigour

As part of checking the validity and credibility of qualitative findings, source triangulation [26,27] was observed. This procedure involved conducting interviews across different professional streams of varying levels of expertise, as well as patients, and their carers to capture a broader and a more balanced perspective. Efforts were in place to ensure the study rigour, including having a second researcher to independently code the first two transcripts. Regular reviews and checks of the remaining transcript coding were also performed by the second researcher, with the whole team to agreeing on the codes and themes [28], which reinforces consistency and dependability in the analytic process. Peer-debriefing and reflexivity were also observed by the researchers to ensure trustworthiness in the validation processes [29,30]. As some participants were known to the researcher (the interviewer), we used strategies to mitigate potential bias. These included regular team meetings to critically reflect on the data analysis and interpretation of the preliminary interview findings. Reflexivity enabled the researchers' position and experience to be clearly articulated to the rest of the team. In addition, the first author does not have any direct relationship with the participants, i.e., does not have a nurse-patient, employment, or line management relationship with any of the participants. Our consumer team member also reviewed the findings.

Ethics

Ethics approvals were secured from the health hospital services (HREC/2023/MNHB/103471) and the universities (A232031; 6925). All participants provided informed written consent. Confidentiality was strictly observed in the data collection and analysis to ensure data deidentification of participants.

Findings

A total of 22 participants participated in our interviews, including doctors (n = 10), nurses (n = 8), patients (n = 2), and carers (n = 2). Out of 22 interviews, 17 were conducted via Zoom. Table 1 shows more demographic findings for 18 participants who are clinicians. The content analysis identified the perceived barriers and facilitators to implementing the SDD clinical pathway. Six TDF domains were predominantly linked to these barriers and facilitators, including (1) knowledge, (2) social/professional role and identity, (3) environmental contexts and resources, (4) beliefs about consequences, (5) memory, attention, and decision-making, and (6) beliefs about capabilities. The themes within each domain provided some insights into the specific barriers and facilitators that will influence the adoption of the SDD clinical pathway (Table 2). Participant ID has been presented at the end of each quote.

Knowledge

The domain of knowledge refers to awareness of condition/scientific rationale, procedure, and task environment [17,31]. Constructs within this domain reflected participants' knowledge about SDD benefits and its importance, recognising the local evidence and safety index that facilitates the adoption of the SDD clinical pathway, and valuing education on the proposed change to increase buy-in and uptake.

Awareness of the SDD process and its importance

All participants interviewed had experience either performing SDD as a clinician or receiving SDD as a patient or a carer; hence, they had some level of knowledge about the SDD process. Participants agreed to have proper SDD criteria and risk management strategies in place to ensure safe discharge, especially commenting on the importance of providing sufficient discharge instructions to patients and carers before discharge and conducting phone follow-up within 24 h of the procedure. Participants highlighted the positive impact of SDD, particularly in patient flow by optimising the availability of beds and streamlining their discharge process. Also, all the participants pointed out that patients and carers were often supportive of SDD and keen to go home the same day provided it was safe to do so, highlighting their preferences of recovering at home.

> "*We look at the data that we've collected on the post-op phone call … and I can tell you all the patients have wanted to go home…*" (ID 8)

Table 1
Participant demographics.

Variables (*N* = 18)[*]	**N (%)**
Male	12 (66.7)
Hospitals[ˆ]	
Hospital A	5 (27.7)
Hospital B	3 (16.7)
Hospital C	3 (16.7)
Hospital D	3 (16.7)
Hospital E	2 (11.1)
Hospital F	2 (11.1)
Clinical role	
Interventional cardiologist	7 (38.9)
Clinical nurse consultant	5 (27.7)
Interventional fellow	3 (15.8)
Nurse unit manager	2 (10.5)
Cardiac nurse	1 (5.3)

[*] Indicates the number of clinicians as participants.
[ˆ] indicates that six hospitals are listed from A to F.

Table 2
TDF domains and themes.

TDF domains	Themes
Knowledge	Awareness of the SDD process and its importance Valuing education on the proposed change Consideration of contextual factors when adopting the SDD clinical pathway
Social/professional role and identity	Leadership with support that enables safety infrastructure Inter-/intra- professional consultation, collaboration, and communication The value of a designated champion
Environmental context and resources	Culture to change Social and geographical factors Resources about workforce and existing services
Beliefs about consequences	Beliefs about SDD safety Scheduling procedures Loss of revenue and financial implications when adopting SDD
Memory, attention, and decision-making	Placing SDD as a practice in conscious awareness Using the clinical pathway as a tool to assist clinician decision-making
Beliefs about capabilities	Perceived smoother adoption of the clinical pathway as SDD already in place SDD post-PCI as a springboard

Note: PCI, percutaneous coronary intervention; SDD, same-day discharge; TDF, theoretical domains framework.

However, some participants perceived little or a lack of relevance of SDD to their local context. For example, one participant said,

> "*... because the procedural numbers are so low it's not a major burden on our workflow, so it's not a relevant metric that we've had to try until now*." (ID 1)

Valuing education on the proposed change

When asked what could facilitate the implementation of the SDD clinical pathway, most participants recommended education. Some participants proposed education within the department in the format of presenting the clinical pathway in staff forums, in-services, or short training sessions. Others added that education should include the reasonings and rationales behind the changes in this new clinical pathway and how the new assessment would look, such as how to conduct the frailty assessment. One participant pointed out this should not be called education but rather information-sharing.

Participants also stated that education should be provided to patients and carers, particularly when SDD with femoral access is proposed. Participants pointed out that clinicians should provide education to patients and carers about being safe to go home despite the femoral access and offer them support if something occurs after discharge. One participant who was a patient added the importance of education, which would help make the decision if "*I'm going home or staying that night*" (ID 14).

Consideration of contextual factors when adopting the SDD clinical pathway

Several participants shared that the SDD criteria they were currently using were strict which excluded many patients from being eligible. Hence, they are currently looking at their existing SDD data with the hope of expanding the current SDD criteria. This was illustrated in the following quote.

> "*... because there were shortages of beds to admit patients... We looked at a very select cohort of patients with inclusion/exclusion criteria to commence it to see whether it was safe practice and it's been working now for 3 years extremely well. The doctors have talked about wanting to extend the criteria, which is very timely for what you're looking at*". (ID 12)

Social/professional role and identity

The constructs within this domain reflected the social dynamics within the wider health system and the professional roles that were seen as important when adopting the SDD clinical pathway. Further analysis of these constructs identified the following three themes.

Leadership with support that enables safety infrastructure

Participants highlighted the value of effective leadership in driving the adoption of SDD in the workplace. They also acknowledged the positive impact of having our new clinical pathway endorsed by a cardiac professional body, as one participant said,

> "*... having some interventional cardiologists who are well respected in Queensland from bigger centres sort of endorsing this and saying this is what the bigger hospitals are doing will help smaller facilities feel safer in adopting something new.*" (ID 6)

Management support, such as from the hospital executives, was seen as an important facilitator to overcome uncertainties.

> "*There's a bit of unknown because the more stents you put in, the more chance of stent thrombosis. That's buying into a little bit more risk. But, if the hospital is happy to support us and if one adverse event happens, they are supportive of, instead of making it a SAC* [severity assessment code] *1 inquiry of us, I'll be happy to do that.*" (ID 4)

Inter-/intra-professional consultation, collaboration, and communication

Another theme within this domain as expressed by the participants was the value of inter-/intra-professional collaboration and communication within the wider team and across institutions as a key strategy in ensuring that best practices are implemented. Participants appreciated one of the criteria in the new clinical pathway about living distance within 1 h of closest care centre rather than PCI-capable centre. This is because the criterion would allow more patients who lived far away from the PCI-capable centre but could access local care to be eligible for SDD. Because of this, participants suggested for consultation and collaboration with local healthcare centres as seen in an example of the quote below.

> "*I'm also thinking about going back to that one hour from health centre. Maybe it's worth the consultants having a discussion with the health centre to see whether they could manage that* [some commonly occurring post-PCI complications]." (ID 12).

Participants also shared the importance of consulting and collaborating within the teams through effective communication, particularly with the consultants who might be more conservative than others. One participant said this was about "*getting it over the line with the medical officers who are going to sign off on the document*" (ID 20). Communication also had to occur with rotating doctors as one participant said, "*... every five weeks we get a new junior resident*" (ID 3) and nurses who were doing different shifts to ensure all clinicians working at the laboratory were aware of the new clinical pathway.

Participants also emphasised the importance of communicating with patients and carers during the introduction of the SDD clinical pathway, including before and after the procedure and prior to discharge, to realise shared decision-making.

The value of a designated champion

Participants perceived the value in the role of the nurses in promoting and screening SDD eligibility and proactively communicating with the medical team to facilitate SDD. They also highlighted the importance of having a designated champion to advocate the adoption and adhere to the clinical pathway.

> "*Even if there's one nurse that becomes the sole changer in it that she can help educate each person, that could be helpful because I always find things get missed.*" (ID 3)

Environmental contexts and resources

This domain refers to any circumstance or environment that can affect the implementation of the new clinical pathway. Constructs in this domain reflected local culture, social and geographical factors, and resources.

Culture to change

Local culture when implementing something new to the practice was frequently mentioned by participants. From participants' perspectives, this new SDD clinical pathway rooted in evidence would be implemented effectively, given there would be a lot of buy-in. One participant stated,

> "*Again, it's making sure that we have that research to back what we're doing, so that make sure that it's safe, but I do think that you would get a lot of buy in from our consultants. They would very much be interested in using the co-designed guideline* [*clinical pathway]*". (ID 8)

The other positive cultural shift, as described by the participants, was driven by a bed resource crisis. Participants shared that because of the overflow and a lack of beds, there is always a positive culture that clinicians want to try and implement SDD as much as possible.

However, participants also shared that there would be some expected resistance to change, as one participant said, "… *the biggest barrier would probably be habitual in terms of what we've done for many years and trying to change that culture*" (ID 13). Participants further explained that when a patient had a straightforward PCI and met SDD, clinicians would habitually send the patient to the ward for the night. Participants were also asked about why some consultants insisted on keeping patients overnight solely due to an estimated glomerular filtration rate (eGFR) below 60 ml/L despite evidence, indicating that acute kidney injury does not occur within 24 h of the procedure. Some participants expressed uncertainty with the reasoning of this practice, with others suggesting that no document would influence established inclinations – attributing the practice based on the physicians' decisions.

Social and geographical factors

One of the common challenges participants frequently mentioned was insufficient social support for patients which could affect the SDD. All participants were aware that a responsible carer is required to enable SDD; however, this could become an issue immediately before discharge because the confirmed carer could become unavailable due to other commitments or could become ineligible due to being frail. This carer issue could also be that "*patients will often say that they have a carer available, but don't actually have one*" (ID 8). Hence, participants highlighted the importance of rechecking and reassessing carer eligibility and availability earlier to facilitate SDD.

Another challenge with SDD was related to geographical considerations. Although our new criterion allows within one hour of the local care centre, a few participants felt concerned about sending those patients home who lived from out of town, which is a long distance from the hospitals. Some participants explored options to facilitate SDD among this cohort, such as offering local hotel rooms. Participants also shared doctors may have different views on how far they live away from the hospital, as one participant explained,

> "*So, in* [one city in Queensland] *living 15 min away from the hospital is considered living out of town. So, it's far away. We don't go to dinner 20 min away because that's out of town. … Whereas in a big city, if you're 20 min from your hospital, you're probably doing pretty good.*" (ID 6)

Resources about workforce and existing services

Participants pointed out that the new SDD clinical pathway should be implemented successfully as the current medical practitioners are young and enthusiastic and often have overseas training where SDD might be a default practice. On the other hand, a few participants pointed out that the complications might occur more frequently with junior doctors who are involved in performing elective PCIs.

Some challenges were reported relating to the services. Participants raised the concern that "*none of our PCI-capable centres had a 24-hour ability to provide phone support*" (ID 1) and "… *after 6:00 pm, there's no one on the end of the phone*" (ID 3). One participant explained that consultants in smaller centres tended to use a more cautious approach due to a lack of surgical backup. As such, participants highlighted the importance of developing strategies to address these challenges to ensure smooth and safe SDD.

Beliefs about consequences

The constructs generated from the analysis that concentrated in the domain of *beliefs about consequences* reflected perceived outcomes from a range of perceived benefits and risks related to implementing SDD.

Beliefs about SDD safety

Most participants stated they were aware of evidence demonstrating SDD safety and agreed that advanced technologies also helped increase SDD safety, such as in using femoral closure devices to control access site bleeding. While most acknowledged the value of evidence that supports the practice, one participant expressed some degree of uncertainty about the associated risks with PCI procedures.

> "*Maybe evidence to demonstrate that it is safe for these patients… so they develop that trust because I don't know the consequences legally for them. Obviously, they don't want any harm to come to the patient. We know there are complications.*" (ID 17)

Scheduling procedures

How elective PCI procedures were scheduled affected whether SDD could occur. Most participants suggested that elective PCIs should be scheduled early in the day to allow sufficient time for patients to recover and observe. This was illustrated in the following,

> *"I think that the main thing to do would be to do the femoral cases earlier in the morning and probably in the initial phases allow for a bit more of a period of observation of that femoral access site to make sure that everyone's happy with it."* (ID 13)

However, this early scheduling did not occur sometimes, which led to procedure to be delayed or cancelled. This could be due to other procedures taking priority, such as having emergency cases (e.g., acute myocardial infarction). Some consultants only performed elective PCIs in the afternoon, which was another reason to prevent patients from going home the same day due to insufficient time for recovery.

Loss of revenue and financial implications when adopting SDD

Another major theme under the domain of 'beliefs about consequences' was the financial challenges when adopting SDD, particularly in funding structures where hospital income is tied to bed occupancy. Such logistical benefit of SDD was then perceived by a few participants to become a financial constraint with an example quote below.

> *"I'm not sure if this is a private (hospital) or public thing… in terms of budgetary, so if you do SDD, they don't get much billing from Medicare and then compared to your overnight stay in CCU* [coronary care unit] *or whatever admission with the hospital and the hospital get paid more…"* (ID 7)

Memory, attention, and decision-making

This domain refers to people's ability to retain information and decide among options [31]. Three themes were generated, including placing SDD as a practice into conscious awareness, a need for a reminder or cognitive aid to promote buy-in, and using the clinical pathway as a tool to assist clinician decision-making.

Placing SDD as a practice in conscious awareness

Participants frequently reported some barriers to implementing the SDD clinical pathway, such as "*not at the front of our* [doctors and nurses] *mind*" (ID 9), "*no one's actually started the pathway*" (ID 3) for eligible patients, and "*simply forgetting it's there*" (ID 3). As such, they suggested a need for a reminder or cognitive aid to place the SDD clinical pathway as a new practice in conscious awareness, therefore promoting buy-in and uptake.

Using the clinical pathway as a tool to assist clinician decision-making

Most participants acknowledged some of the SDD criteria were more liberal than the ones they were using in their hospitals. For instance, our SDD criteria included patients with eGFR >30 ml/L (rather than those commonly used >60 ml/L) with an age limit of 18–100 years old. Participants welcomed these expanded criteria by acknowledging the SDD importance to patients, clinicians, and organisations. However, they emphasised that the clinical pathway would be considered a tool to assist clinician decision-making, and hence, the final decision sits with the consultants who perform the procedure.

> "*… realistically the final caveat is at the discretion of the treating clinician. So I think that's pretty reasonable, saying that you should be able to do it with an eGFR 40, 45, or whatever is, is fine. But ultimately, it's the call of the clinician.*" (ID 16)

Beliefs about capabilities

This domain refers to people's beliefs in their ability to put practice into action. Two themes generated included perceived smoother adoption of the clinical pathway as SDD already in place and SDD post-PCI as a springboard.

Perceived smoother adoption of the clinical pathway as SDD already in place

Overall, participants were confident about implementing this SDD clinical pathway, and perceived a smoother adoption of the guide as they have already been implementing their own SDD guideline. They pointed out that the main facilitator would be to identify the differences between their current SDD clinical pathway and our newly developed clinical pathway and discuss/consult with the medical and nursing teams before introducing this new clinical pathway.

On the other hand, some participants highlighted that integrating new practices required time and more experience, as exemplified in the following quote.

> "*There was a time, I can remember when we would get very excited about doing a Fractional Flow Reserve* [a cardiac procedure] *… So that's within 10 years or so the same for things like atherectomies and other types of imaging. So, as we become more comfortable with it, then I think people will start to utilise same-day discharge and things like that.*" (ID 16)

SDD post-PCI as a springboard

A few participants were very excited about implementing this new SDD clinical pathway and they believed their positive results from doing SDD helped them along the way. As such, they already looked into developing this service to other areas and perceived same-day PCI as a springboard to launch further expansion.

> "*We are looking to expand our SDD into some of the more electrophysiological procedures. So, I think we're using the PCI as a springboard…*" (ID 20).

Discussion

This study reveals the perceived barriers and facilitators to adopting a consensus-based SDD clinical pathway from the perspectives of doctors, nurses, patients, and their carers using TDF to categorise them. This study found six dominating domains representing the barriers and facilitators to the SDD implementation, including (1) knowledge, (2) social/professional role and identity, (3) environmental contexts and resources, (4) beliefs about consequences, (5) memory, attention, and decision-making, and (6) beliefs about capabilities.

The findings of this study highlight the interrelatedness and overlap of constructs within TDF domains, which are recognised in literature and reported in some studies looking at barriers and facilitators to implementation [32–34]. An example is the interrelationship of the *knowledge* domain with the domain of *beliefs about consequences*. If staff members have a clear understanding of the benefits of SDD (*knowledge domain*), their concerns about potential complications may be reduced (*beliefs about consequences domain*), and thus more likely to support the implementation of the SDD clinical pathway. This aligns with the sociological principle of *collective consciousness* [35,36], arguing that to strengthen social cohesion and collective commitment to implement new practice, there needs to be a shared awareness of its benefits and challenges. In the context of implementing SDD post-PCI, we theorise that shared awareness and understanding of the practice encourage stakeholders to align their efforts and strengthen the foundation of sustainable implementation of SDD.

Key barriers identified in this study revealed complex dynamics of logistical, professional, and socio-cultural challenges that could influence the adoption of SDD post-PCI, particularly related to the *environmental contexts and resources* and *beliefs about consequences*. These findings were in line with what was reported in a study, where some participants were conservative with the SDD criteria due to beliefs about the complications and there was a lack of dedicated resources during the SDD implementation [14]. As our study was based on six public hospitals, our unique finding of logistical limitations, particularly in smaller hospitals with no surgical backup that makes re-admission challenging, can limit the adoption of SDD. Hence, contextual factors must be considered when developing strategies to address the identified barriers in line with the United Kingdom's Medical Research Council framework for process evaluation of complex interventions [37].

Main facilitators for implementing SDD were identified particularly within the domains of *social/professional role and identity* and *knowledge*. Effective leadership, benchmarking, and inter-hospital consultation and collaboration in managing patients were seen by participants as key drivers to successfully implement SDD. All these drivers were not identified in a previously similar study exploring barriers and facilitators to the SDD implementation [14], which may explain why the implementation appeared problematic in their study. The role of champions has also long been used in facilitating and promoting behaviour change and evidence-based practice in healthcare [17,38,39]. Such interventions were seen by participants in our study to increase buy-in and sustained adherence. In the 2021 American College of Cardiology consensus statement, the use of champions has been recommended to advocate and facilitate the adoption of SDD post-PCI [40]. Targeted education sessions were also seen by participants as potentially effective tools to enhance adherence to the SDD clinical pathway, which has been considered an important strategy to facilitate any implementation [41]. Understanding these facilitators before the implementation is critical as strategies can be put in place beforehand to enable a smooth implementation [42,43].

Strengths and limitations

Strengths of this study include (1) having participants from multiple sites with variations from the cardiac service size, geographical location, and the population which enables the deep understanding of the contextual issues in implementing the consensus-based clinical pathway; (2) having participants with a range of experience levels and targeted disciplines across the study sites to gain multiple perspectives; and (3) the use of an underpinning framework (TDF) for the data analysis [31]. Assessing the perceived barriers and facilitators aligns with the recommendations outlined in the Knowledge to Action Framework [42,43], a framework that synthesised commonalities in more than 60 existing theories.

The study also has some limitations. First, some participants were either known to the interviewer or part of the research team; hence, they may have changed the way they responded to our interview questions. While providing rich data on barriers and facilitators to the future clinical pathway implementation, the findings represent a 'snapshot' in time which could change depending on many factors and the local context of the implementation efforts [42]. Furthermore, we had challenges in recruiting more patients and carers. However, the patient and carer interviews conducted did provide valuable insights into their experiences and perspectives of SDD, which complemented the data obtained from the clinicians. Finally, healthcare systems in Australia is broadly similar across states/territories, such as hybrid public–private model and universal healthcare access via Medicare [44]. However, service utilisation and access can vary, e.g., in rural and remote areas in Queensland [45] compared to more densely populated areas in states like Victoria and New South Wales [46]. Hence, our findings may not apply to other healthcare settings both within and beyond Australia. Despite the limitations, the barriers and facilitators identified in our study are important for any clinician who considers introducing SDD for elective PCI or other cardiac procedures in their healthcare settings. The study findings provide guidance for developing implementation strategies aimed at improving the clinical pathway implementation. Future research could examine whether tailored implementation strategies based on the barriers and facilitators identified in this study are effective and confirm whether the perceived barriers were actual barriers to the implementation.

Conclusion

Implementing SDD post-PCI is multifaceted. Leaders in public health policy and organisations must consider a range of interconnected influences and pre-empt potential problems when implementing this consensus-based SDD clinical pathway. The interviews enabled clinicians and consumers to identify areas in need of change, reflect on perceived barriers and facilitators, and how they could be targeted or facilitated with behaviour change interventions. By leveraging these factors identified, a coordinated approach across institutions to implementation can shift its focus on strengthening knowledge, fostering a culture of support within peer and leadership teams, optimising logistical processes, and promoting inter-professional and inter-hospital collaboration.

Ethical statement

This study was conducted in compliance with all stipulations of the study protocol, the conditions of the ethics committee approval, the NHMRC National Statement on Ethical Conduct in Human Research (2007) – Updated 2018, and the NHMRC and Universities Australia Australian Code for the Responsible Conduct of Research (2018). Ethics were approved through the Queensland Health Services (HREC/2023/MNHB/103471) and the universities (A232031; 6925).

All participants were provided with the study information. They were reassured by the data collector that participation in the study was entirely voluntary and that they could discontinue an interview at any time without any consequences if they felt uncomfortable. Written consent was obtained before the interviews, and all collected data were de-identified and stored following the National Health and Medical Research Council Guidelines (2018).

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CRediT authorship contribution statement

Yingyan Chen: Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Jacqueline Peet:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation. **Natalie Hausin:** Writing – review & editing, Methodology, Investigation, Data curation. **David Hinds:** Writing – review & editing, Methodology, Investigation, Data curation. **Rohan Jayasinghe:** Writing – review & editing, Methodology, Investigation, Data curation. **Wendy Kennedy:** Writing – review & editing, Methodology, Investigation, Data curation. **Suzanne Morris:** Writing – review & editing, Methodology, Investigation, Data curation. **Rohan Poulter:** Writing – review & editing, Methodology, Investigation, Data curation. **Gregory Starmer:** Writing – review & editing, Methodology, Investigation, Data curation. **Yash Singbal:** Writing – review & editing, Methodology, Investigation, Data curation. **Anna Townsend:** Writing – review & editing, Methodology, Investigation, Data curation. **Paul Wallis:** Writing – review & editing, Methodology, Investigation, Data curation. **Raibhan Yadav:** Writing – review & editing, Methodology, Investigation, Data curation. **Zhihua (Michael) Zhang:** Writing – review & editing, Methodology, Investigation, Data curation. **Karen Wardrop:** Writing – review & editing, Methodology, Investigation, Data curation. **Junel Padigos:** Writing – review & editing, Formal analysis. **Frances Fengzhi Lin:** Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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