

Developing a Same-Day Discharge Clinical Pathway for Patients Undergoing Elective Percutaneous Coronary Intervention Using a Nominal Group Technique



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Background

Same-day discharge (SDD) following elective percutaneous coronary intervention (PCI) has gained popularity; however, uptake varies worldwide, and existing SDD consensus documents have largely been developed without input from clinicians and consumers. We aimed to develop an SDD clinical pathway in collaboration with clinicians, patients, and carers.

Method

This was a mixed-methods study. The AGREE II instrument was used to guide the development of the SDD clinical pathway to ensure rigour. A hybrid workshop, allowing both online and in-person attendance, was conducted with participants from six public hospitals in Queensland, Australia. The project funded all participants' travel to the workshop to maximise in-person attendance. A modified seven-step nominal group technique was used to guide the workshop and refine the clinical pathway. Sessions in Step 4 (participants presented ideas one by one) and Step 5 (researchers provided clarification) were audio-recorded and transcribed verbatim. Deductive content analysis was undertaken. We counted and recorded numbers for quantitative data.

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Results

A total of 15 participants took part in the study, including nurses (n=6), medical officers (n=5), patients (n=3), and a carer representative (n=1). Consensus was achieved for six out of seven pre-PCI factors, all 14 post-PCI factors, all nine pre-discharge checklist statements, and all five risk management statements. All participants agreed that, despite the consensus, the final SDD decision should remain with the interventional cardiologist performing the procedure.

Conclusions

Our approach has demonstrated that the developed clinical pathway is not only evidence-based but also considers contextual factors and the needs of consumers. It will assist clinicians in making decisions about SDD in hospitals, thereby enhancing the efficiency of cardiac service delivery and improving patient satisfaction.

Keywords

Consensus-based clinical pathway • Clinical pathway development • Nominal group technique • Patient involvement • Percutaneous coronary intervention • Same-day discharge

Introduction

Percutaneous coronary intervention (PCI) is the most common procedure worldwide to treat obstructive coronary heart disease. Between 2013 and 2017, the number of PCI procedures in the United States rose by 15.8%, increasing from 550,872 to 637,650. In Japan, the volume grew by 36% during the same period, from 181,750 to 247,274 [1]. In 2018–2019, 45,900 PCIs were performed in Australia [2], and in Queensland, 5,145 PCIs were performed in public hospitals annually in 2023–2024, with 21.2% elective PCIs [3]. Patients who undergo elective PCI through either the femoral or radial approach have traditionally been admitted to hospital owing to concerns about post-procedure complications [4,5]. However, same-day discharge (SDD) following elective PCI has been demonstrated to be as safe as an overnight stay [6–8]. SDD also leads to a reduced length of stay and decreased health care costs [9–11], while improving patient satisfaction [12–14].

Despite the mounting evidence about SDD safety and benefits, the rates of SDD vary worldwide, ranging from 0%–83% [9,11,15,16]. There is also inconsistency in the SDD criteria reported in the literature, with some studies reporting conservative criteria [17], while others utilise more liberal criteria [12,18]. Consequently, the number of patients discharged on the same day varies greatly across settings, which may show little benefit to health care organisations and patients. In 2018, the Society for Cardiovascular Angiography and Interventions published an updated consensus statement, outlining favourable patient, procedural, and institutional characteristics for expedited SDD following elective PCI [5]. This consensus document focuses on the “three Ps,” including procedure, patient, and program, when guiding the adoption of SDD, regardless of patient presentation and access sites. The consensus recommendations [5], together with the American College of Cardiology expert consensus decision pathway [19], are intended to support cardiologists’ reasonable judgement to facilitate early discharge following PCI. However, they may not fit into Australian clinical practice, as they mainly draw evidence from

studies conducted in European countries and the United States. There is a need to complement these international consensus documents by developing a clinical pathway that can be used at a local level to guide the SDD decision-making process.

Locally, we analysed data from two databases for 4,387 patients who underwent elective PCI between December 2012 and December 2019 across six public hospitals in Queensland, Australia. Our findings show limited implementation of SDD in these hospitals and recommend strategies to increase the adoption of SDD, including an examination of the current SDD criteria [20]. To our knowledge, the current SDD consensus documents available have been largely externally designed and researcher-led, with limited or no involvement of clinicians and consumers during development [12,21]. Accordingly, we conducted our current study to develop an SDD clinical pathway with clinicians and consumers. We declare that there is no conflict of interest, not only for the authors of this article but also for any experts involved in the development of the draft clinical pathway or consultation process.

Methods

Study Design

This was a mixed-methods study, reporting on the SDD clinical pathway development using a modified nominal group technique (NGT) [22]. The NGT is a highly structured face-to-face group interaction where everyone has an equal opportunity to contribute their views and then develop their own thoughts through the discussion and reflections of others before reaching consensus on a given topic [23]. This technique has been utilised in health care settings to develop criteria by achieving consensus [22] or to determine research priorities [24]. The traditional NGT proposed by Delbecq et al. [25] includes five steps: silent idea generation, round robin, clarification, voting, and discussion. We also followed the AGREE II guidance [26] when developing this clinical pathway.

Participants and Recruitment

A purposive sampling technique was used, as we only recruited participants who had expert insight into a particular area of interest, which is SDD. We aimed to recruit four participants for each hospital site (one interventional cardiologist, one nurse, one patient, and one carer) ($n=24$). Staff (doctors and nurses) working at each cardiac service site of the six hospitals were invited to participate in this study. The six Queensland public hospitals included two referral hospitals in major cities and four regional acute hospitals.

To recruit staff from each site, the Principal Investigator (PI) approached the nurse unit managers and cardiology directors, asking them to identify one interventional cardiologist and one nurse from each site to participate in our workshop. There were no exclusion criteria for staff unless they were not willing to participate or had no knowledge or experience in SDD practice.

A research team member (nurse) at each site was responsible for recruiting patients and their carers to the workshop. The nurses approached and invited consecutive patients who arrived in the cardiac catheterisation laboratory for an elective PCI and who met pre-procedure eligibility for SDD to participate in the study. Patients and their carers were excluded if they had cognitive impairment or were not willing to participate.

Drafting the SDD Clinical Pathway

The SDD clinical pathway was drafted with clinicians and consumers based on a comprehensive integrative review, our previous research experience [14,17,21,27,28], clinicians' and consumers' experience and expertise, and the individual needs of the participating hospitals.

We conducted an integrative review in November 2023 to answer the following question: "How safe is SDD compared to overnight stay for patients who undergo elective PCI in a hospital setting, and what are the SDD criteria being used in the literature?" Four databases were searched, including the Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, Scopus, and Cochrane. Articles were included if they were written in English after January 2014 (the published integrative review [27] had a literature search up to January 2014) and focused on investigating the outcomes of SDD following elective PCI. The methodological quality of the included studies was assessed using the Critical Appraisal Skills Program [29] quality assessment tool. A total of 39 papers were included in the review, comprising 33 observational studies, three randomised controlled trials, and three systematic reviews. The findings show that SDD is safe if patients are properly assessed. The findings also show that SDD criteria have been evolving, with more liberal criteria being reported in the literature that accompany positive patient outcomes.

The draft clinical pathway contained two main sections, including SDD criteria in two periods (pre-PCI and post-PCI), a pre-discharge checklist, and risk management

questions. Each criterion included more than one choice, from the most stringent to the most liberal, and included research evidence when available. For example, the age cut-off for SDD had five choices: 18–65 years, 18–75 years [30–32], 18–80 years [11,17,33,34], 18–100 years [35,36], and above 18 years with no upper limit. The PI worked collaboratively on this draft with the research team members, including one consumer representative, to reach agreement on the completeness of the content in the draft clinical pathway. Once the draft clinical pathway was complete, it was circulated among the cardiac clinicians in the six hospitals for their feedback and revised accordingly. Hence, the nominal question was: "What criteria and risk management can we achieve consensus on in the draft SDD clinical pathway so that we can implement the clinical pathway in our hospitals to increase SDD uptake?"

Preparation Before the NGT Workshop

Although Delbecq *et al.* [25] did not specify that briefing information should be provided to participants before the NGT, some researchers suggest briefing information as a valid option [37]. In our study, all participants were emailed the draft clinical pathway and integrative review documents 1 week before the NGT. Additionally, the PI prepared four sets of Mentimeter questions, including seven pre-PCI factors, 14 post-PCI questions, nine pre-discharge checklist questions, and five risk management questions. Mentimeter [38] is an online presentation tool that can also be used as a survey tool to allow participants to vote on their responses to questions.

Pre-Voting Before the NGT

Not all members from the six sites were able to attend the in-person workshop due to logistical considerations and busy work schedules. Hence, those who were unable to attend the workshop were asked to provide one round of pre-voting for each criterion before the workshop.

The NGT Workshop

We carried out the NGT through a 7-hour workshop from 08:00 to 1:500 on 24 May 2024 in a centrally located conference room for participants. The workshop accommodated 10 participants, one facilitator (the PI), and two researchers (observers), with one participant joining via ZOOM (version 5.12.9). The participants were seated around three tables. Each participant received paper-based copies of the workshop schedule and the draft clinical pathway, along with pens in different colours. Each table was also provided with butcher's paper for participants to write on during the discussion. A group of 6–12 participants is considered manageable when conducting NGT [39].

Our modified NGT involved seven steps during the workshop, with details shown in Figure 1. We ensured that voting scores were recorded clearly during each voting process. We audio-recorded the sessions in Steps 4 and 5

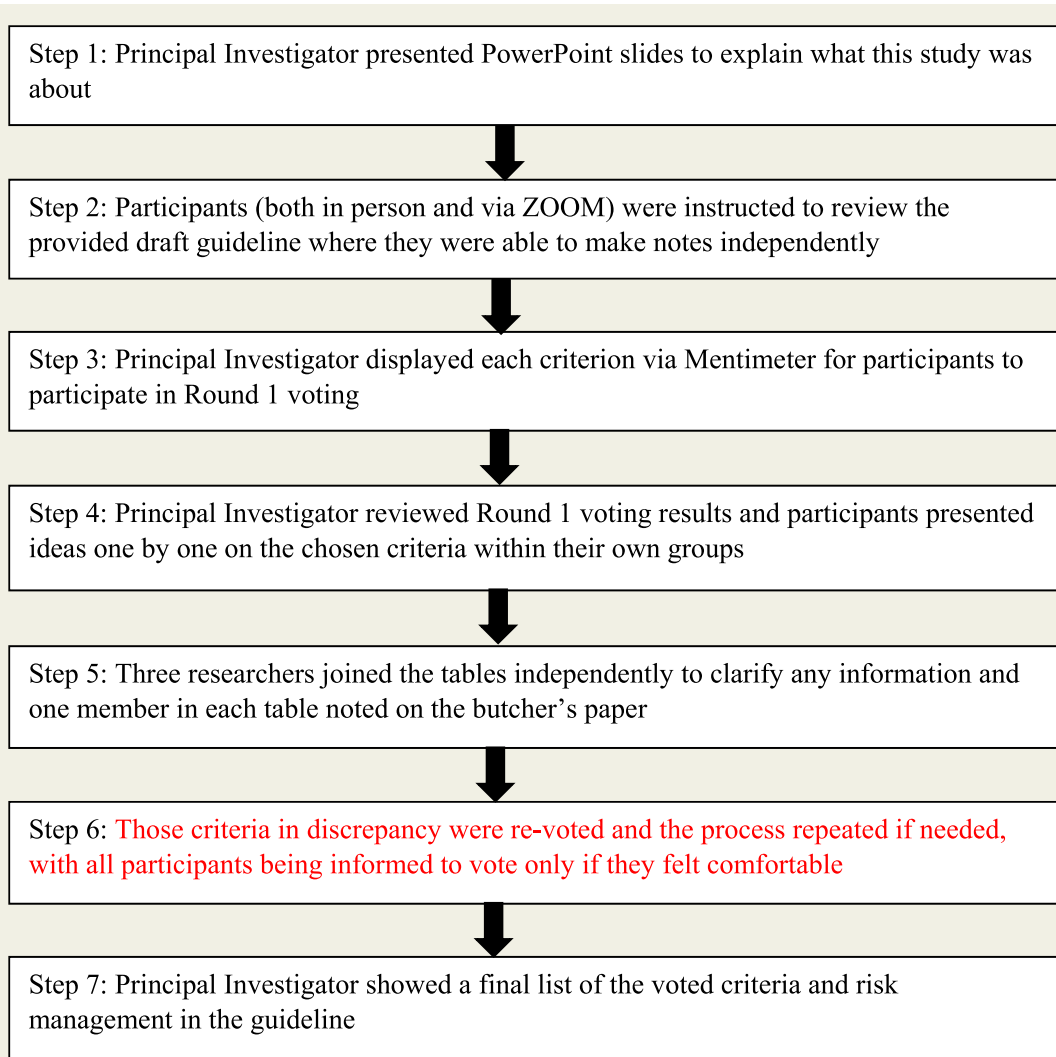


Figure 1 Modified seven-step NGT.

and collected any paper-based written information, such as group notes on butcher's paper and written notes from the observers. Notes from the online participants were also collected. A professional transcriber transcribed the audio recordings. The senior author (F.F.L.) has strong expertise in NGT and clinical pathway development research.

Data Analysis

Following data collection, two authors (Y.C. and J.P.) independently reviewed all data sources and checked data accuracy. The transcripts and workshop notes were imported into NVivo to assist with data analysis. We used a deductive content analysis approach, which involved breaking the text into reasonably small units of content to obtain a concise and broad description of the phenomenon under investigation [40]. In our study, the phenomenon was related to SDD criteria and risk management. We read the transcripts and workshop notes several times to ensure a full understanding of the data before commencing deductive coding

using the pre-existing criteria and risk management categories. The data analysis was presented to core research team members before the whole team reviewed the findings. Due to the relatively small sample, we counted and recorded numbers for quantitative data.

Ethical Considerations

We obtained ethics approvals from the healthcare services (HREC/2023/MNHB/103471) and the universities (A232031; 6925) involved in the study. All participants were provided with a study information sheet and explanation and were informed of what participation entailed, including their commitment, risks and benefits, and strategies to mitigate or manage risks if needed. Once participants agreed to participate in the study, they returned the signed consent form via email before the workshop or handed in a paper-based consent form on the day of the workshop. All data collected were kept securely and confidentially.

Results

Participants

A total of 15 participants participated in the NGT, including those who provided pre-votes ($n=4$), attended the in-person workshop ($n=10$), and joined the workshop via ZOOM ($n=1$). Six participants were senior registered nurses working in cardiac catheterisation laboratories (nurse unit manager [$n=1$], clinical nurse [$n=1$], and clinical nurse consultants [$n=4$]), five were medical officers, including interventional cardiologists ($n=2$) and advanced cardiac trainees ($n=3$), three were consumers who had previously undergone PCI, and one was a carer representative.

NGT Findings and Consensus

Through the various stages of the NGT process, the participants reached consensus on some of the SDD criteria and risk management. [Tables 1–4](#) and [Supplementary Tables S1–S4](#) provide details of the voting scores, consensus, and discussion after Round 1.

Pre-PCI Factors

We achieved consensus for six out of seven pre-PCI factors ([Table 1](#) and [Supplementary Table S1](#)): 1) Age cut-off of 18–100 years for SDD; 2) Living within 1 hour's of drive to the closest care centre; 3) Must have a responsible carer at home; 4) Patient and/or carer must speak English; if not, an interpreting service can be used; 5) Having normal kidney function; 6) Patients must agree to the plan for SDD. No consensus was achieved in relation to left ventricular ejection fraction.

Table 1 Pre-PCI factors.

Pre-PCI factor for voting	Consensus (Conditions where a patient is suitable for SDD)
Age cut-off for SDD	18–100 years
Distance from home to the treating PCI centre	Live within 1 hour's drive to the closest care centre
Carer at home	Must have a responsible carer at home
Language	Patient and/or carer must speak English; If not, an interpreting service can be used
eGFR	Normal renal function
LVEF	No consensus
Willingness of SDD – shared decision-making	The patient needs to agree on the plan of SDD

Abbreviations: eGFR, estimated glomerular filtration rate; LVEF, left ventricular ejection fraction; PCI, percutaneous coronary intervention; SDD, same-day discharge.

Regarding driving distance, all participants agreed to revise the criterion from living within 1 hour's drive of a PCI-capable centre to the closest care centre. The rationale for the change is that acute thrombosis following elective PCI is rare. Therefore, participants commented that the key concern is not the distance from the hospital but how quickly patients can access care if complications arise after SDD. Participants defined the closest care centre as a facility where medical care is available when patients need to see a doctor or nurse immediately, even if PCI is not available, such as a local hospital. Although we achieved consensus on having normal renal function, the discussion following this was more of a critique of the criterion being too conservative. Participants recommend an estimated glomerular filtration rate (eGFR) of 40 mL/min/1.73 m² and above for SDD.

Post-PCI Factors

We achieved consensus for all 14 post-PCI factors ([Table 2](#) and [Supplementary Table S2](#)). The consensus related to having PCI completed before 14:00, limiting PCI to procedures performed from Monday to Friday, and regardless of access site and number of stents. Participants agreed to consider SDD when patients undergo PCI to bifurcation, left

Table 2 Post-PCI factors.

Post-PCI factor for voting	Consensus
PCI completion time	Before 14:00
PCI completion day	Limited to PCI performed from Monday to Friday
Access	Regardless of the access
Vessels involved – Bifurcation	Can be for SDD if all other criteria are met for SDD
Vessels involved – LAD with RCA	Can be for SDD if all other criteria are met for SDD
Vessels involved – OM2 with PDA	Can be for SDD if all other criteria are met for SDD
Vessels involved – Graft	Can be for SDD if all other criteria are met for SDD
Vessels involved – Left main	Exclude patients who had left main PCI from SDD
Vessels involved – Chronic total occlusion	Exclude patients who had chronic total occlusion from SDD
Vessels involved – Last remaining vessel	Exclude patients who had PCI to the last remaining vessel from SDD
Vessels involved – Atherectomy	Exclude patients who had atherectomy from SDD
Number of stents	Regardless of the number of stents
Successful PCI	TIMI 3 flow for SDD
Sheath size	No need to mention the sheath size

Abbreviations: LAD, left anterior descending; OM, obtuse marginal; PCI, percutaneous coronary intervention; PDA, posterior descending artery; RCA, right coronary artery; SDD, same-day discharge; TIMI, thrombolysis in myocardial infarction.

anterior descending with right coronary artery, obtuse marginal 2 with posterior descending artery, and grafts, if all other criteria are met for SDD. However, they agreed to exclude patients from SDD if the procedures involve the left main, chronic total occlusion, last remaining vessel, or atherectomy. Participants agreed that sheath size would not need to be considered when assessing suitability for SDD.

Pre-Discharge Checklist

We achieved consensus for all nine pre-discharge checklist statements (Table 3 and Supplementary Table S3). Participants agreed to include the following in the checklist: 1) At baseline comorbidities; 2) No chest pain and access site complications during the 4-hour observation; 3) Seen by a pharmacist; 4) Walking freely and tolerating diet and fluids; 5) Providing discharge instructions to patients and carers; 6) Shared decision-making. The initial checklist of 'at baseline mental status' was discontinued as it was deemed inappropriate on this occasion, and the wording was changed to 'no new neurological changes'. The initial checklist item of

'seen by a cardiac rehabilitation nurse' was also discontinued as not all six sites have this service, and a senior nurse can act in this role.

Risk Management

We achieved consensus for all five risk management statements (Table 4 and Supplementary Table S4). Participants agreed to have the PCI procedure scheduled early in the day, provide phone numbers for patients and carers to call if any issues, and conduct a phone follow-up by a cardiac catheterisation laboratory nurse. Although 14 out of 15 participants agreed that the SDD list should be handed over to the coronary care nurse-in-charge, this practice has been considered unnecessary during the post-consensus discussions as SDD is no different from other discharges. Similarly, the consensus of a phone follow-up at 30 days of discharge was considered unnecessary during the post-consensus discussions.

Discussion

This study aimed to develop a consensus-based SDD clinical pathway with clinicians and consumers, with the hope of improved uptake of SDD with more patients going home the same day following elective PCI. The voting scores and

Table 3 Pre-discharge checklist.

Pre-discharge checklist for voting	Consensus
At baseline comorbidities	The medical team should assess all patients to ensure their comorbidities are stable from the baseline before discharge
At baseline mental status	No new neurological changes before discharge
No ongoing chest pain during the 4-hour observation	No chest pain before discharge
No access site complications during the 4-hour observation	No access site complications before discharge
Seen by the pharmacist	A patient needs to be seen by the pharmacist before discharge
Seen by the cardiac rehabilitation nurse who also makes the referral	A patient does not need to be seen by the cardiac rehabilitation nurse before discharge
Walks freely and tolerates diet and fluids	A patient needs to walk freely and tolerates diet and fluid before discharge
Patients and carers are given discharge instructions with paperwork and education	Patients and carers are given discharge instructions with paperwork and education before discharge
Patients, carers, and clinicians are happy for SDD – Shared decision making	Patients, carers, and clinicians need to be happy with SDD before discharge

Abbreviations: SDD, same-day discharge.

Table 4 Risk management.

Risk management for voting	Consensus
The procedure will be scheduled early in the day	Agree that the procedure needs to be scheduled early in the day
What do you do with the list of all SDD patients of the day?	The list should be handed over to the CCU nurse-in-charge
Contact information for patients after SDD: Patients can call the cardiac catheterisation laboratory number from 07:00–18:00 Monday to Friday, and the CCU number for other times if needed, within 24 hours of discharge	Contact information for patients after SDD should be provided to patients/carers before discharge
A cardiac catheterisation laboratory nurse will conduct a phone follow-up within 24 hours of discharge	Agree to have a cardiac catheterisation laboratory nurse conduct a phone follow-up within 24 hours of discharge
A cardiac catheterisation laboratory nurse will conduct a phone follow-up at 30 days of discharge	Agree to have a cardiac catheterisation laboratory nurse conduct a phone follow-up at 30 days of discharge

Abbreviations: CCU, coronary care unit; SDD, same-day discharge.

subsequent discussions provided some guidance in terms of what criteria patients need to meet to be considered for SDD and what risk management strategies are in place to ensure patients are safe.

Key findings from our pre-PCI factors are that participants reached a consensus on SDD for the age cut-off of 18–100 years and living within 1 hour's drive to the closest care centre. These criteria appear to be more liberal than what has been reported in the literature, such as the age of 18–75 years old [30–32] and living 1 hour's drive to the PCI-capable centre [17,41–45]. In our study, participants agreed that conducting a formal frailty assessment is more appropriate than using age as a limiting factor, as the impact of age is subjective and varies among individuals. This is in line with the literature that frailty is a barrier to cardiac invasive procedures, not age [46], and assessing for frailty is crucial for older people before PCI [47]. Also, participants in our study agreed to change from the 'distance from the PCI centre' where the procedure was performed to the 'closest care centre', which will offer patients who live farther away from the PCI centres more opportunities to be eligible for SDD if they have access to local hospitals. This decision has been driven by the fact that acute stent thrombosis is rare following elective PCI [6–8], and staff at the local hospitals should be able to manage common procedure-related symptoms, such as chest pain and access site bleeding. However, not all literature supports the consideration of pre-PCI factors. An earlier consensus document shows that essential milestones should be met before considering a patient ready for SDD, regardless of their presentation and pre-PCI factors [5].

One of the important findings from the post-PCI factors is that participants agreed on SDD regardless of access site and number of stents. Radial PCI is often preferred, but with our consensus, patients who have PCI via femoral can also be considered for SDD. This consensus is congruent with the literature that SDD is safe even in patients with femoral PCI [33,45,48–50]. Not limiting the number of stents will also provide more patients with opportunities for SDD. In a recent retrospective study, multivessel stents (three or more) were seen in 19.5% ($n=854$) of all the elective PCIs and only 0.7% ($n=30$) were SDD [20]. If our criterion had been applied in this study, 18.8% of the patients could have been offered SDD [20].

We achieved consensus for all nine pre-discharge checklist statements. It is important to note that we removed 'seen by a cardiac rehabilitation nurse' from the pre-discharge checklist. It is well-known that patients who receive cardiac rehabilitation information during their in-hospital stay are more likely to attend outpatient cardiac rehabilitation to make necessary lifestyle changes, therefore facilitating their self-management of cardiovascular disease [51]. Researchers have found that few nurses provide information about outpatient cardiac rehabilitation programs to their patients during their hospital stay [52], highlighting the importance of providing nurses with education about the importance of providing proper inpatient cardiac rehabilitation. On the other hand, senior cardiac nurses can provide cardiac education and refer patients to outpatient cardiac rehabilitation; however, there are concerns that patients who are

discharged home the same day have a much higher likelihood of not attending outpatient cardiac rehabilitation [20]. Reasons for this low attendance are multifaceted, such as their false impression that their cardiovascular disease has been fixed as a result of shortened hospital length of stay [53,54]. Given the benefits of attending outpatient cardiac rehabilitation, future research could evaluate how this criterion affects patients' attendance in cardiac rehabilitation.

All participants in our study agreed on the importance of shared decision-making among clinicians, patients, and carers before the procedure and the discharge. Through the literature search of our integrative review, we only found one observational study clearly emphasising the importance of shared decision-making by involving patients and carers [12]. Patients and carers should be involved in their care process as part of person-centred care [55] which empowers their long-term disease management and is associated with high patient and family satisfaction [28]. In a most recent consensus document, asking if the patient is willing to be discharged the same day occurs at both the pre-procedure and post-procedure evaluations to reinforce patient-centred care [19]. For instance, our participants agreed on 'regardless of access'; however, patients worry that carers might panic and carers fear they would be overly anxious and vigilant throughout the night if their PCI was undertaken by the femoral approach. Also, shared decision-making has been emphasised in a recently published clinical guideline for diagnosing and managing acute coronary syndrome [56]. Although strategies can be developed to increase patients' and carers' confidence in femoral PCI, patients play an important role when deciding on SDD, and shared decision-making must be taken into consideration among clinicians, patients, and carers [4].

The main findings related to risk management are agreeing on the early procedure schedule on the day, providing phone numbers for patients and carers to call, and conducting next-day phone follow-up. Scheduling the procedure early on the day has been identified as one of the contextual factors that allows a sufficient period of post-PCI monitoring, resumption of baseline mobility status, and SDD at a reasonable time [19]. This is a reasonable approach as patients need to be observed at least 4 hours after the procedure, and most cardiac catheterisation laboratories close at 18:00. Providing phone numbers to patients and carers is also important for any emergency consultation [9], and in one study, patients were given the phone number of emergency services (24/7) [57]. Given the importance of phone number provision, patients and carers must be ensured to have phone access to be able to go home the same day [33]. In our study, one participant (patient) wanted the phone number on a sticky note of an envelope for easy access rather than buried in discharge paperwork, while another participant (carer) described instinctively dialling 000 when complications arise. Hence, we agreed that patients and carers should be instructed to call 000 if other phone numbers are not accessible. Also, a phone follow-up within 24 hours of discharge must be conducted to ensure patients have an uneventful night following PCI [12,32,41].

Compared to existing documents [5,19], our consensus-based clinical pathway may seem conservative. There are notable points of agreement and divergence. In our study, patients will need to meet several criteria before the procedure, such as age, distance from home to the closest care centre, and eGFR. However, in Seto et al. [5]'s consensus document, they do not include any of our pre-procedure criteria, given that the patient is clinically stable with baseline functional, mental, and comorbidity status. Similarly, Rao et al. [19] do not confine those pre-procedure criteria that we have in our study, but they emphasise the importance of social factors, such as ensuring patients and carers being able to call for help, and system factors, such as scheduling procedures early enough in the day to facilitate SDD. It must be noted that those important considerations from both consensus documents have been incorporated into our risk management plan. For post-PCI factors, similar to our study findings, Seto et al. [5] allow patients for SDD if a successful procedure, including multivessel PCI and bifurcation PCI, regardless of the number and length of stents used, and excluding the last remaining artery and atherectomy. However, our clinical pathway appears more specific, including PCI to vessels with left anterior descending and right coronary artery (did not specify proximal left anterior descending), obtuse marginal artery 2, and posterior descending artery, and grafting, but excluding PCI to left main coronary artery and chronic total occlusion. In Rao et al. [19]'s consensus document, the post-PCI considerations are broad, including whether any complications occurred during and after the procedure, whether successful PCI, and whether there are any changes in mental status and comorbidities. Our pre-discharge checklist is in line with what has been reported in Rao et al. [19]'s consensus document and the recently published acute coronary syndrome diagnosis and management guideline [56], such as including referral to cardiac rehabilitation, appropriate discharge instructions, and follow-up planning. Consistent with the literature [5,19], it is important that our clinical pathway is not to be considered prescriptive, but rather to support the clinician's reasonable decision-making about SDD.

Finally, our participants have made clear that the interventional cardiologist who performs the procedure will make a final decision if SDD is to occur despite the consensus. This is in line with the previous consensus documents, intending to support clinicians' reasonable clinical decision-making regarding SDD, rather than prescribing what has to occur [5,19]. For instance, our participants agreed that patients could be for SDD regardless of the number of stents and the sheath size. However, if the interventional cardiologist feels uncomfortable about sending a patient home on the same day, they have the right to override the clinical pathway by monitoring the patient overnight in the hospital, despite all the criteria are met. This intention is particularly important given that the thresholds for SDD safety continue to be defined [58], and a final medical decision must be made based on individual, procedural, and patient factors before SDD [4,5,19].

Implications for Clinical Practice and Future Research

Implementing SDD in Queensland, where it contains geographically dispersed communities, can pose unique challenges that require thorough consideration. These may include additional risk stratification, for example, ensuring patients and their carers have access to phone and post-discharge services if any post-discharge complications occur [59,60]. Clinicians must assess patients' suitability for SDD carefully and consider fully their medical conditions and existing support systems before hospital discharge. In addition, clinicians from the PCI centres could collaborate with clinicians in local hospitals (where PCI is not available) to identify their knowledge and skills in managing post-PCI complications and provide support and training if needed [61]. This collaboration has been explored in other cardiac services that have improved clinical outcomes and patient satisfaction [62,63]. Furthermore, telehealth services [64,65] have been reported to help manage cardiovascular disease, which could be developed and implemented to ensure patients receive adequate care following SDD without restriction of their geographical locations.

Future research could focus on evaluating patient- and carer-reported outcomes and experiences in various settings, including in regional and remote communities. Additionally, qualitative research can be useful to explore the barriers and facilitators to implementing this consensus-based clinical pathway [21,61], especially regarding how we can support SDD with those who live far away from the PCI centres. Furthermore, the integration of telehealth and local hospital services to support post-discharge care could be evaluated in terms of their impact on patient outcomes and hospital resource utilisation as a result of improved access to care [66]. These future research endeavours may help further refine our consensus-based clinical pathway, which is essential to maintaining and optimising high-quality patient care.

Strengths and Limitations

To our knowledge, this is the first study reporting the rigorous development of an SDD clinical pathway with the involvement of clinicians and consumers as recommended by AGREE II [26]. The two main advantages of conducting this NGT workshop in our study were to initiate meaningful dialogue among researchers, clinicians, and consumers and to gain consensus between SDD criteria recommended by research evidence and the experience of clinicians and consumers in the SDD process. However, while many clinicians supported a face-to-face consensus process, it was challenging for them to be released from their departments in the six participating hospitals. As a consequence, our sample size was less than what we predicted, with 15 participants in the study, and four of them providing pre-votes only. Hence, our consensus might have been different if more participants and those pre-voters had attended in

person. Participants were also instructed not to vote if they were uncomfortable or lacked the knowledge to do so; therefore, not all participants participated in all voting. There was one occasion when participants did not agree on the consensus of normal renal function during the discussions, which may be due to some participants not understanding some of the criteria, but still voting. Finally, questions were raised during the voting process, and consequently, some wording has been revised, such as changing from a PCI centre to a local care centre when referring to driving distance. Despite these limitations, we provided a detailed recording of each voting stage and summarised our discussion points to supplement the achieved consensus.

Conclusions

We developed the SDD clinical pathway using the NGT through the collaborative involvement of researchers, clinicians, and consumers, which has been proven to be comprehensive and effective. This interdisciplinary approach has ensured that our SDD clinical pathway is evidence-based, considers the contextual factors and the needs of consumers, and highlights the integration of research evidence, clinical expertise, and consumer perspectives. Our developed clinical pathway can be used by clinicians in their decision-making about SDD, which will ultimately promote SDD uptake and shorten patient hospital length of stay. These will subsequently improve resource efficiency, enhance cardiac service delivery, and patient experiences.

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Declaration of Competing Interests

There are no conflicts of interest to declare.

Author Contributions

Y.C. and F.F.L.: Conceptualisation, Methodology, Investigation, Data Curation, Formal Analysis, Writing - original draft, review, & editing; J.P.: Methodology, Investigation, Data Curation, Formal Analysis, Writing - original draft, review, & editing; N.H., D.H., W.K., S.M., A. T., P.W.: Methodology, Investigation, Data Curation, Writing - review & editing; R.J., R.P., G.S., Y.S., R.Y., M.Z.: Methodology, Investigation, Writing - review & editing; K.W.: Methodology, Investigation, Data Curation, Writing - review & editing; J.P.: Formal analysis, Writing - review & editing).

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Appendices

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