2016

Evidence review: implementation strategies for same day discharge post percutaneous coronary intervention: an integrative review

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Publication details
Published version available from http://doi.org/10.1111/wvn.12163
IMPLEMENTATION STRATEGIES FOR SAME DAY DISCHARGE POST PERCUTANEOUS CORONARY INTERVENTION: AN INTEGRATIVE REVIEW

Since percutaneous coronary intervention (PCI) was first introduced in 1977, this procedure has undergone rapid evolution to become one of the most widely performed cardiac procedures (Goodman et al., 2009) with an estimated 3 million being performed worldwide each year (Gerber et al., 2007). However, with improved medical therapy, introduction of drug-eluting stents, publication of the Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluations (COURAGE) trial (Shaw et al., 2008), and the national cardiovascular societies’ efforts through appropriate use criteria (Patel, Dehmer, Hirshfeld, Smith, & Spertus, 2009), there is speculation that the volume of PCI has declined over the last several years suggesting a potential reduction in the rate of PCI internationally, such as has occurred in the United States of America (USA) where a reported 27% reduction in the rate of PCI occurred between 2007-2008 and 2010-2011 (Kim et al., 2014).

Nowadays, diagnosis and treatment of coronary artery disease is more accessible than ever before and treatment interventions, both pharmacological and non-pharmacological are advancing at a rapid pace. These advancements are occurring in the context of a greater awareness of the need for fiscal restraint in the setting of ever increasing demand. Literature suggests that hospital resources are sparse and efficient discharge planning is required to meet the increasing demand for acute care hospital beds (Glasby, Littlechild, & Pryce, 2006; Lewis & Glasby, 2006), which is expected in line with anticipated rise in the overall aging population requiring hospitalisation beds (Kahn et al., 2014). Optimising utilisation of healthcare resources and reducing hospital length of stay for patients undergoing PCI in selected patients is likely to contribute to a reduction in overall healthcare costs (Le Corvoisier et al., 2013).
PCI can be required for urgent and non-urgent reasons. Non-urgent PCI is applied to this review. Traditionally, patients undergoing PCI were hospitalised overnight so that potential risks such as acute vessel occlusion, myocardial infarction (MI) and access site complications could be assessed (Brayton, Patel, Stave, de Lemos, & Kumbhani, 2013). However, the risk of major adverse events is low in contemporary practice (Roe et al., 2010). Further, most adverse events occur within 6 hours of the procedure (Jabara et al., 2008; Small et al., 2007), rather than during extended observation. These factors suggest that same day discharge (SDD), which refers to patients returning home or to pre-admission living circumstance following PCI, may be feasible in selected patients and the practice may lead to reduced healthcare costs and increased patient satisfaction while upholding clinical efficacy and patient safety (Abdelaal et al., 2013).

In reality, for the past 15 years, the safety and feasibility of SDD has been reported in both observational studies and randomised controlled trials (RCTs) as well as two meta-analyses (Abdelaal et al., 2013; Bertrand et al., 2006; Brayton et al., 2013; Heyde et al., 2007; Kiemeneij, Laarman, Slagboom, & Van Der Wieken, 1997; Knopf et al., 1999; Kumar et al., 2004; Slagboom, Kiemeneij, Laarman, & Van Der Wieken, 2005; Ziakas et al., 2003). SDD can reduce healthcare costs (Rinfret et al., 2010), positively impact patient flow (Mavromatis, 2013), increase patient satisfaction (Heyde et al., 2007; Knopf et al., 1999), reduce the risk of developing hospital-acquired complications (Hauck & Zhao, 2011), and increase the opportunity for other patients to receive care in a timely manner. In some healthcare systems, there might be some financial advantages of SDD although this may be contingent on the way in which procedure and hospital costs are reimbursed within specific health systems.

Although research has shown SDD to be safe and feasible, the practice of SDD is variable with uptake being strongest in Europe, Asia, and Canada and less so in the USA.
There is some evidence within published efficacy studies on how to implement SDD in clinical practice.

**Purpose**

The purpose of this review is to describe SDD and summarise strategies to facilitate the implementation of SDD in clinical practice. Therefore, the following research question guided this review: Among patients who undergo non-urgent PCI, what components are included in and which strategies are used to facilitate the implementation of SDD in clinical practice?

**Methods**

The current study uses an integrative review methodology to summarise past empirical or theoretical studies irrespective of methodological underpinnings aiming to provide a better understanding of a particular phenomenon or healthcare problem (Broome, 1993). Therefore, integrative reviews are potential to build nursing science, inform research and clinical practice as well as policy initiatives (Whittemore & Knafl, 2005).

**Search strategy** We searched the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Excerpta Medica dataBase (Embase), Cochrane and Medline databases. Search terms used were: same day discharge, outpatient, day-case, short stay, ambulatory care, percutaneous coronary intervention, outpatient coronary stenting. Articles were included if they were primary studies describing evaluation or implementation strategies for SDD, in English dated from January 1990 to September 2014.

After review of the abstracts and removal of duplicates 74 articles were identified for inclusion. A hand search of the reference lists of these articles was conducted and a further eight articles were identified. We identified seventeen papers that reported on some aspects of SDD implementation. In order to gain more information about implementation strategies, we
contacted 60 corresponding authors of the papers where email was provided as a contact method. We chose to include a further two papers based on receiving the additional information (Hodkinson et al., 2013; Rao et al., 2011). A total of nineteen articles and supplementary information were included in the final review (Figure 1).

**Data extraction and analysis** The quality of the included papers was assessed and scored by two authors using the Mixed Methods Appraisal Tool (MMAT) (Pluye et al., 2011), in which a 100% is the best score. The score for the nineteen papers ranged from 75% to 100% (Table 1). Data were extracted by the first author about study characteristics, study design and sample (Table 1). Information to describe 1) what constituted SDD; 2) patient selection criteria; and 3) strategies used to implement SDD was also extracted and these data were reviewed by all authors. Strategies were defined as those activities or actions used when implementing SDD into clinical practice. Using a deductive content analysis (Elo & Kyngas, 2008), a categorisation matrix was developed and the data were coded based on the categories. Categories that were common among the included nineteen studies are reported in this review.

**Results**

**Study characteristics** Of the nineteen articles included in this review, five were multisite and the remaining fourteen studies were single centre studies. About one third (n=7) of the studies were conducted in the USA (Gilchrist, Rhodes, & Zimmerman, 2012; Glaser et al., 2009; Kim et al., 2013; Knopf et al., 1999; Muthusamy, Busman, Davis, & Wohns, 2013; Rao et al., 2011; Wilentz et al., 1999). The remaining twelve studies were completed in the United Kingdom (n=4) (Brewster et al., 2013; Dalby et al., 2003; Hodkinson et al., 2013; Kumar et al., 2004), Canada (n=2) (Khatri et al., 2002; Lauck, Johnson, & Ratner, 2009), the
Netherland (n=2) (Heyde et al., 2007; Kiemeneij et al., 1997), Turkey (n=1) (Aydin, Gurol, Soylu, & Dagdeviren, 2014), Jordan (n=1) (Khater, Zureikat, Alqasem, Alnaber, & Alhaddad, 2007), Denmark (n=1) (Antonsen, Jensen, & Thayssen, 2013) and France (n=1) (Le Corvoisier et al., 2013). All studies used quantitative methodologies, of which, four were RCTs and the remaining fifteen were observational studies.

**Components of same day discharge**  Although each of the papers described SDD, what this process constituted differed across the nineteen papers included in this review. Each however, basically described patient selection, final review prior to discharge after the period of observation post procedure, discharge instructions and follow up (see Table 2 in supporting information).

**Patient selection**  Patients considered eligible for SDD varied across the studies (see Table 3 in supporting information). Seven studies included only elective PCI in their patient selections, while four studies expanded their patient selections from those receiving elective PCI to other patient groups including those with unstable angina, non-ST elevation MI (NSTEMI) and ST-elevation MI (STEMI) (Aydin et al., 2014), low risk acute coronary syndrome (ACS) (Gilchrist et al., 2012; Hodkinson et al., 2013) and ad hoc PCI (Lauck et al., 2009). Eight studies did not describe elective PCI specifically in their patient selection, but included stable angina as inclusion criteria.

**Review before discharge**  The timing for review of patients prior to discharge was varied across the studies, and ranged from 2 to 10 hours post PCI. Healthcare professionals who undertook this review also differed across the studies. In four studies the review was conducted by a cardiologist (Dalby et al., 2003; Khatri et al., 2002; Lauck et al., 2009; Le Corvoisier et al., 2013), and in one study the review was conducted by a nurse practitioner (Wilentz et al., 1999). Six studies mentioned final review or final assessment prior to
discharge, but did not state who conducted this review. Eight studies did not describe a process of final review.

**Discharge instruction and follow up** Providing verbal discharge advice was described in eight articles with the main focus appearing to be in relation to medication compliance. Only one study reported addressing cardiac rehabilitation (Muthusamy et al., 2013). Cardiac education was only provided in four studies (Gilchrist et al., 2012; Knopf et al., 1999; Muthusamy et al., 2013; Wilentz et al., 1999).

Post discharge follow up was described in fifteen studies with the timeframe varying from 24 hours to 6 months. It was unclear whether the purposes of follow up were for clinical reasons or for research reasons or perhaps both. Follow up was primarily conducted by phone. Most studies conducted follow up within the first 24 hours and 30 days. Thirteen studies were not specific about who conducted the follow up, while others had follow up conducted by a cardiologist (Kumar et al., 2004; Le Corvoisier et al., 2013), a nurse practitioner (Gilchrist et al., 2012), a doctor (Aydin et al., 2014; Hodkinson et al., 2013), and a nurse by phone and a cardiologist in person (Muthusamy et al., 2013).

**Implementation strategies for same day discharge** There were some common approaches used to promote implementation of SDD. For example, two studies described the importance of changing culture or perception. Brewster et al. (2013) claimed that the increased rates of SDD reflected a change in culture at the operator and departmental level away from the expectation of overnight admission to the expectation of SDD. Kumar et al. (2004) acknowledged that patients had a good perception of the SDD procedure. However, neither study was specific about how they modified culture or provided detailed explanation of what it meant by a good perception.
Consideration of patient preferences was described as another approach to promote implementation of SDD, which was highlighted in five studies (Heyde et al., 2007; Khatri et al., 2002; Kiemeneij et al., 1997; Kim et al., 2013; Kumar et al., 2004). In a RCT, the authors assessed patient preferences for SDD following PCI using a standardised questionnaire (Kim et al., 2013). In this study, the vast majority of patients indicated a preference for SDD should they require PCI again in the future. Acceptance of SDD was also reported to promote the uptake of SDD. Three studies stated that their SDD programs were accepted by their patients (Dalby et al., 2003; Le Corvoisier et al., 2013; Muthusamy et al., 2013), however they were not specific about what acceptance was and how it was measured.

Literature suggests that implementation strategies can be orientated towards healthcare professionals such as with the use of educational materials or outreach visits. Other implementation strategies can be directed towards the institution such as financial incentives, changes in the setting and use of regulatory processes such as accreditation (Grimshaw et al., 2004; Thorsen & Mäkelä, 1999). Based on this conceptual classification, we have identified six strategies that are commonly used to implement SDD, including (1) guideline or protocol, (2) environmental context, (3) champion, (4) education, (5) audit or feedback, and (6) team building (Table 4).

**Same day discharge guideline or protocol** Six papers described using a procedure protocol, or a guideline as a way of implementing SDD (Antonsen et al., 2013; Dalby et al., 2003; Gilchrist et al., 2012; Hodkinson et al., 2013; Muthusamy et al., 2013; Rao et al., 2011). For example, Antonsen et al. (2013) implemented SDD using a guideline that specified each criterion patients needed to fulfil to be deemed eligible for SDD. The guideline implemented by Muthusamy et al. (2013) listed detailed pre, peri, and post-procedure as well as discharge criteria. For instance, the criterion from peri-procedure included no dissection, no side branch occlusion, procedure duration less than 3 hours and also less than 3 stents, etc.
In another study, agreement of criteria amongst PCI operators and finalising an agreed protocol amongst the cardiologists was essential (Hodkinson et al., 2013). Only one study (Muthusamy et al., 2013) reported guideline adherence and identified deviations in patient selection where 23 patients exceeded the age recommended in the guideline. There were no other deviations identified in this study.

**Environmental context** Creating a physical environment to promote SDD following PCI was described in two studies (Aydin et al., 2014; Brewster et al., 2013). One example of environmental change was developing a dedicated ‘radial lounge’ as a space with comfortable chairs with leg rest, television, refreshments, internet access and magazines, in which patients could recover following PCI.

A short stay area or prep-recovery unit was also described as a way of modifying the environment to make implementation of SDD easier (Khater et al., 2007; Muthusamy et al., 2013; Wilentz et al., 1999). Khater et al. (2007) appealed that such a strategy may require redesigning future catheterisation laboratory to include large short-stay areas.

**Champion** Social influence was described as an important strategy for improving the adoption and uptake of SDD. In addition to having a specific champion, early adopters were also influential in widespread adoption within the hospital. Hodkinson et al. (2013) described high volume of early adopters in the physician group, which resulted in an increase in adoption following recognition by other cardiologists that SDD was safe, efficient, and preferred by patients. The authors did not mention the characteristics of the change champion.

**Education** Education was frequently used as a strategy to implement SDD. In some studies the education was focused on healthcare professionals, for example, education specific to vascular access site management (Hodkinson et al., 2013; Wilentz et al., 1999), or risk factor modification (Lauck et al., 2009). In another study education was focused on
patients and their families (Muthusamy et al., 2013). Wilentz et al. (1999) highlighted the importance of nursing education regarding access site care and general interventional and preventive cardiologic concerns during the post-procedure observation time.

**Audit or feedback** Two studies described audit or feedback as a specific implementation strategy. In one study feedback from physicians regarding ambulatory PCI was extremely positive (Le Corvoisier et al., 2013). In another study, outcomes were audited confirming the safety of this approach and also highlighting improved use of resources waste from unnecessary overnight stay, especially around the use of nursing resources (Hodkinson et al., 2013).

**Team building** Team building was recommended in two studies. Le Corvoisier et al. (2013) called for close collaboration between the referring cardiologists, general practitioners and interventional centres. Muthusamy et al. (2013) described important issues such as team building for all parties involved in patient care, minimising vascular complications, patient receptivity, and patient and family education.

**Discussion**

We undertook this review to identify and summarise approaches to implementing SDD. We identified a variety of ways organisations enacted SDD from the included nineteen papers, with differences noted in patient selections and implementation strategies. While not all studies explicitly reported strategies used to implement SDD, there was sufficient information available to explore approaches that might assist others in introducing SDD in clinical practice.

There was significant variability observed in the way SDD was delivered. Although papers included in this review span almost two decades (1997-2014), bulk of literature has been published in the last 15 years. Based on the included nineteen studies from 1997 to
2014, there has been no significant trend in terms of the practice of SDD such as in patient selection criteria and hours of observation despite the advances of cardiac technology and 24-hour catheterisation laboratory availability. For example, in the patient selection criteria some studies used a conservative approach with patients only included if they underwent elective PCI, with a radial access (Kumar et al., 2004; Le Corvoisier et al., 2013). In contrast, others used a more liberal selection criterion including patients who underwent PCI using a femoral approach, and who had clinical presentations of unstable angina, NSTEMI (Knopf et al., 1999; Wilentz et al., 1999) or STEMI (Aydin et al., 2014; Hodkinson et al., 2013).

A possible explanation of the variability in patient selection criteria could be attributed to differences in risk perception. If patients with unstable angina, NSTEMI and STEMI are perceived as higher risk of complications with femoral approach, this might result in exclusion from SDD. Such risk perception might be unfounded as studies demonstrated positive results without inadvertently increasing complications for patients who presented with MI undergoing PCI through femoral access (Knopf et al., 1999; Wilentz et al., 1999).

As with patient selection criteria, there was also variability in how SDD was implemented. Some authors reported using a single strategy to implement SDD such as guideline or protocol, or radial lounge, while others used multifaceted implementation strategies such as champions, education and audit or feedback. It could be assumed that multifaceted interventions are more effective than single interventions (Grimshaw, Eccles, Lavis, Hill, & Squires, 2012). However, an overview of systematic reviews of 25 published articles on the effectiveness of multifaceted compared to single interventions for changing healthcare professionals’ behaviour in clinical settings (Squires, Sullivan, Eccles, Worswick, & Grimshaw, 2014) was unable to produce compelling evidence to reference multifaceted interventions over single-component interventions. This is consistent with Grimshaw et al.
(2004) who stated that multifaceted interventions were not necessary for significant improvements in processes of care.

In this integrative review, multiple implementation strategies were only reported in four studies (Hodkinson et al., 2013; Le Corvoisier et al., 2013; Muthusamy et al., 2013; Wilentz et al., 1999). In addition, explicit reporting of the implementation strategies was lacking, limiting the ability to use this information to inform future implementation. We recognise that the aims of all included papers were not to report implementation strategies, but to report the patient outcomes of SDD. The authors in these studies might have used other implementation strategies in their SDD, but did not report them.

However, the literature suggests that authors must describe and report the components of interventions clearly when implementing interventions to provide benefits to the intended populations (Michie, Fixsen, Grimshaw, & Eccles, 2009). It is agreed that detailed reporting of studies increases the chance of learning from previous studies, makes it easier to standardise methods and facilitates the development of a shared knowledge base (Wensing et al., 2011).

While further research is needed to determine whether single or multifaceted interventions are most effective, it is suggested that interventions be directed towards specific barriers or enablers (Flottorp et al., 2013) allowing the intervention to be tailored to the setting in which the implementation is intended. In this integrative review, none of the implementation strategies was based on an assessment of what might facilitate or mitigate barriers to the uptake of SDD, suggesting that implementation strategies may not have been tailored to the clinical context. In a recent review, Baker et al. (2010) reported that tailored interventions were more likely to improve professional practice such as prescribing and adherence to guideline recommendations than there was no intervention or the dissemination of guidelines or educational materials. Overall, it is suggested that planned knowledge
translation is more likely to succeed if the implementation interventions chosen are tailored
built upon an assessment of the potential barriers and facilitators (Grimshaw et al., 2012).

Although assessing the potential barriers and facilitator are essential to aid developing
tailored intervention strategies for implementation of the program, evaluating how the
program and strategies are delivered is equally important. Process evaluation is a tool that
determines the degree to which the program and strategies were implemented as intended and
the extent to which they reached the targeted participants (Moore et al., 2014). It is evident
that evaluation of patient level outcomes is essential, but the process evaluation will add
values onto the outcomes evaluation research by providing a deep and detailed understanding
of how and why the program worked or not, for whom, and in what circumstance (Moore et
al., 2014). In this integrative review, guideline use/protocol, radial lounge, champion,
education etc. were used as implementation strategies, but there was no information or
evidence whether these implementation strategies worked.

There are some limitations in this review. Firstly, we were unable to locate any paper
that explicitly reported implementation strategies. However, we attempted to extract
implementation strategies from these papers, and contacted authors for additional
information. Secondly, only one reviewer independently extracted data from the included
studies, however, we maintain the rigor of this review by conducting fortnight meetings and
discrepancies were resolved during group discussions. Lastly, we only included published
articles written in English in our review which could introduce publication and language bias.
**LINKING EVIDENCE TO ACTION**

- Using guideline or protocol
- Creating physical environment to promote timely discharge
- Clinical champions to promote SDD
- Providing education to facilitate the implementation
- Audit or feedback on the intervention delivered
- Promoting team building

**Future direction**

Implementing SDD is a complex and dynamic process. However, gaps exist from the current literature. We were able to identify papers reporting SDD implementation; however, the primary aims of these papers were to report the effectiveness of SDD on patients and organisation. Significant variability was observed in patient selections for SDD and the way SDD was implemented. A detailed description of the program and improvement strategies reporting on all components and corresponding activities and how well the strategies were implemented was poorly described. Importantly, the implementation strategies identified in this review were not based on the assessment of the factors that might hinder or facilitate the implementation. With these limited findings, more literature reporting implementation is needed and also more rigorous research is required to reveal theories and frameworks that guide barriers and facilitators assessment as well as to uncover the mechanisms of how and which implementation strategies mostly successfully translate SDD into routine practice.
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