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Research Article

Same-Day Discharge Protocol After Percutaneous Coronary Intervention: A Single-Center Experience in Brazil

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Summary:

Introduction:
Percutaneous coronary intervention (PCI) is commonly performed worldwide. Its growing safety enables early discharge in selected patients. This study aims to assess the safety and patients' satisfaction using the same-day discharge protocol after PCI.

Methods:
Prospective observational study carried out from July 2020 to August 2022, which included uncomplicated elective outpatients eligible for the same- day discharge protocol after PCI. Inclusion criteria were age < 65 years, absence of severe comorbidities, use of one or two stents in non-complex coronary lesions, transradial access, low contrast volume and good understanding of the instructions by the patient and family. Clinical follow-up occurred until the seventh day after the procedure, through telephone calls. Safety outcomes were complications related to the procedure, especially cardiac complications and those related to the puncture site. The degree of patients' satisfaction with the protocol was assessed using an objective questionnaire with scores from 0 to 10 for practicality, comfort, safety, and reliability.

Results:
During the follow-up period, 1,884 patients underwent coronary procedures, 449 (23.8%) of which were elective PCIs, and 34 of these patients (7.6%) were included in the same-day discharge protocol. None of them presented any adverse events or complications, none required medical evaluation in the emergency room. All patients showed a high degree of satisfaction, responding with scores of 9 or 10 to the questionnaire items.

Conclusion:
The same-day discharge protocol was used in few patients, given the strict inclusion criteria. The protocol was highly safe in this scenario, with no complications and a high degree of satisfaction. Day hospital protocols are a reality for elective PCI, improving comfort and cost-effectiveness.

Descriptors: percutaneous coronary intervention; vascular complications; mortality; hospital discharge; safety

Introduction:

Cardiovascular diseases are the leading causes of premature death and chronic disability worldwide, with approximately 422 million cases in 2015, 424,058 of which occurred in Brazil [1]. Interventional treatment is used in a variety of clinical scenarios, with the main indication being stable coronary artery disease (CAD) and acute coronary syndromes (ACS) [2]. In recent years, percutaneous coronary intervention (PCI) has become the most commonly performed invasive cardiac procedure worldwide. Current protocols recommend hospital observation for at least 24 hours after the procedure [3]. PCI is performed on a large scale in the public Unified Health

System in Brazil, with increasing numbers year after year. A 35% increase in PCIs occurred between 2010 and 2015, totaling 405,407 hospitalizations [4]. Due to a significant improvement in the safety and success of the procedure, along with the evolution of pharmacological and interventional therapy, space has been opened for better management of personnel and expenses, as well as faster bed turnover, gaining considerable attention in several countries [5].

Medicare and *Medicaid* Services in the United States changed their criteria so that hospitalization for elective PCI was no longer eligible for reimbursement, increasing financial pressures to eliminate short overnight hospital admissions. These criteria raised concerns about patient safety and prudent medical practice. In light of this, in 2009, the Society for Cardiovascular Angiography and Interventions (SCAI) published a consensus statement specifying that the standard of care should be an overnight stay after uncomplicated elective PCI and proposed that criteria be dictated by a level of conservatism in the absence of definitive studies. Since publication of this consensus statement, post- procedure complication rates have continued to decline. In addition, studies have demonstrated the safety of same-day discharge and patient preference for recovery at home [6].

The expansion of the scientific basis involving the same-day discharge protocol favors its use in several countries. However, this practice is rarely performed in Brazil [7]. Considering the growing curve of PCIs in the Brazilian public health system with a subsequent increase in expenses and bed occupancy, this study aims to evaluate the safety of the PCI protocol with same-day discharge for elective patients.

Methods:

In this prospective, observational study, we consecutively included patients referred for elective PCI between July 2020 and August 2022, from both the public Unified Health System and the supplementary health system, at a reference service for cardiovascular procedures in Vitória, Brazil. Patients underwent a careful evaluation before PCI, with the aim of selecting those possible candidates for hospital discharge on the same day. Thus, those eligible for the same-day discharge protocol according to the medical team's assessment were included in the study after reading and signing the Free and Informed Consent Term.

The inclusion criteria used to select patients eligible for hospital discharge on the same day after PCI were: patients with stable CAD (no ACS in the last three months); age under 65 years; target lesion considered favorable and non- complex by the Interventional Cardiology team (American Heart Association type A, B1 and B2 lesions); single-vessel CAD; procedure performed in the morning; procedure performed using the radial access and vascular sheath removed in the room after the procedure; use of one or two stents; absence of intra-procedural complications; angiographic result considered excellent; use of contrast medium volume less than two times the creatinine clearance (ml for contrast medium volume and ml/m2 for creatinine clearance).

We excluded from the study patients who were hospitalized, using oral anticoagulants, with a previous diagnosis of diabetes, kidney or liver disease or other limiting or potentially serious systemic comorbidities, without adequate socioeconomic or family support, unable to understand the instructions and living outside the metropolitan region of Vitória, Brazil. Patients who presented complications or cardiovascular symptoms during the post-PCI observation period (4 to 8 hours), which justified hospitalization, were also excluded.

Full data collection included clinical characteristics, such as: gender, body mass index, lesion location, previous ACS, previous PCI, comorbidities, medications in continuous use, procedure data (number of stents, arterial access route, volume of contrast used), and socioeconomic characteristics, such as level of education and income.

The standard antiplatelet therapy was acetylsalicylic acid (ASA) 81 or 100 mg/day, for an indefinite period, associated with clopidogrel at a loading dose of 300 mg, administered 24 hours before the procedure, followed by 75 mg/day, for at least six months. For patients who previously used another antiplatelet agent in association with ASA (ticagrelor or prasugrel), we advised that it should be maintained normally. The radial artery should be the access route chosen and successfully obtained, with the vascular sheath being heparinized, with a supplemental dose of unfractionated heparin intravenously to complete 100 IU/kg. Standard PCI techniques were recommended, with no impact of the study on this type of decision. Drug-eluting stents were the standard device in the institution. After PCI, vascular sheaths were immediately removed. Post- procedure control was performed with electrocardiogram, vital signs and physical examination of the access route, and clinical observation was performed in the Interventional Cardiology department. Patients who remained asymptomatic, without changes in the electrocardiogram and without complications at the puncture site, were discharged with instructions on medication, additional periods of rest, possible complications and outpatient follow-up for reevaluation. In the event of any signs or symptoms related to the procedure, patients were instructed to seek emergency care at the hospital. For all patients, the hospitalization bed was maintained until discharge, and the admission department was informed about the protocol and same-day discharge when it was confirmed. After discharge, two telephone calls were made to each patient, on days 1 and 7 after the procedure, by the research team. If any complications were reported, the patient was called for an early in-person consultation.

The primary outcome analyzed was a composite endpoint of major adverse cardiac events (MACE) - death from any cause, cardiovascular death, nonfatal myocardial infarction or stroke – within seven days from the PCI procedure. Secondary outcomes were the need for emergency department visits or hospitalization (due to post-procedure complications or ACS) and puncture site complications. For all patients, the degree of satisfaction was assessed through an objective questionnaire with scores from 0 to 10 for the following items related to the same-day discharge protocol: practicality, comfort, safety, and reliability. The questionnaire was done during the second phone call.

The study was approved by the Research Ethics Committee of the

institution, with approval number 3,669,280. All patients signed the Free and Informed Consent Term at the time of inclusion in the study, in addition to the Consent Form in the Interventional Cardiology department to perform the procedures.

Results:

During the period analyzed, 1,884 patients underwent diagnostic and therapeutic coronary procedures, with elective PCI being the procedure performed in 449 patients (23.8%). Of these, 36 patients (7.6%) were included in the same-day discharge protocol, with two patients later excluded, one due to impossibility of radial access, and one due to episodes of symptomatic hypotension after the procedure. Thus, 34 patients remained in the final study sample. There was a predominance of male patients and a high prevalence of hypertension and dyslipidemia. The clinical data of the patients analyzed are described in Table 1. The mean in-hospital observation time was 4.4 ± 0.6 hours (median 4 hours). The mean time to contact with the patient after PCI was 1.2 ± 0.4 day (median 1 day) for the first, and 7.4 ± 0.3 days (median 7 days) for the second contact. None of the included patients were lost to follow-up.

Clinical data	Total, n = 34
Age, mean ± SD	55.4 ± 6.3
Male, n (%)	28 (82.3%)
Arterial hypertension, n (%)	29 (85.2%)
Dyslipidemia, n (%)	26 (76.4%)
Smoking, n (%)	3 (8.8%)
Alcoholism, n (%)	2 (5.8%)
Family history of CAD, n (%)	13 (38.2%)
Heart failure, n (%)	4 (11.7%)
Body mass index, mean ± SD	28.4 ± 2.8

Table 1: Baseline clinical characteristics of patients submitted to the same-day discharge protocol after percutaneous coronary intervention.

CAD: coronary artery disease; SD: standard deviation.

Regarding education levels, most patients had completed high school, whilst the minority had completed college or were illiterate. Almost half of the patients received a monthly income of up to two minimum wages. However, one fifth declared having no income. The data are detailed in Table 2.

Education level, n (%)	Total, N=34
Illiterate, n (%)	1 (2.9%)
Incomplete elementary school education, n (%)	5 (14.7%)
Complete elementary school education, n (%)	9 (26.4%)
Complete high school education, n (%)	16 (47%)
Complete college education, n (%)	3 (8.8%)
Socioeconomic level, n (%)	**Total, N=34**
No income, n (%)	7 (20.5)
Up to 2 minimum wages, n (%)	15 (44.1%)
From 2 to 4 minimum wages, n (%)	10 (29.4%)
From 4 to 10 minimum wages, n (%)	2 (5.8%)

Table 2: Socioeconomic characteristics of patients submitted to the same-day discharge protocol after percutaneous coronary intervention.

No MACE or other complications occurred during the seven-day follow-up. Despite the intensive questioning about puncture site complications or any other symptoms, there was no need for emergency department visits, hospitalizations or extra medical appointments. On the questionnaire about degree of satisfaction, the practicality, comfort, safety and confidence from patients on the same-day discharge protocol, grade 10 was the median of the scores for all variables. No grades below 9 were reported. The mean satisfaction levels are expressed in Table 3.

Satisfaction level	Score (0-10)
Practicality, mean ± SD	9.7 ± 0.6
Comfort, mean ± SD	9.7 ± 0.4
Safety, mean ± SD	9.9 ± 0.2
Reliability, mean ± SD	10 ± 0

Table 3: Satisfaction level on the same-day discharge protocol reported by patients after percutaneous coronary intervention.

SD: standard deviation.

Discussion:

In this single-center initial experience, a strict same-day discharge protocol has shown to be safe after successful elective PCI. This possibility must be considered in reference institutions and in a group of carefully selected patients, based on comorbidities and their potential clinical implications. Although our sample was composed exclusively by low-risk patients submitted to elective PCI, our results confirm that this protocol must be implemented with thorough monitoring of clinical results and satisfaction.

Besides being comfortable, reliable and safe, the same-day discharge protocol after PCI is definitely cost-saving. Economic analyses of similar protocols have shown to save $1,086.6 USD per patient in Canada (8), $5,128 USD in the United States (9), $1,523 USD in Europe (10) and $2,350 AUD in Australia (11). This type of analysis was not a target for our investigation. Further research may quantify the economic impact in Brazil and guide the development of specific guidelines and protocols.

A cohort study conducted in 2007, which included 1,015 patients classified as low risk, demonstrated that six hours of hospital observation are sufficient to detect the main complications resulting from PCI (12). With the evolution of the PCI procedure techniques and advancement of resources, our results show the possibility of a very short time of in-hospital observation. In our study, patients deemed suitable for same-day release with no forecast of MACE had to be eligible for successful radial access. Current PCI recommendations for preferably using radial access strengthen the use of this protocol and provide a broader indication for its use (13).

Multiple and robust data corroborate the safety of early discharge

after elective PCI. A meta-analysis of eight randomized clinical trials and 1,598 patients discharged on the same day showed no significant increase in mortality, MACE, major bleeding, blood transfusion, repeated revascularization and readmission (14). Nevertheless, other cohorts show that MACE or other complications are not uncommon. Whilst hospitalizations may reach 7.8% (11), MACE rates have been reported from zero (15) to 4.9% (16). Our study differs from many others by including only very low risk patients and procedures. This conservative approach was chosen as the best strategy, since the first goal was to prove safety with zero or very few clinical complications, in order to avoid medico-legal issues. The protocol may be expanded to a greater number of patients as confidence and safety progressively raise. Besides, a large increase in the use of same-day discharge following elective PCI was not associated with worse 30-day mortality or re-hospitalization (17).

Our study, despite being relevant, has important limitations. Our limited sample size is insufficient to guarantee a high degree of satisfaction in different populations. Because of our strict inclusion criteria to adopt the same-day discharge protocol, our positive results cannot be extrapolated to other regions or institutions, or even to other clinical scenarios. However, even with a relative low education level in our sample (less than 10% had complete college education), patients were strongly advised about all the procedures adopted for the same-day discharge protocol. The advantages exposed to patients at the planning stage may have led to high scores concerning satisfaction and safety when the questionnaire was applied. Hence, high-quality communication and understanding are paramount for successful and incremental adoption of the same-day discharge protocol after PCI.

Conclusion:

There was a high degree of safety and acceptance of the same-day discharge protocol after elective PCI, in a group of carefully selected patients, reducing the length of hospital stays. No MACE or other complications occurred within seven days. The same-day discharge protocol after PCI can lead to cost minimization, increased hospital efficiency and improve patient satisfaction.

Conflicts of interest:

The authors declare no conflicts of interest related to this manuscript.

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