Original Article

Is there an association between hospital costs and door-to-balloon time?

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ABSTRACT

Background: Door-to-balloon time (DBT) has become a measure of performance and is the focus in quality of care improvement initiatives. This study aimed to evaluate the association between DBT and its impact on hospital costs.
Methods: Patients treated with primary percutaneous coronary intervention between 2008 and 2013 were divided according to the DBT < or ≥ 90 minutes. All costs recorded at hospital discharge were adjusted by the Medical-Hospital Cost Variation Index.
Results: A total of 141 patients were included, grouped as DBT < 90 minutes (n = 77) and DBT ≥ 90 minutes (n = 64). DBT was 64.0 ± 14.1 minutes and 133.8 ± 35.2 minutes, respectively. There were no differences in clinical outcomes between the groups. The costs were R$ 34,883.24 ± 27,749.46, with the mean cost for DBT < 90 minutes being R$ 33,194.24 ± 27,387.61 and the cost for DBT ≥ 90 minutes R$ 36,947.58 ± 28,267.80 (p = 0.43). The costs, according to the culprit artery, were R$ 29,588.53 ± 16,358.85 for the right coronary artery; R$ 48,494.62 ± 44,015.04 for the left circumflex artery; and R$ 34,016.96 ± 26,503.94 for the left anterior descending artery. There was a difference between the costs of procedures related to the left circumflex artery when compared to the right coronary or left anterior descending arteries (p = 0.01), but there was no difference between the costs related to the right coronary, when compared to the left anterior descending artery (p = 0.68).
Conclusions: There was no difference in hospital costs regarding the private health insurance, when the groups were divided according to the DBT. Clinical outcomes were similar and a difference in costs was found for patients with the circumflex artery as the culprit vessel.

Há relação entre custos hospitalares e tempo porta-balão?

Palavras-chave:
Custos hospitalares
Infarto do miocárdio
Intervenção coronária percutânea

RESUMO

Introdução: O tempo porta-balão (TPB) tornou-se uma medida de desempenho e é foco de iniciativas de melhoria da qualidade assistencial. Este estudo teve como objetivo avaliar a relação entre o TPB e seu impacto nos custos de internação hospitalar.
Métodos: Pacientes tratados com intervenção coronária percutânea primária, entre 2008 e 2013, foram divididos de acordo com o TPB < ou ≥ 90 minutos. Todos os custos registrados na alta hospitalar foram ajustados por meio do Índice de Variação de Custos Médico-Hospitalares.
Resultados: Foram incluídos 141 pacientes, agrupados em TPB < 90 minutos (n = 77) e TPB ≥ 90 minutos (n = 64). Os TPB foram 64,0 ± 14,1 minutos e 133,8 ± 35,2 minutos, respectivamente. Não foram observadas diferenças nos desfechos clínicos entre os grupos. Os custos foram de R$ 34.883,24 ± 27.749,46, sendo o custo médio para TPB < 90 minutos de R$ 33.194,24 ± 27.387,61, e para TPB ≥ 90 minutos, de R$ 36.947,58 ± 28.267,80 (p = 0,43). Os custos, segundo a artéria culpada, foram de R$ 29.588,53 ± 16.358,85 para a coronária direita; R$ 48.494,62 ± 44.015,04 para a circunflexa; e de R$ 34.016,96 ± 26.503,94 para a descendente anterior. Houve diferença entre os custos dos procedimentos relativos à artéria circunflexa comparados aos da coronária direita ou da descendente anterior (p = 0,01), mas não houve diferença entre os custos relativos à coronária direita, comparados à descendente anterior (p = 0,68).

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Conclusões: Não houve diferença nos custos hospitalares, no âmbito da saúde suplementar, quando os grupos foram divididos de acordo com o TPB. Os desfechos clínicos foram semelhantes, e foi encontrada uma diferença de custos em pacientes com a artéria circunflexa culpada.

Introduction

Door-to-balloon time (DBT) is one of the markers of quality of care and, according to the current guidelines, it should be less than 90 minutes.[1-3] Several clinical and logistic factors may be related to a high DBT.[4-6] A decrease in DBT results in a reduction of short- and medium-term mortality, as well as lenght of hospital stay.[7,8]

In recent years, health care costs have increased faster than the general inflation rate, thus becoming a liability to be paid by both the institution that provides the service and the agents that finance the procedures. Cost control without loss of quality is, thus, an urgent topic.[9]

Despite the positive effect of reducing DBT on patient outcomes, the impact on care-related costs in Brazil is still scarcely studied. As it represents a disease with high prevalence and of great influence in economic terms, as well as having significant morbidity and mortality,[10] it becomes essential to understand the costs associated with the management of patients with ST-elevation acute myocardial infarction (STEMI).

This study aimed to evaluate the association between DBT and its impact on hospital costs.

Methods

Study place, design, and institutional measures

In 2007, Hospital Vera Cruz, a tertiary hospital that integrates the supplementary health network in Belo Horizonte (MG), initiated a project on the quality of care provided to patients with acute myocardial infarction through the measurement of several indicators, among them the DBT.

With the implementation of these indicators, measures were taken to improve the DBT, such as expedite the admission of patients in the emergency room; perform the 12-lead electrocardiogram (ECG) within 10 minutes after admission; and engaging the whole team, consisting of nurses and physicians (clinical and interventional cardiologists) through a standardized code. With the implementation of these measures, there was a progressive reduction in DBT.

As determined by the quality program, epidemiological data and time related to treatment were collected and stored in an institution database.

Study population

Between March 2008 and June 2013, 200 patients underwent primary percutaneous coronary intervention (pPCI). Patients transferred from other institutions; those who developed STEMI after admission; those on prolonged cardiorespiratory arrest in the emergency room; those with segment ST-elevation without evidence of coronary artery disease (e.g., acute myocarditis, ventricular repolarization disorder, or Takotsubo syndrome); and those submitted to staged treatment during the same hospital admission were excluded from the analysis.

The care was carried out following the on-duty schedule of the interventional cardiology laboratory, which has in-attendance and on-call medical and nursing staff 24 hours a day, 7 days a week.

The patients included in the study were divided into two groups according to DBT < or ≥ 90-minutes.

Procedure

Patients received a loading dose of 300 mg of acetylsalicylic acid and 300 to 600 mg of clopidogrel. The use of morphine, sublingual/intravenous nitrate, or beta-blocker was made at the discretion of the physician. All patients received unfractionated heparin immediately before the intervention (60 to 100 U/kg). Patients were taken to undergo the intervention as soon as the cath lab was available. The pPCI procedures were performed as described in literature.[11] Specific technical aspects, such as access route, drug administration, type of stent, and thromboaspiration, were carried out at the discretion of the interventionists. After pPCI, patients were referred to the coronary care unit and received treatment according to the institutional protocol established for STEMI.

Data collection

Data collection was performed in two ways. First, delays and epidemiological data were collected dating to the patient's admission at the institution; second, the data related to costs were collected through the review of medical records and of the invoices sent by the institution to the health insurance companies. This registry was approved by the Research Ethics Committee of the hospital (CAE 46658215.5.0000.5135).

Angiographic analysis and definitions

Lesion morphology was classified according to the definitions established by the American College of Cardiology/American Heart Association (ACC/AHA).[12] Angiographic analysis was performed by two of the authors (RW and MABE), identifying the culprit artery and considering as a significant lesion that which would cause vessel lumen obstruction > 70% by the visual method interpretation. Thrombus on the angiography was defined as abrupt cessation of vessel flow, with contrast retention or a filling defect in a patent vessel (negative image) over a stenotic or adjacent region.[13]

Procedure success was defined as obtaining angiographic success (residual stenosis < 30% with Thrombolysis In Myocardial Infarction - TIMI grade 3 flow), as well as absence of major adverse cardiovascular and cerebrovascular events, including death, reinfarction and emergency coronary artery bypass graft surgery.

The DBT was defined as the delay between the first medical contact and the first balloon inflation; total ischemic time was defined as the delay between symptom onset and the first balloon inflation.

Lenght of hospital stay was recorded in days since the admission day (day zero). The analysis of the length of stay considered only the