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ORIGINAL ARTICLE

External validation of the ProACS score for risk stratification of patients with acute coronary syndromes☆

Ana Teresa Timóteo[a,*], Sílvia Aguiar Rosa[a], Marta Afonso Nogueira[a], Adriana Belo[b], Rui Cruz Ferreira[a]

[a] *Serviço de Cardiologia, Hospital Santa Marta, Centro Hospitalar de Lisboa Central, Lisboa, Portugal*
[b] *Centro Nacional de Coleção de Dados em Cardiologia (CNCDC), Sociedade Portuguesa de Cardiologia, Coimbra, Portugal*

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KEYWORDS
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Abstract
Introduction: The ProACS risk score is an early and simple risk stratification score developed for all-cause in-hospital mortality in acute coronary syndromes (ACS) from a Portuguese nationwide ACS registry. Our center only recently participated in the registry and was not included in the cohort used for developing the score. Our objective was to perform an external validation of this risk score for short- and long-term follow-up.
Methods: Consecutive patients admitted to our center with ACS were included. Demographic and admission characteristics, as well as treatment and outcome data were collected. The ProACS risk score variables are age (≥72 years), systolic blood pressure (≤116 mmHg), Killip class (2/3 or 4) and ST-segment elevation. We calculated ProACS, Global Registry of Acute Coronary Events (GRACE) and Canada Acute Coronary Syndrome risk score (C-ACS) risk scores for each patient.
Results: A total of 3170 patients were included, with a mean age of 64±13 years, 62% with ST-segment elevation myocardial infarction. All-cause in-hospital mortality was 5.7% and 10.3% at one-year follow-up. The ProACS risk score showed good discriminative ability for all considered outcomes (area under the receiver operating characteristic curve >0.75) and a good fit, similar to C-ACS, but lower than the GRACE risk score and slightly lower than in the original development cohort. The ProACS risk score provided good differentiation between patients at low, intermediate and high mortality risk in both short- and long-term follow-up ($p<0.001$ for all comparisons).

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* Corresponding author.
E-mail address: ana_timoteo@yahoo.com (A.T. Timóteo).

Conclusions: The ProACS score is valid in external cohorts for risk stratification for ACS. It can be applied very early, at the first medical contact, but should subsequently be complemented by the GRACE risk score.

PALAVRAS-CHAVE
ProACS;
Estratificação de risco;
Síndrome coronária aguda;
Prognóstico

Validação externa do *score* de risco ProACS para estratificação de risco de doentes com síndrome coronária aguda

Resumo
Introdução: O *score* ProACS é um *score* simples e precoce desenvolvido para estratificação de risco de mortalidade hospitalar nas síndromes coronárias agudas (SCA), a partir de um registo nacional de SCA. O nosso centro só participou mais recentemente, pelo que os nossos doentes não foram incluídos na coorte de desenvolvimento do *score*. O nosso objetivo é o de validar externamente o *score* ProACS para mortalidade a curto e longo prazo.
Métodos: Foram incluídos doentes consecutivos admitidos no nosso centro por SCA. Obtiveram-se as características demográficas e da admissão, bem como o tratamento e seguimento. O *score* ProACS inclui as seguintes variáveis: idade $\geq$ 72 anos, pressão arterial sistólica $\leq$ 116 mmHg, classe Killip na admissão e elevação do segmento ST. Para cada doente foi calculado o *score* ProACS, *Global Registry of Acute Coronary Events* (GRACE) e o C-ACS.
Resultados: Incluíram-se 3170 doentes, idade média de 64 $\pm$ 13 anos, 62% com enfarte com elevação de ST. A mortalidade total hospitalar foi de 5,7 e 10,3% a um ano de seguimento. O *score* ProACS mostrou uma boa capacidade discriminativa (AUC > 0,75) e boa calibração, semelhante ao C-ACS, mas inferior quando comparado com o *score* GRACE e ligeiramente inferior quando comparado com a coorte de desenvolvimento original. Permite uma boa diferenciação entre doentes com risco baixo, intermédio e alto quer para mortalidade a curto quer a longo prazo ($p < 0{,}001$ para todas as comparações).
Conclusões: O *score* ProACS é um *score* válido em coortes externas. Pode ser aplicado muito precocemente no primeiro contacto médico, mas posteriormente deverá ser complementados pelo *score* GRACE.

Introduction

The approach to acute coronary syndrome (ACS) has undergone many changes in recent years, particularly regarding invasive treatments, not only for ST-segment elevation myocardial infarction (STEMI) but also other ACS and in patients at high risk for cardiovascular events.[1–4] Various scores have been developed over the last 20 years to stratify this risk. The first were developed on the basis of large multicenter clinical trials, such as the TIMI score; the disadvantage was they were not always sufficiently representative of real-world populations.[5,6] More recently, the most widely used score has been the Global Registry of Acute Coronary Events (GRACE) score, which was based on a multinational ACS registry and hence is more representative. It also has better discriminative ability for both STEMI and other ACS.[7,8] However, such scores are not always used in clinical practice, partly due to their complexity.[9,10]

Our group has previously demonstrated that risk scores can be simplified, albeit with a slight reduction in discriminative ability.[11] The ProACS score was accordingly developed on the basis of the Portuguese Registry on Acute Coronary Syndromes (ProACS).[12] The aim of the present study was to validate this score in a Portuguese population and to determine its short- and long-term predictive value.

Methods

The ProACS score was developed from the population of the ProACS registry, and included all patients enrolled between January 1, 2002 and October 31, 2014. ProACS is a continuous, prospective observational registry with 33 participating cardiology departments in Portugal. The inclusion criteria and variables have been published previously.[13] The ProACS score was based on 37 460 records of all-cause in-hospital mortality. Patients enrolled between January 1, 2002 and June 30, 2011 were randomly separated into the development (60%) and internal validation (40%) cohorts, while the 8586 patients enrolled from after July 1, 2011 made up the external validation cohort. Since our center only recently began to participate in the ProACS registry, our records were