



Physicians' perceptions of the Thrombolysis in Myocardial Infarction (TIMI) risk score in older adults with acute myocardial infarction



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ABSTRACT

Objectives: To evaluate physician-perceived strengths and limitations of the Thrombolysis in Myocardial Infarction (TIMI) risk scores for use in older adults with acute myocardial infarction (AMI).

Background: The TIMI risk scores are risk stratification models developed to estimate mortality risk for patients hospitalized for AMI. However, these models were developed and validated in cohorts underrepresenting older adults (≥ 75 years).

Methods: Qualitative study using semi-structured telephone interviews and the constant comparative method for analysis.

Results: Twenty-two physicians completed interviews ranging 10–30 min (mean = 18 min). Median sample age was 37 years, with a median of 11.5 years of clinical experience. TIMI strengths included familiarity, ease of use, and validation. Limitations included a lack of risk factors relevant to older adults and model scope and influence.

Conclusions: Physicians report that the TIMI models, while widely used in clinical practice, have limitations when applied to older adults. New risk models are needed to guide AMI treatment in this population.

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Introduction

Approximately 30% of adults hospitalized for acute myocardial infarction (AMI) are 75 years of age or older.^{1–3} With changing demographics worldwide, the number of adults in this age group who experience an AMI is expected to grow.^{1,4} Their high burden of comorbid conditions – including physical and cognitive impairments – and lower physiologic reserve render this group more

complex than younger AMI patients. This complexity can complicate AMI clinical care for older adults both acutely, during hospitalization, and in the long-term after hospital discharge.

The use of risk stratification models is endorsed by the American College of Cardiology (ACC) and the American Heart Association (AHA) to assist clinicians' decision-making in AMI care.^{4,5} Based on risk stratification models, patients judged to be at higher risk might receive more intensive treatment or closer surveillance compared with those at lower risk. Risk models are an important part of AMI care because clinicians may underestimate the risk of adverse clinical outcomes when relying on implicit risk assessments alone, particularly in older adults.^{6–8}

The Thrombolysis in Myocardial Infarction (TIMI) risk scores are commonly used risk stratification models developed to estimate short-term risk and guide decisions regarding revascularization for patients with AMI.^{9–11} The TIMI risk score for patients with

Abbreviations: AMI, acute myocardial infarction; ACC, American College of Cardiology; AHA, American Heart Association; TIMI, Thrombolysis in Myocardial Infarction; STEMI, ST-elevation myocardial infarction; InTIME, Intravenous nPA for Treatment of Infarcting Myocardium Early; NSTEMI, Non-ST elevation myocardial infarction; UA, unstable angina; CAD, coronary artery disease; ACS, acute coronary syndrome.

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ST-elevation myocardial infarction (STEMI) was developed in a cohort of patients eligible for fibrinolytic therapy as part of the Intravenous nPA for Treatment of Infarcting Myocardium Early (InTIME) II trial. The model was designed to estimate 30-day mortality risk and was validated as part of the TIMI 9A and 9B trials.^{10,12} An additional version of the model was developed and validated to predict the composite of all-cause mortality, new or recurrent myocardial infarction, or recurrent ischemia requiring urgent revascularization in non-STEMI (NSTEMI) and unstable angina (UA) populations through 14 days.⁹

The TIMI risk scores assign weighted integers based on risk factors assessed at the time of hospital admission. The risk factors in the STEMI model include: age 65 through 74 or 75 years or older; a previous history of angina, diabetes, or hypertension; admission systolic blood pressure less than 100 mmHg; admission heart rate greater than 100 beats per minute; admission Killip Heart Failure class II through IV; admission weight less than 67 kg; anterior infarction or left bundle branch block; and time to reperfusion therapy greater than 4 hours among patients who receive reperfusion therapy.¹⁰ The model for UA/NSTEMI has seven risk factors including: age 65 years or older; at least three coronary artery disease (CAD) risk factors; known CAD defined as prior coronary stenosis of at least 50%; aspirin use within the past seven days; at least two anginal episodes within the past 24 hours ST-segment changes of a least 0.5mm on electrocardiogram at time of initial presentation; and elevation of serum cardiac markers.⁹

Since development, the TIMI risk scores continue to be widely used in AMI care. However, both the STEMI and UA/NSTEMI TIMI risk scores were developed and validated from clinical trials which underrepresented adults over the age of 75 compared to community-based estimates.^{13–16} The lack of older adults within the development and validation cohorts of these models may limit their ability to accurately stratify risk and predict outcomes when applied to older populations. For example, previous studies have found that when applied to older adults with AMI, the STEMI TIMI model has reduced 30-day mortality discrimination¹⁷ and calibration.¹⁸ Despite these potential limitations, little is known about the perceived value or current use of the TIMI risk scores in determining risk among older adults with AMI.

Given the anticipated growth in the number of older adults with AMI, there is a critical need to better understand clinicians' experiences with applying risk stratification models, such as the TIMI risk scores, to this population. Therefore, the purpose of this study was to qualitatively describe physicians' perceptions about the role, strengths, and limitations of the TIMI risk scores in the medical care of older adults hospitalized for AMI.

Methods

Study design

We conducted this study as part of an ongoing, multi-center, observational study designed to develop and validate risk

stratification models for adults 75 years of age or older with AMI. The purpose of this qualitative study was to describe physician practices and preferences related to the use of existing risk stratification models in older adults with AMI. While respondents discussed several other models used in AMI risk stratification, here we report data on the TIMI risk scores. The Institutional Review Board at Yale University exempted this study.

Sample

Our sample included hospitalist or cardiology physicians. We chose this sample as this population frequently cares for older adults hospitalized with AMI throughout a hospital admission. Study inclusion criteria required that hospitalist or cardiology physicians have self-reported experience caring for older adults with AMI, however we did not specify an explicit number of years of experience. We utilized a snowball technique to identify potential physician respondents. We emailed study site investigators who were participating in the multi-center study and non-study associates and asked for referrals of hospitalist or cardiology physicians with experience caring for older adults with AMI. All contacts were sent a mass email seeking a response from those with experience caring for older adults with AMI and interest in completing a research telephone interview. All cardiology or hospitalist physician respondents who replied to the mass email were invited to participate in the study. Prior knowledge of the TIMI risk scores or other risk stratification models was not required, nor included as exclusion criteria for study participation. Participants were encouraged to refer other physicians with experience caring for older adults with AMI to the study and who might provide insights based on clinical experience. We continued to recruit potential participants until theoretical data saturation was reached, determining the final sample size.

Interview procedures

Two registered nurses (S.L.F., K.W.) with experience in qualitative interviewing conducted all telephone interviews. Interviews were semi-structured, with general probes based on respondents' responses. Examples of interview questions and probes are included in Table 1. Interview questions were purposively broad in nature without requiring the respondent to specify a particular TIMI model. Interview topics included the general use of risk stratification models such as the TIMI in clinical practice, perceptions of model utility, and perceived strengths and limitations of risk models including the TIMI, when applied to older adults. A professional medical transcription service audio-recorded and transcribed verbatim all telephone interviews.

Data analysis

We used ATLAS.ti 7 qualitative software (Scientific Software, Berlin, Germany) to facilitate data coding and analysis. Data

Table 1
Examples of interview questions and probes.

Question	Probe
Can you tell me about any of the risk stratification models you use in your clinical care of patients with AMI?	<ul style="list-style-type: none"> • What do you like/dislike about this model? • Are there any theoretical or practical strengths or limitations of the model you use and if so what are they? • If you don't use risk models – why?
Can you tell me about any of the risk stratification models you use in your clinical care of adults ≥ 75 with AMI?	<ul style="list-style-type: none"> • What do you like/dislike about this model? • Are there any theoretical or practical strengths or limitations of the model and if so what are they? • If you don't use risk models – why?
Regarding the TIMI risk scores, do you use these models for adults ≥ 75 with AMI?	<ul style="list-style-type: none"> • How do you use them? • Are there any specific reasons why you do not use them? • What do you like/dislike about these models? • Are there any theoretical or practical limitations of these models and if so what are they?

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