ORIGINAL ARTICLE

Application of High-Sensitivity Troponin in Suspected Myocardial Infarction

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ABSTRACT

BACKGROUND

Data regarding high-sensitivity troponin concentrations in patients presenting to the emergency department with symptoms suggestive of myocardial infarction may be useful in determining the probability of myocardial infarction and subsequent 30-day outcomes.

METHODS

In 15 international cohorts of patients presenting to the emergency department with symptoms suggestive of myocardial infarction, we determined the concentrations of high-sensitivity troponin I or high-sensitivity troponin T at presentation and after early or late serial sampling. The diagnostic and prognostic performance of multiple high-sensitivity troponin cutoff combinations was assessed with the use of a derivation–validation design. A risk-assessment tool that was based on these data was developed to estimate the risk of index myocardial infarction and of subsequent myocardial infarction or death at 30 days.

RESULTS

Among 22,651 patients (9604 in the derivation data set and 13,047 in the validation data set), the prevalence of myocardial infarction was 15.3%. Lower high-sensitivity troponin concentrations at presentation and smaller absolute changes during serial sampling were associated with a lower likelihood of myocardial infarction and a lower short-term risk of cardiovascular events. For example, high-sensitivity troponin I concentrations of less than 6 ng per liter and an absolute change of less than 4 ng per liter after 45 to 120 minutes (early serial sampling) resulted in a negative predictive value of 99.5% for myocardial infarction, with an associated 30-day risk of subsequent myocardial infarction or death of 0.2%; a total of 56.5% of the patients would be classified as being at low risk. These findings were confirmed in an external validation data set.

CONCLUSIONS

A risk-assessment tool, which we developed to integrate the high-sensitivity troponin I or troponin T concentration at emergency department presentation, its dynamic change during serial sampling, and the time between the obtaining of samples, was used to estimate the probability of myocardial infarction on emergency department presentation and 30-day outcomes. (Funded by the German Center for Cardiovascular Research [DZHK]; ClinicalTrials.gov numbers, NCT00470587, NCT02355457, NCT01852123, NCT01994577, and NCT03227159; and Australian New Zealand Clinical Trials Registry numbers, ACTRN12611001069943, ACTRN12610000766011, ACTRN12613000745741, and ACTRN12611000206921.)

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