

N-terminal-pro-B-type natriuretic peptide testing reduced duration of ED visits in patients presenting with dyspnea

Moe GW, Howlett J, Januzzi JL, Zowall H. N-terminal pro-B-type natriuretic peptide testing improves the management of patients with suspected acute heart failure: primary results of the Canadian prospective randomized multicenter IMPROVE-CHF study. *Circulation*. 2007;115:3103-10.

Clinical impact ratings: Emergency Med ★★★★★☆ Hospitalists ★★★★★☆ Cardiology ★★★★★☆

QUESTION

In patients presenting to the emergency department (ED) with dyspnea, does N-terminal-pro-B-type natriuretic peptide (NT-proBNP) testing improve management?

METHODS

Design: Randomized controlled trial (RCT) (Improved Management of Patients with Congestive Heart Failure [IMPROVE-CHF] study).

Allocation: {Concealed}†.*

Blinding: Blinded (patients, clinicians, {data collectors, outcome assessors, data analysts, safety and monitoring committee, and manuscript writers}†).*

Follow-up period: 60 days.

Setting: 7 EDs in Canada.

Patients: 500 patients > 18 years of age (mean age 71 y, 52% men, 93% white) presenting to the ED with dyspnea of suspected cardiac origin. Patients were diagnosed with acute heart failure, no heart failure, or prevalent heart failure using clinical evaluation and standard diagnostic tests. Exclusion criteria were serum creatinine > 250 μmol/L, acute myocardial infarction, cancer, and noncardiac dyspnea.

Intervention: NT-proBNP-guided management (*n* = 246) or usual care (*n* = 254).

Outcomes: Duration of initial ED visit. Secondary outcomes were length of stay in the intensive care unit (ICU), length of initial hospital stay, in-hospital and 60-day mortality, initial hospitalization from ED, rehospitalizations over 60 days, and direct medical costs.

Patient follow-up: 97% (intention-to-treat analysis) (0.90 vs 0.83, *P* < 0.001).

MAIN RESULTS

The NT-proBNP group had shorter ED visits, fewer rehospitalizations over 60 days, and incurred less direct medical costs than did the usual care group (Table). Groups did not differ for length of ICU or hospital stay, in-hospital or 60-day mortality, or initial hospitalization from the ED (Table). NT-proBNP testing combined with clinical judgment led to a larger area under the receiver-operating characteristic curve than did clinical judgment alone for diagnosis of heart failure

CONCLUSION

N-terminal-pro-B-type natriuretic peptide testing reduced duration of emergency department visits, decreased costs, and improved diagnostic accuracy of heart failure in patients presenting with dyspnea.

Source of funding: Roche Diagnostics Canada.

For correspondence: Dr. G.W. Moe, St. Michael's Hospital, Toronto, Ontario, Canada. E-mail moeg@smh.toronto.on.ca.

*See Glossary.

†Information provided by author.

N-terminal-pro-B-type natriuretic peptide (NT-proBNP) testing vs usual care in patients presenting to the emergency department (ED) with dyspnea at 60 days‡

Outcomes	NT-proBNP	Usual care	Difference	P value
Median duration of ED visit, h [§]	5.6	6.3	-0.7	0.03
Median length of ICU stay, d [§]	6	5.5	0.5	0.7
Median length of hospital stay, d [§]	6	7	-1	0.3
Direct medical costs, US \$	5180	6129	-949	0.02
	RRI (95% CI)		NNH	
In-hospital mortality	4.5%	2.4%	89% (-26 to 387)	Not significant
60-d mortality¶	5.5%	4.4%	22% (-43 to 162)	Not significant
	RRR (CI)		NNT (CI)	
Initial hospitalization from ED	57%	58%	1.7% (-15 to 16)	Not significant
Rehospitalizations over 60 d	13%	20%	33% (0.6 to 55)	16 (8 to 960)

‡ICU = intensive care unit; other abbreviations defined in Glossary. RRI, RRR, NNH, NNT, and CI calculated from data in article.

§Based on nonparametric analysis.

||Costs for all ED visits, hospitalizations, and outpatient services.

¶Excludes hospital mortality.

COMMENTARY

The industry-sponsored RCT by Moe and colleagues assessed the effect of NT-proBNP testing in ED patients with dyspnea. The reduced length of stay in the ED (mean 42 min) for the NT-proBNP group is important and represents a clinically meaningful difference in overcrowded EDs, even though a larger time reduction was anticipated (sample size calculation was based on a 20% reduction in ED length of stay or 108 min). It would be valuable to know the point at which the observed time savings occurred, but no such breakdown was provided. Because the randomization process and revelation of the test result occurred at the end of clinical evaluation, it must be assumed that most of the 4- to 8-hour ED visit occurred before intervention.

The reduced costs in the NT-proBNP group were realized partly through a reduction in follow-up tests, such as computed tomography imaging and echocardiography. It is reassuring that this cost reduction and trend toward reduced follow-up tests did not increase 60-day rehos-

pitalization or mortality. NT-proBNP testing compared with clinical judgment alone did not differ for diagnosis of heart failure, and their combination improved diagnostic accuracy. Change in the opinion of the ED physician after receipt of NT-proBNP test results was not assessed.

Randomizing patients to have or not to have a diagnostic test is the most appropriate study design to determine the effect of that test (1). Knowledge of NT-proBNP test results in addition to standard clinical assessment changed physician behavior in the RCT, resulting in faster ED discharge and lower health care costs. Whether changes in physician behavior translate into improvements in important patient-related health outcomes awaits further study.

Heather Murray, MD, MSc, FRCPC
Queen's University
Kingston, Ontario, Canada

Reference

1. Sackett DL, Haynes RB. *BMJ*. 2002;324:539-41.