Rapid measurement of B-type natriuretic peptides reduced time to discharge and treatment costs in patients with acute dyspnea

Mueller C, Scholer A, Laule-Kilian K, et al. **Use of B-type natriuretic peptide in the evaluation and management of acute dyspnea.** N Engl J Med. 2004;350:647-54.

QUESTION

In patients presenting to the emergency department (ED) with acute dyspnea, does a diagnostic strategy guided by rapid measurement of B-type natriuretic peptide (BNP) levels reduce time to discharge and total treatment cost?

METHODS

Design: Randomized controlled trial (B-Type Natriuretic Peptide for Acute Shortness of Breath Evaluation [BASEL] study).

Allocation: {Concealed}†.*

Blinding: Blinded {outcome assessors}†.*

Follow-up period: 30 days.

Setting: The ED of the University Hospital, Basel, Switzerland.

Patients: 452 patients (mean age 71 y, 58% men) who presented to the ED with a primary symptom of acute dyspnea and no obvious traumatic cause for dyspnea. Exclusion criteria were severe renal disease (serum creatinine level > 250 µmol/L), cardiogenic shock, or request for early transfer to another hospital.

Intervention: 225 patients were allocated to a diagnostic strategy that included rapid bedside measurement of BNP levels in addition to the conventional diagnostic strategy. In patients with BNP levels < 100 pg/mL, heart failure (HF) was considered unlikely, and alternative causes of dyspnea were investigated; in patients with levels > 500 pg/mL, HF was considered the most likely diagnosis, and rapid therapy with diuretics, nitroglycerin, angiotensin-converting enzyme inhibitors, and morphine was recommended; and in patients with levels between 100 and 500 pg/mL, clinical judgment and possible further diagnostic testing were recommended to rule out left ventricular dysfunction and other conditions as the cause of dyspnea. 227 patients were allocated to the conventional diagnostic strategy; echocardiography and pulmonary function tests were strongly recommended. Similar guidelines for management of all causes of acute dyspnea were used in both groups.

Outcomes: Time to discharge and treatment cost (based on hospital charges). Secondary outcomes were in-hospital and 30-day mortality.

Patient follow-up: 100% (intention-to-treat analysis).

MAIN RESULTS

Patients in the BNP group had a shorter time to discharge and lower total treatment costs than did the usual-care group (Table). The groups did not differ for in-hospital mortality (6% vs 9%, $P = 0.21$) or 30-day mortality (10% vs 12%, $P = 0.45$).

CONCLUSION

In patients presenting to the emergency department with acute dyspnea, a diagnostic strategy involving rapid measurement of B-type natriuretic peptide levels reduced time to discharge and total treatment costs more than did the conventional diagnostic strategy.

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*See Glossary.

†Information provided by author.

Rapid measurement of B-type natriuretic peptides vs conventional diagnostic strategy (usual care) for acute dyspnea‡

Outcomes	Rapid measurement of peptides	Usual care	*P* value
Median time to discharge in days (IQR)§	8 (1 to 16)	11 (5 to 18)	0.001
Total median treatment cost (95% CI)	$5410 (4516 to 6304)	$7264 (6301 to 8227)	0.006

‡CI defined in Glossary.
§IQR = interquartile range.

COMMENTARY

Congestive heart failure (CHF) can mimic other diseases associated with dyspnea. BNP is a neurohormone secreted from the cardiac ventricles in response to volume expansion and increased intracardiac pressure (1). Several observational studies have shown that BNP has good diagnostic test characteristics in CHF, with likelihood ratios of 2.5 to 5.0 for BNP levels > 50 pg/mL and diagnostic accuracy ≥ 80% (2, 3). So, why another study on BNP? The study by Mueller and colleagues is unique because it provides a randomized comparison of a diagnostic and management strategy, including BNP measurement, with usual care in patients presenting with dyspnea. In addition, the investigators assessed patient-important outcomes and found reduced time to discharge, reduced cost, and trends toward decreased mortality. The BNP strategy also reduced the need for hospitalization and intensive care by about 10%. Thus, this study provides direct, high-quality evidence for improved patient care based on BNP measurement in CHF.

Readers should recognize, however, that the strategy included other diagnostic tests (electrocardiograhy, pulse oximetry, echocardiography, and chest x-rays) and scripted care. The treatment strategy was not described in the published report, and it would be useful to know if it differed between the 2 groups. We would also like to know whether the results are generalizable beyond the 1 Swiss center in the study, as well as the likelihood ratios for the BNP cutoffs used in the study. Before adopting the diagnostic strategy assessed by Mueller and colleagues, readers should be aware that jumping on the BNP bandwagon requires diagnostic uncertainty, rapid assays, high-quality downstream care, and astute decision making. Otherwise BNP will be added to the troponin test as yet another test to deal with in the ED.

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