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Original Contributions

EARLY POINT-OF-CARE TESTING AT TRIAGE REDUCES CARE TIME IN STABLE ADULT EMERGENCY DEPARTMENT PATIENTS

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☐ **Abstract—Background: Core laboratory testing may increase length of stay and delay care. Objectives: We compared length of emergency department (ED) care in patients receiving point-of-care testing (POCT) at triage vs. traditional core laboratory testing. Methods: We conducted a prospective, case-controlled trial of adult patients with prespecified conditions requiring laboratory testing and had POCT performed by a nurse after triage for: a basic metabolic panel, troponin I, lactate, INR (i-STAT System), urinalysis (Beckman Coulter Icon), or urine pregnancy test. Study patients were matched with controls based on clinical condition, gender, age, and time to be seen. Groups were compared with Wilcoxon rank–sum or Fisher's exact tests. Results: We matched 52 POCT study patients with 52 controls. Groups were similar in age, gender, clinical condition, time to be seen by a physician (3.3 h, 95% confidence interval [CI] 2.2–4.4, vs. 3.1 h, 95% CI 2.2–4.5 h, in POCT and control patients, respectively; $p = 0.84$), use of imaging, and disposition. Of 52 study patients, 3 (5.8%, 95% CI 2.0–15.9) were immediately transferred to the critical care area to be urgently seen by an emergency physician. POCT patients had a significantly shorter median (interquartile range [IQR]) ED care time than matched controls (7.6, 95% CI 5.1–9.5 vs. 8.5, 6.2–11.3 h, respectively; $p = 0.015$). Median [IQR] ED length of stay was similar in study patients and controls (9.6, 95% CI 7.9–14.5 vs. 12.5, 8.2–21.2 h, respectively; $p = 0.15$). Conclusions: Among stable adult patients presenting to the ED with one of the prespecified conditions, early POCT at triage, compared with traditional core laboratory testing after evaluation by an ED provider, reduced ED care time by approximately 1 h.**

☐ **Keywords—point-of-care testing; emergency department; length of stay; triage**

INTRODUCTION

Emergency department (ED) crowding and boarding is widespread in the United States and around the world (1). A large body of evidence has demonstrated its association with adverse patient outcomes (2–4). Crowding increases medical errors, and not uncommonly, patients with time-critical illness experience delays in care. Delays in critical interventions have been shown to worsen patient outcomes in sepsis and acute myocardial infarction (5,6).

Several interventions are available to reduce crowding. One such intervention is the use of early point-of-care testing (POCT) at the time of patient triage and prior to physician evaluation. Triage POCT also may hasten the time to clinically important test results that may lead to earlier detection of time-sensitive diseases such as acute myocardial infarction and sepsis. Patients with other common chief complaints such as syncope, abdominal pain, generalized weakness, and gastrointestinal bleeding (in whom a potentially serious underlying condition may

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exist) may also benefit from expedited testing. POCT at triage also may reduce ED length of stay (LOS) by expediting decision-making. In prior work, we developed a protocol for POCT at ED triage, and demonstrated in simulated settings that the protocol would change management decisions at ED triage (7,8).

The objectives of the current study were twofold. First, we sought to determine whether the use of a POCT at the time of ED triage through a protocolized approach would reduce the time to disposition decision in patients with one of eight common chief complaints (Table 1). Second, we determined how often early POCT resulted in immediate transfer to a critical care area in a patient, specifically from less acute triage levels to more urgent ones, whether triage POCT was helpful in either disposition or care, and its impact on ED LOS. We hypothesized that early POCT would reduce time to disposition decision by at least 1 h and would result in changes in triage decision-making, compared with matched controls.

METHODS

Study Design

We conducted a prospective, observational study with matched controls from December 2016 to June 2017. All patients gave written informed consent and the study was approved by the Institutional Review Board.

Setting

We conducted the study at a tertiary care, suburban, academic medical center with an annual ED census of 110,000. At the start of the study, early POCT was not available for patient triage.

Subjects

Stable ED patients with one of eight predefined chief complaints (chest pain, generalized weakness, gastrointestinal bleeding, missed dialysis, suspected infection or sepsis, females with abdominal pain ages 18–45 years, and patients older than 65 years with abdominal pain or syncope) that presented to the ED when one of the study nurses was present were eligible for enrollment. Patients requiring immediate or urgent physician evaluation by initial triage assessment were excluded. For patients with chest pain, a 12-lead electrocardiogram was performed within 10 min of triage and shown to a senior emergency physican who determined whether patients needed to be seen immediately. These patients were also excluded. In addition, patients were enrolled only when the estimated time to be seen by an ED practitioner exceeded 1 h. This was based on the average time to be seen of nonstudy patients presenting to the ED shortly prior to the study patient. The first patient of the research coordinator shift (Monday through Saturday, 8 AM to 10 PM) meeting inclusion criteria was enrolled as the study patient. Then, for each study subject, a control subject presenting around the same time was matched based on gender, chief complaint, age (plus or minus 5 years), and time to be seen by an ED provider (plus or minus 30 min). If no similar control patient was found during the same shift in which the study patient was enrolled, a matched control patient was identified from a prior shift.

Study Interventions

ED patients meeting inclusion criteria were approached by one of the study nurses. After obtaining written, informed consent, a study nurse withdrew a venous blood

Table 1. Chief Complaints Eligible for Enrollment for Point-of-Care Testing at ED Triage (n = 52)

Chief Complaint	Point-of-Care Tests*	Number of Patients Enrolled
Adult patients with chest pain	CG8+, cTnI	17
Young females (ages 18–45 years) with abdominal pain	Urine pregnancy, urinalysis	12
Older patients (age >65 years) of either sex with abdominal pain	CG8+, lactate	9
Older (age >65 years) patients with syncope	CG8+, cTnI	4
Generalized weakness	CG8+, cTnI, lactate	3
Gastrointestinal bleeding	CG8+, lactate, INR if on coumadin	3
Missed dialysis	CG8+	2
Infection/sepsis	Lactate	2
Total		52

i-STAT CG8+ cartridge = sodium, potassium, ionized calcium, glucose, hematocrit, hemoglobin, pH, pCO2, pO2, TCO2, HCO3, and sO2.
i-STAT cTnI test cartridge = cardiac troponin I.
i-STAT CG4+ = Lactate.
i-STAT PT/INR.
Beckman Coulter Icon 20 = Urine pregnancy.
ED = emergency department; cTnI = cardiac troponin I; INR = international normalized ratio.
* Point-of-care test cartridges used.