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USE OF QUALITY IMPROVEMENT INTERVENTIONS AND THE LINK TO PERFORMANCE ON PERCUTANEOUS INTERVENTION FOR ACUTE MYOCARDIAL INFARCTION

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☐ **Abstract—Background: Despite numerous calls for hospitals to employ quality improvement (QI) interventions to improve emergency department (ED) performance, their impact has not been explored in multi-site investigations. Objective: We investigated the association between use of QI interventions (patient flow strategies, ED electronic dashboards, and five-level triage systems) and hospital performance on receipt of percutaneous intervention (PCI) within 90 min for acute myocardial infarction patients, a publicly available quality measure. Methods: This was an exploratory, cross-sectional analysis of secondary data from 292 hospitals. Data were drawn from the Quality Improvement Activities Survey, the American Hospital Association's Annual Survey, and Hospital Compare. Linear regression models were used to detect differences in PCI performance scores based on whether hospitals employed one or more QI interventions. Results: Fifty-three percent of hospitals reported widespread use of patient flow strategies, 62% reported using a dashboard, and 74% reported using a five-level triage system. Time to PCI performance scores were 3.5 percentage points higher (i.e., better) for hospitals that used patient flow strategies and 6.2 percentage points higher for hospitals that used a five-level triage system. Scores were 10.4 percentage points higher at hospitals that employed two quality improvement interventions and 12.8 percentage points higher at hospitals that employed three. Conclusion: Employing QI interventions was associated with better PCI scores. More research is needed to explore the direction of this relationship, but results suggest that hospitals should consider adopting patient flow strategies, electronic dashboards, and five-level triage systems to improve PCI scores.** © **2015 Elsevier Inc.**

☐ **Keywords—quality improvement; performance measurement; PCI; health policy**

INTRODUCTION

There is widespread agreement that the emergency department (ED) is a busy, high-risk environment with many opportunities for error, and several studies suggest that the quality of emergency care can be improved (1). As a result, the Institute of Medicine (IOM), the Joint Commission, the American College of Emergency Physicians (ACEP), and others have recommended the

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adoption of various improvement practices and technologies (1,2). These interventions include the adoption of patient flow improvements, electronic ED dashboards, and reliable and validated five-level triage systems.

Previous studies have shown that these three quality improvement interventions hold potential to improve ED operations and reduce ED crowding (1,3,4). As such, EDs that employ these strategies may be better able to provide prompt care for patients with time-sensitive conditions, for example, timely administration of percutaneous coronary intervention (PCI) for acute myocardial infarction (AMI) patients. However, the relationship between hospitals' adoption of quality improvement interventions and the delivery of prompt emergency care has not been explored in multi-site investigations.

In this article, we investigate the association between use of three diverse quality improvement interventions and hospital performance on receipt of PCI within 90 min, a publicly reported core quality measure that affects Medicare reimbursement (5). We hypothesize that use of quality improvement interventions is positively related to performance on PCI scores, and that hospitals adopting multiple interventions perform better on PCI scores than those adopting only one intervention or none at all.

METHODS

Design

This is a cross-sectional analysis of secondary data.

Interventions

The three quality improvement interventions included in this study were patient flow strategies, electronic ED dashboards, and five-level triage systems. These three interventions were selected because they had previously been shown to improve ED operations and reduce ED crowding, and because each is distinct in its implementation and purpose. Patient flow strategies represent a bundle of improvements to speed ED admissions and reduce ED crowding (3). Electronic dashboards are used to manage ED flow and resources, providing staff with easy access to real-time information from laboratory, radiology, and admitting databases (1). Reliable and validated five-level triage systems support efficient ED operations, ensuring that scarce resources are directed to patients with the greatest need (4).

Data Sources and Selection of Participants

Data on hospitals' use of patient flow interventions and ED dashboards were drawn from the 2009 Quality Improvement Activities Survey (QAS), which was designed by Cohen and colleagues to gather information from hospital chief quality officers about the nature and extent of quality improvement activities undertaken (6). Survey respondents were asked whether they had implemented an electronic ED dashboard. They were also asked about the extent to which patient flow improvement strategies were used. Response options included: not used at all, used minimally, used moderately, used widely, and used hospital-wide. We collapsed responses to create a dichotomous variable (used widely or used hospital-wide vs. otherwise). In 2009, invitations to participate in the QAS were sent to all 713 safety net hospitals (as defined using Bazzoli et al.'s uncompensated care approach) and a randomly selected control group of 1275 non-safety-net hospitals (7). Surveys were completed by 578 hospitals (29% response rate).

Data on triage system use were drawn from the 2009 American Hospital Association (AHA) Annual Survey. The survey, conducted annually since 1946, provides a cross-sectional view of the hospital industry, collecting information on hospital size, ownership, geographic location, services, teaching status, and network affiliation. The AHA Annual Survey is mailed to all hospital chief executive officers (CEOs) in the United States, and they are instructed to circulate the survey to the individuals most appropriate to complete the different sections of the survey. In 2009, the survey was mailed to CEOs from 4897 general medical and surgical hospitals (including children's general hospitals), and 4009 (82%) responded.

In 2009, the following question was added to the AHA survey: "Which of the following best describes the type of triage system your emergency department uses on a daily basis to determine which patients can wait to be seen and which need to be seen immediately?" Response options were: 3-level system, 4-level system, 5-level Emergency Severity Index (ESI), 5-level system, other (please specify), and don't know. We created a new, dichotomous variable to indicate whether a hospital used ESI or other 5-level system.

Outcome Measure and Data Source

We used PCI within 90 min of arrival for AMI patients (AMI-8A) as the outcome measure because it is a time-sensitive core quality measure with considerable variation in performance across hospitals, and it is related to patient mortality (8,9). A hospital's PCI score represents the percent of eligible AMI patients who received PCI within 90 min of arrival.

PCI scores were obtained from Hospital Compare. Due to the link between data reporting and the annual Medicare payment update, the overwhelming majority of hospitals report data to Hospital Compare (10). We excluded hospitals that did not have at least 25 patients