

Facilitators and Barriers to Reducing Emergency Department Admissions for Chest Pain: A Qualitative Study

Michelle P. Lin, MD, MPH, MS,* Shaw Natsui, MD, MPA, †‡ Corine Sinnette, MA, MPH, † Alexis Ball, †‡
Joel S. Weissman, PhD, †‡ and Jeremiah D. Schuur, MD, MHS †‡

Background: Chest pain of possible cardiac etiology is a leading reason for emergency department (ED) visits and hospitalizations nationwide. Evidence suggests outpatient management is safe and effective for low-risk patients; however, ED admission rates for chest pain vary widely. To identify barriers and facilitators to outpatient management after ED visits, we performed a multicenter qualitative study of key stakeholders.

Methods and Results: We identified Massachusetts hospitals with below-average admission rates for adult ED chest pain visits from 2010 to 2011. We performed a qualitative case study of 27 stakeholders across 4 hospitals to identify barriers and facilitators to outpatient management. Clinicians cited ability to coordinate follow-up care, including stress testing and cardiology consultation, as key facilitators of ED discharge. When these services are unavailable, or inconsistently available, they present a barrier to outpatient management. Clinicians identified pressure to maintain throughput and the lack of observation units as barriers to ED discharge. At 3 of 4 hospitals without observation units, clinicians did not use clinical protocols to guide the admission decision. At the site with a dedicated ED observation unit, low ED admission rates were attributed to clinician adherence to clinical protocols.

Conclusions: In conclusion, most participants have not adopted protocols focused on reducing variation in ED chest pain admissions. Robust systems to ensure follow-up care after ED visits may reduce admission rates by mitigating the perceived risk of discharging ED patients with chest pain. Greater use of observation protocols may promote adoption of clinical guidelines and reduce admission rates.

Key Words: chest pain, hospitalization, qualitative research

(*Crit Pathways in Cardiol* 2018;17: 201–207)

BACKGROUND

Chest pain is a leading reason for seeking care in the emergency department (ED), accounting for 7 to 10 million ED visits in the United States annually.^{1,2} Initial ED evaluation entails identifying acute myocardial infarction and other emergent conditions that require intervention or hospitalization. Patients with benign etiologies of chest pain can be safely managed on an outpatient basis after initial risk stratification.^{3,4}

Received for publication November 13, 2017; accepted January 24, 2018.
From the *Icahn School of Medicine at Mount Sinai, New York, NY; †Brigham and Women's Hospital, Boston, MA; and ‡Harvard Medical School, Boston, MA.
This project was funded by the Blue Cross Blue Shield Foundation of Massachusetts (PI Schuur).

Nothing to declare.

This study was conducted at Brigham and Women's Hospital and Harvard Medical School, where Dr. Lin was previously located.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (www.critpathcardio.com).

Corresponding Author: Michelle P. Lin, MD, MPH, MS, Department of Emergency Medicine, 3 East 101st Street, 2nd floor, New York, NY 10029. E-mail: michelle.lin@mountsinai.org

Copyright © 2018 Wolters Kluwer Health, Inc. All rights reserved.

ISSN: 1003-0117/18/1704-0201

DOI: 10.1097/HPC.0000000000000145

Among adult patients presenting to the ED with chest pain, 17%–50% are admitted to the hospital, accounting for \$10.3 billion in annual hospital charges; among Medicare beneficiaries, 63% of patients are admitted to the hospital or placed in observation status.^{2,5} However, ED admission rates for chest pain vary without evidence of associated variation in outcomes.^{6,7} Reducing variation in ED admission rates for chest pain has the potential to improve the value of acute cardiac care by improving quality and substantially reducing health care costs.⁵

While variation in ED admission rates has been widely described in administrative datasets, hospital and provider-level factors influencing implementation of quality improvement efforts to reduce admission rates—in particular, barriers and facilitators to implementation—remain unknown. Therefore, we conducted a multicenter qualitative study of EDs with below-state average ED admission rates to identify facilitators and potential barriers to outpatient management after ED visits for chest pain of possible cardiac etiology.

METHODS

Study Setting and Participants

This qualitative study is part of a larger mixed-methods study examining variation in ED admission rates across Massachusetts hospitals. To identify sites that had implemented quality improvement strategies to reduce ED admission rates for chest pain, we performed a retrospective cross-sectional analysis of all adult ED visits and admissions with a diagnosis of chest pain in the 2010–2011 Massachusetts hospital discharge dataset. We calculated unadjusted and risk-standardized admission rates using previously described methods to adjust for hospital-specific case mix.^{8,9} Among ED visits resulting in discharge home, we examined balancing measures representing potential unintended consequences of lower than average ED admission rates: (1) rate of all-cause repeat ED visits within 3 days to any statewide ED; (2) rate of all-cause admission within 7 days to any hospital in the state; and (3) rate of admission within 30 days for cardiopulmonary emergency to any hospital in the state (International Classification of Diseases-9 Diagnoses; Appendix A, Supplemental Digital Content, <http://links.lww.com/HPC/A206>).

We assembled a 9-member technical expert panel to assist with the identification of sites for qualitative study among the hospitals with below-average ED chest pain admission rates and below-average balancing measures. During the modified Delphi selection process, we stratified hospitals by volume, teaching status, Trauma Center designation, and geographic location to represent a broad range of practice settings.

Data Collection and Analysis

Our primary objective was to identify strategies to promote outpatient management of patients with chest pain of possible cardiac etiology after an ED visit. We focused on ED clinicians and leaders at low-admitting hospitals because our aim was to identify barriers and facilitators to disseminate with other EDs and stakeholders and also because of limited resources. We developed the

interview guide based on our literature review and team members' clinical experience evaluating ED patients with chest pain. The guide began with open-ended questions inquiring about specific clinical practices and resources, such as stress testing and observation facilities. The questions included with probes to determine whether these practices and resources were facilitators or barriers to outpatient management, recognizing that even at the highest-performing hospitals, variation may occur and barriers to outpatient management may exist (Interview Guides, Appendix B, Supplemental Digital Content, <http://links.lww.com/HPC/A206>). We made minor revisions to improve flow and clarity after pilot-testing the interview guide with practicing clinicians at our institution and based on responses to initial rounds of interviews. At enrolled sites, a multidisciplinary team, consisting of 2 physicians trained in qualitative research methods (J.D.S., M.P.L.) and a qualitative methodology expert (C.C.S.), conducted phone and in-person semistructured interviews with ED directors, full-time attending emergency physicians, and other key informants identified in the interview process.

We transcribed interviews verbatim, and 4 coders (2 physicians, 1 qualitative methodology expert, and 1 trained research assistant) used inductive content analysis techniques to independently code all transcripts in NVivo9 (QSR Software International, 2010).^{10,11} Using a rigorous and systematic process, 2 primary coders (C.C.S., S.N.) subsequently reviewed all coded data to identify themes that emerged as barriers and facilitators of outpatient management. Themes were then reviewed by all authors and discussed to ensure consensus.

RESULTS

Among 70 Massachusetts EDs, ED admission rates ranged from 2.2% to 46.6%, with a statewide unadjusted average ED admission rate of 24.9. We identified 35 hospitals with average or below-average ED admission rates for chest pain. Of these, the technical expert panel considered 15 hospitals with average or below-average rates for all balancing measures. We invited the top 5 highest ranked hospitals to participate in the qualitative study; 4 hospitals agreed to participate (unadjusted chest pain ED admission rate Site A, 15.8% and 21%; Site B, 19.4%; Site C, 19%; Site D, 19.3%; see Table 1). We conducted 27 semistructured interviews of emergency physicians, clinical directors, case managers, a cardiologist, and a primary care provider across 4 sites, yielding 774 minutes of transcript. Participant characteristics are described in Table 2. Key quotes from all themes are listed in Table 3, and themes are classified as barriers or facilitators in Table 4.

Description of Site and Context

Two of the 4 sites (B and C) were community-based suburban EDs; Site A was an academic-affiliated high-volume urban community ED; and Site D was a high-volume urban primary academic site (Table 1). Three of the 4 hospitals lacked a dedicated observation unit, and Site D had a longstanding ED-based observation unit. A majority of sites were affiliated with one or more local primary care practices, and all but Site A were able to access outpatient electronic medical records for a substantial proportion of ED patients. However, Site A clinicians described a unique collaborative relationship with a local community health clinic; thus, we also interviewed a primary care clinician affiliated with Site A. Most sites did not involve other medical specialists in the decision to admit ED patients with chest pain, with the exception of Site C, which reported access to on-site cardiology consults to assist with the decision to hospitalize ED chest pain patients or perform additional testing. Therefore, we interviewed a cardiologist who provided on-site consultations at site C. In addition, we interviewed case managers who were involved facilitating outpatient management after ED visits at 2 sites. Key quotes from all themes are listed in Table 3, and themes are classified as barriers or facilitators in Table 4.

Access to Follow-Up Care Facilitates Outpatient Management

Nearly all ED clinicians identified a patient's ability to access to follow-up care after an ED visit as a key factor in facilitating discharge and outpatient management. "I think that would be the biggest barrier: A, if they don't have a primary care doctor, and B, if they cannot be seen timely enough to get that test that we need" (ED Clinician, Site A). At majority of sites (B, C, and D), respondents reported both patients, and emergency physicians could reliably contact outpatient primary care providers to establish follow-up care. One emergency physician stated: "We have largely primary care, largely connected patients, so almost always, we're able to reach a private care doctor, at least for those patients in our community, to make arrangements" (ED Clinician, Site B).

In contrast, respondents at Site A reported an ED patient population with inconsistent access to follow-up care. To facilitate ED discharge, the hospital and ED had partnered with a local community health clinic so emergency physicians could ensure follow-up care for patients without a regular source of care. According to one emergency physician, "if someone doesn't have a primary care physician (PCP), we can literally make them an appointment one of the community health centers. We can put their name in the book, and have them show up at that time, and that will be like their initial PCP visit" (ED Clinician, Site A). The perception of strong primary care linkage was reinforced in an interview with a primary care provider at the aforementioned community health center, who emphasized the reciprocally collegial relationship between the primary care and ED clinicians.

Variable Access to Outpatient Stress Tests as Barrier to Outpatient Management

Emergency physicians at 2 of the 4 sites were able to directly order next-day stress tests for ED patients with chest pain, via appointment for discharged ED patients (Site A) and as part of the ED-based observation pathway (Site D). At the other 2 sites, noninvasive cardiac imaging could be ordered for patients after ED discharge by primary care providers (Site B) and/or cardiologists in the ED (Site C). At Site C, on call cardiologists were also occasionally able to facilitate stress tests or noninvasive cardiac imaging during the index ED visit for patients evaluated Monday through Friday between 9 AM and 5 PM.

Some emergency physicians perceived the inability to obtain timely exercise tolerance test during or after the ED visit as a barrier to ED discharge: "if I feel that [a patient] could get a stress test within 24 to 48 hours and I can arrange that as an outpatient ... and often I can—then that's ... a reason to discharge a patient. If I can't get any of that stuff done, then, yeah, they stay in the hospital" (ED Clinician, Site B).

At Site A, ED clinical leaders, in conjunction with cardiology staff, reported establishing a system to facilitate stress tests within 24 hours of ED discharge for patients with low-risk chest pain. However, practicing frontline emergency physicians at Site A reported inconsistent availability and, therefore, variable utilization of this service: "It involves a lot of faxing paperwork and trying to get ahold of their PCP, and figuring out who's going to follow up these stress test results after they get done, so I haven't done one. I tried one the first time, and it was just so hard to do that I just haven't [done it again]" (ED Clinician, Site A). On the other hand, Site D respondents reported that the reliable availability of next-day stress testing for observation patients increased their use of observation as an alternative to hospitalization: "If we keep the patient overnight in an observation unit, we're pretty much guaranteed to get a stress test the next day. That usually comes through without a problem" (ED Clinician, Site D).

Limited Role of Non-ED Clinicians in Decision to Admit or Discharge

Nearly all emergency physicians interviewed reported they were primarily responsible for the decision to admit ED patients with chest pain to the hospital, with occasional input from admitting hospitalists.

TABLE 1. Study Site Characteristics 2014

	State Average	Site A	Site B	Site C	Site D
Practice setting (academic vs. community)		Community	Community	Community	Academic
Teaching hospital		No	No	No	Yes
Geographic location		Urban	Suburban	Suburban	Urban
Number of interviews (No.)		8	7	6	6
Median years in practice (range)		4	9.5	16	12
Annual ED visits (No.)		>50,000	30,000–49,000	30,000–49,000	>50,000
Unadjusted admission rate for chest pain (%)	24.9	15.8, 21.0	19.4	19.0	19.3
Risk-adjusted admission rate ratio for chest pain (RSARR)	1	0.64, 0.82	0.85	0.81	0.86
Percent of short-stay hospitalizations*	86.1	72.8, 89.4	90.7	88.1	85.6
72-hour repeat ED visits (%)	6.4	5.4, 3.8	3.6	4.7	7.5
Seven-day all-cause admission rate (%)	2.9	2.4, 1.7	1.8	2.5	2.8
30-day related-condition admission rate (%)	1.2	0.5, 1.1	0.8	1.4	1.0
Dedication observation unit		No	No	No	Yes
Percent patients observed for <24 hours	29.7	0, 27.0	23.1	19.6	58.3
Access to outpatient electronic medical record		No	Yes	Yes	Yes

*Short-stay admissions: the proportion of hospitalizations that were 2 calendar days or shorter.

A notable exception was Site C, where emergency physicians still made the decision to admit or discharge patients, but incorporated cardiology consult recommendations in their decision-making: “Whatever the cardiologist recommends is usually the way that we’ll go, and occasionally the patient might go right over for a stress test or may get admitted to observation with a stress test scheduled the following morning” (ED Clinician, Site C). Both emergency physicians (EPs) and cardiologists concurred on the consistent availability of ED cardiology consults as an important facilitator of ED discharge: “From 7:00 in the morning to 5:00 at night, there are two non-invasive cardiologists that are doing purely consultative cardiology, reading EKGs, doing stress testing, reading [echocardiograms], seeing some office patients. We’re immediately available” (Cardiologist, Site C). At Site D, while the cardiology department was involved in the initial development of a chest pain protocol, they were no longer routinely involved in decisions to admit or discharge patients with low-to-intermediate risk chest pain.

Limited Role of Clinical Protocols and Pathways

We observed high variability in practice patterns across sites and among interview participants. While some ED clinical directors and chairs reported the existence of an ED clinical protocol for evaluating chest pain of possible cardiac origin, few of the clinicians interviewed were aware of such guidelines, and none reported adhering to any standardized institutional practice. Most emergency physicians order an initial set of cardiac biomarker testing; however, there

was little consensus regarding the timing of a second set of cardiac enzymes, the utility and timing of stress testing, or the criteria for admitting a patient to the hospital for additional testing. When asked about protocols, one EP stated: “There’s no sort of set guideline. It’s just catch as catch can. If you can get the cardiologist on the phone and get them to do a stress test usually you sort of count yourself somewhat lucky I think” (ED Clinician, Site B).

Multiple emergency physicians cited the American Heart Association (AHA) Scientific Statement on the use of outpatient ETT for low-risk patients with chest pain as a barrier to outpatient management (AHA). As one emergency physician stated: “Even though I know that the literature is changing ... it’s hard to go against the [AHA] guidelines and not do that stress testing, especially if the person does end up having a heart attack, you can’t go by literature that’s published but doesn’t have any guidelines, when the actual guidelines are saying that you should have a stress test in the next 72 hours” (ED Clinician, Site B).

Another exception to the low utilization of guidelines for ED chest pain evaluation was Site D, which was unique among participating sites in having an ED-based observation unit. EPs at Site D were in agreement regarding the institutional practice of placing low- and intermediate-risk chest pain patients in ED observation after an initial set of negative biomarkers, while only hospitalizing those with acutely abnormal biomarkers or a high clinical suspicion of acute coronary syndromes (ACS). Although not all clinicians at Site D verbalized adherence to a clinical pathway, emergency physicians demonstrated remarkable consistency when verbalizing their decision-making and criteria for admitting or discharging ED patients with chest pain.

ED-Based Observation Units Facilitate Outpatient Management

Three of the 4 sites (A, B, and C) lacked dedicated observation units. Although many of these clinicians admitted ED chest pain patients to the hospital under “observation status,” they perceived the absence of a dedicated observation unit as a barrier to outpatient management. One physician noted the lack of observation facilities as a particular barrier during evening and weekend hours when a patient’s outpatient providers are more difficult to contact: “The same patient in the evening, they’re going to get admitted, essentially

TABLE 2. Participant Characteristics

	% (Number)
Female	15 (4)
Years in practice, median (range)	8 (1–22)
Years at institution, median (range)	7 (1–35)
Professional role	
Emergency physician	71 (19)
Clinical director	14 (4)
Case manager	7 (2)
Primary care provider	4 (1)
Cardiologist	4 (1)

TABLE 3. Themes and Key Quotes

	Theme	Key Quotes
Site A	Limited availability of cardiology consults	“If we got Cardiology consults in the Emergency Department, I think a lot of us would be more comfortable with the patients going home”
	Impact of guidelines	“I know clinically and physiologically if you have two sets of negative biomarkers over six hours, the chance that you’re having an acute coronary are really, really, really low. That being said, I don’t think that’s translated to any guidelines yet, and so the guidelines still say despite two negative cardiac markers, you need a stress test within the next 72 hours...”
	Role of follow-up in mitigating risk	“If you know that there’s a one in 20 chance of a patient having a fatal outcome, your likelihood of sending that patient home who doesn’t have a primary care doctor who can see them well before that time, is low. If you know that they have primary care physician follow-up, I think you’re more than comfortable assuming that risk and letting them go.”
	Lack of clinical policy or protocol	“Yeah, we don’t have a clear policy. We don’t have—I would not say we have a clear pathway. We have reviewed various clinical pathways at our meetings, but I don’t think it’s adhered to. I don’t think we really strategize and organize around a set pathway that everyone is practicing by. I think it’s more individual attending-specific driven decision-making.”
Site B	Variable availability of stress tests	“Or if the—depend upon, again, how things—what the clinical picture is; if I feel that they could get a stress test within 24 to 48 hours and I can arrange that as an outpatient, then—and often I can—then that’s something that—that’s a reason to discharge a patient. If I can’t get any of that stuff done, then, yeah, they stay in the hospital.”
	Limited availability of cardiology consults	“I mean would it change if the cardiologist was always available or if we had some better protocol for either imaging or stress test? Yeah. I think that would be nice. Our institution doesn’t have any. There’s no sort of set guideline. It’s just catch as catch can. If you can get the cardiologist on the phone and get them to do a stress test usually you sort of count yourself somewhat lucky I think.”
	Lack of clinical policy or protocol	“Our institution doesn’t have any. There’s no sort of set guideline. It’s just catch as catch can. If you can get the cardiologist on the phone and get them to do a stress test usually you sort of count yourself somewhat lucky I think.”
Site C	Availability of stress tests; pressure to maintain throughput	“Sometimes, if you’re working Monday through Friday and it’s early enough in the day, you have somebody come in with chest pain and you’re just maybe not real sure, or you suggest to somebody that they come into the hospital and they say, “Heck no, I don’t have time for that,” sometimes we can get in touch with the cardiologist and if it’s early enough in the day, they can get a stress test. That’s a beautiful thing when that happens.”
	Lack of clinical policy or protocol	“There’s lots of protocols, but we really have lots and lots of protocols but I am not aware of a chest pain pathway protocol that I follow on a regular basis.”
Site D	Adherence to observation criteria	“I’m sure they do—tell you the truth, the diagnosis of chest pain, we do not admit people with ACS as a primary concern unless they’re getting admitted for cardiac cath, for the most part. Most of our ACS presentations get essentially [discharged] either from the emergency department or during observation status in the emergency department.” “I don’t think so. A couple years ago—and I think even bigger frankly than the cardiology consult, like I mentioned, we set in place this pathway and used the observation unit for treatment of all but really high risk patients with chest pain. The admission rate for patients with chest pain who are not having acute coronary syndrome is really negligible in the academic site.”
	Access to primary care follow-up	“We have—some of it depends on your insurance, but we have an ability to set up appointments for follow up within 24 hours with either an outside clinic or our own clinic. Again, that depends on what your insurance is. That’s actually been very useful. We also have the ability to set someone up with cardiology clinics all up within 72 hours.”

to a chest pain observation unit setting, but we don’t have one at this hospital, so they just get admitted” (ED Clinician, Site B).

At Site D, however, observation was a frequent alternative to admission: “We do not admit people with ACS as a primary concern unless they’re getting admitted for cardiac cath, for the most part. Most of our ACS presentations get essentially [discharged] either from the ED or during observation status in the emergency department” (ED Clinician, Site D). Overall, the presence of ED observation unit and the practice of placing intermediate-risk chest pain patients in observation “had tremendous impact [in reducing] our one-day admission rate for chest pain” (ED Clinician, Site D).

Pressure to Maintain Throughout as a Barrier to Outpatient Management

Emergency physicians often perceived pressure to maintain throughput and admit or discharge patients quickly as a barrier to increased outpatient management for ED patients with chest pain. For example, respondents reported reluctance to perform a second set of cardiac biomarkers in the ED because: “when a patient has to wait for a second biomarker, that prolongs their ER visit” (ED Clinician, Site C). Although clinical concern for ACS and access to follow-up care were the primary considerations affecting the decision to admit or discharge, some EPs admitted their criteria for admitting patients changes when their hospital or ED was full

TABLE 4. Facilitators and Barriers of Discharge and Outpatient Management After ED Visits for Chest Pain

Facilitator	Barrier
Access to and ability to coordinate outpatient follow-up care	Clinician risk perception and risk tolerance
Observation pathways incorporating protocols for ED disposition	Provider-level practice variation and limited adoption of clinical pathways and protocols
Consistent availability of cardiology consults	Inability to observe patients in ED and pressure to maintain throughput
ED clinician access to outpatient clinic and/or outside facility medical records	Limited availability of same-day or expedited outpatient stress tests
Availability of ED case management	Guidelines recommending stress testing within 72 hours Limited quality measurement and improvement around ED admission rates

or over capacity. “If we don’t have high acuity, high volume and long wait times, then I think my decision-making is changed ... If I’m in a high volume, high acuity environment I’m more of a triage physician” (ED Clinician, Site B).

Limited Quality Improvement Around ED Admission Rates

Respondents reported little to no department or hospital-level quality improvement initiatives aimed at reducing ED admission rates for ED patients with chest pain. All respondents perceived their hospitals would prefer to lower ED admission rates in general, but were unaware of specific efforts related to chest pain. Some ED clinicians were aware of hospital-wide efforts to reduce short-stay (less than 48-hour) admissions and readmissions; however, there was variation in specific quality measurement and improvement efforts.

At the departmental level, most EDs and clinical directors collect and report aggregate ED admission rates; some track provider-specific ED admission rates; and almost none were aware of condition-specific ED admission rates for chest pain or any other clinical syndrome. While most participants at Site D reported lower ED chest pain admission rates as a result of high adherence to observation protocols, one respondent noted room for improvement: “We’ve moved the site of [care] and technically reduced admissions but have not been as aggressive as I think we can be about instituting evidence-based pathways ... to reduce admissions and even observation days for chest pain” (ED Clinician, Site D).

Communication and Electronic Medical Record Access Promotes Outpatient Management

Many emergency physicians indicated they are more likely to discharge patients when they are readily able to communicate and share clinical information with patient’s outpatient providers. At each of the sites, communication took a variety of forms, including shared electronic medical records, automatic e-mails, and real-time telephone conversations to establish follow-up care plan. At Sites B, C, and D, emergency physicians were able to view outpatient medical records for a proportion of ED patients. As one participant stated, the effect of electronic health record access on ED decision-making is “huge—the more that you know about a patient, the more comfortable you are that they be managed as an outpatient.” (ED Clinician, Site D). ED

clinicians at all sites reported contacting outpatient providers via telephone. In addition, at site D, “Every single patient—every patient who has a primary care physician, in our system, gets an e-mail within the hour of discharge summarizing the patient’s stay and whatever recommendations we actually have” (ED Director, Site D).

Risk Tolerance and Perception as Barrier to Outpatient Management

Emergency physician perception of the risk of adverse patient outcomes played a critical role in the decision to admit or discharge ED patients with chest pain. Many of the previously discussed practices are tools to mitigate the likelihood of adverse cardiopulmonary events, for example: accessing prior information on cardiac workup, ensuring follow-up care or stress testing after discharge, and consulting cardiologists. As one EP stated, “If you know that there’s a one in 20 chance of a patient having a fatal outcome, your likelihood of sending that patient home who doesn’t have a primary care doctor who can see them well before that time, is low. If you know that they have primary care physician follow-up, I think you’re more than comfortable assuming that risk and letting them go” (ED Clinician, Site A). One cardiologist described discharging a patient with chest pain home after an ED visit as a “leap of faith on the Emergency Room doctor’s part ... That is the thing. The ER doctors have to buy-in to this. They have to trust the cardiology people” (Cardiologist, Site C).

Limited Role of ED Case Management in Facilitating Outpatient Management

One domain of the semistructured interview focused on the case management and additional care coordination resources to facilitate outpatient management after ED visits for chest pain. However, we found that most EDs not only had limited access to ED case management (eg, during daytime or weekday hours only), but also that case management played a less prominent role in the decision to admit or discharge ED patients with chest pain. Emergency physicians, ED directors, and case managers identified case management as an important resource to facilitate care transitions in other clinical conditions, but overall played a lesser role in the management of chest pain relative to the aforementioned factors.

DISCUSSION

We performed a qualitative analysis of 4 high-performing Massachusetts hospitals with lower than average ED admission rates for chest pain and lower than average revisit and readmission rates. To our knowledge, this is the first qualitative analysis to identify strategies to promote outpatient management after ED visits for chest pain. Prior studies have identified variation using administrative data and associations with specific hospital, physician, community, and patient-level factors.

Robust systems to ensure follow-up care after an ED visit were predominantly cited as a key facilitator of ED discharge and outpatient management. Follow-up care is particularly important given evidence that patients at higher risk of ACS or death after an ED visit for chest pain were less likely to visit a PCP or cardiologist.^{12–14} From an emergency physician perspective, the ideal course of action after an ED visit is safe for the patient, reliably available 24/7, efficient, and seamless to use. In some clinical settings, inpatient hospitalization may be the only option that meets all of these criteria. In order for outpatient management to be a feasible alternative to hospitalization, emergency physicians need to perceive these pathways to be equally reliable, efficient, and seamless. Prior studies have demonstrated that post-acute follow-up care is associated with lower readmission rates after hospitalization for heart failure or chronic obstructive pulmonary disease; further research is needed to determine whether post-ED follow-up care is associated with lower admission rates for chest pain and other conditions.^{15,16}

One goal of our study was to determine the impact of clinical resources such as stress testing, cardiology consults, and case management on the decision to admit or discharge. Most respondents reported low utilization of resources that were inconsistently available and regular utilization of resources that were perceived to be consistently available. For example, a system for scheduling outpatient stress tests after ED discharge was reported to be difficult to use and, therefore, not widely adopted by practicing emergency physicians. Conversely, at Site C, a cardiology consult was widely perceived as being routinely available on all weekdays and was therefore cited by all emergency physicians as playing a significant role in the decision to admit or discharge after ED visits for chest pain. It is possible that offering additional clinical resources such as cardiology consults or stress testing (whether during the index ED visit or in the post-discharge period) may reduce ED chest pain admissions; however, our findings suggest that maximizing the availability and ease of accessing existing clinical resources is a more effective strategy to promote outpatient management.

We had hypothesized that high-performing EDs were implementing evidence-based interventions through structured implementation frameworks to reduce physician-level variation in ED admission rates, based on best practices successfully used to reduce variation and improve quality in other clinical settings.^{17,18} However, emergency physicians reported either that no protocols or guidelines exist, or that they do not adhere to them when deciding whether to admit or discharge ED patients with chest pain. There were 2 notable exceptions: (1) the use of guidelines to promote ED-based observation unit use (Site D) and (2) the perception of the AHA recommendation to obtain a stress test within 72 hours as a barrier to outpatient management. The latter poses a particular barrier to the outpatient management of chest pain given the inconsistent availability to stress testing within 72 hours identified across sites in our interviews, particularly over the weekend. Despite limited evidence regarding the optimal timing of outpatient stress tests, the guideline stipulates the “safety and utility of outpatient ETT are predicated on performance of the test within 72 hours (24 hours is preferable).”³ Revising guidelines to recommend noninvasive testing based on individual clinical risk factors and patient preferences and values (eg, shared decision-making) instead of arbitrary temporal thresholds may promote greater use of outpatient pathways.

The use of observation as an alternative to inpatient admission for ED patients with chest pain appeared to be a key factor in reducing variation in clinical practices and ED admission rates at Site D. This finding is consistent with the increased use of observation nationwide for chest pain and other conditions, in part due to payment policy penalizing short-stay hospitalizations such as Medicare recovery audit contractors, which have focused on avoidable ED hospitalizations for chest pain.¹⁹ A substantial body of evidence supports the use of observation after ED visits as a safe and effective alternative to hospitalization; however, the impact of observation on utilization and costs remains unclear.²⁰

The emphasis on reliable follow-up care underscores the importance of emergency physicians’ risk tolerance with respect to the decision to admit or discharge ED patients with chest pain. Clinical tools and resources such as additional biomarker testing, stress testing and observation pathways not only contribute to patient-level risk stratification but also mitigate emergency physician perception of the risk-adverse outcome associated with discharge. Communicating with primary care providers or consulting with cardiologists also reduces risk perception by sharing and diffusing risk across multiple providers. Patient-centered approaches to reducing ED admissions for chest pain may incorporate shared decision-making, an approach which has been shown to reduce admissions and improve patient engagement without an increase in adverse outcomes.²¹ Prior studies have demonstrated an association between higher risk-taking characteristics with lower rates of ED admission;

further research is needed to determine association with adverse outcomes and whether modifying risk tolerance can affect utilization.²²

Of note, emergency physicians were primarily concerned with the infrequent but potentially serious adverse outcomes associated with missed diagnosis or delayed management of acute coronary syndrome to the exclusion of adverse outcomes associated with over-testing or avoidable hospitalization. Future efforts to improve ED admission rates may also promote awareness less tangible iatrogenic harms of over-testing and avoidable hospitalization. Respondents reported concern for adverse patient outcomes related to missed diagnosis or delayed management of acute coronary syndrome as a more important factor in decision-making than concern about malpractice risk. One respondent stated, “I certainly don’t worry about getting sued when I’m making my decision. I just don’t want to be wrong, and I don’t want to harm anyone” (ED Clinician, Site A). These findings also suggest malpractice reform alone may not reduce ED admission rates.

While there was an emphasis on reducing short-stay admissions, we found little evidence of structured quality improvement or adherence to implementation science frameworks with the goal of reducing ED admission rates. ED culture and emphasis on throughput, in addition to existing process metrics such as ED length-of-stay, do not incentivize emergency physicians to engage in care coordination activities to help avoid hospitalization. While these findings suggest that quality metrics targeting ED admission rates for chest pain would promote ED discharge, it is important to adopt such metrics cautiously. ED admission rates are not necessarily a clinically important outcome, and any quality measures related to hospitalization rates would need to be balanced by patient-oriented safety metrics, such as missed acute myocardial infarction rates, which are more complex to measure, in part because it is fortunately rare.²³ Further research is needed to determine whether implementation frameworks such as RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) can be applied in ED settings to reduce variation in ED admission rates for chest pain and other conditions.²⁴

Limitations

As this was a qualitative study, our findings are intended to be exploratory and hypothesis generating. We elected to focus on high-performing hospitals only and did not include low-performing sites that had higher than average ED admission rates, so it is possible that the themes we identified do not account for the lower admission rates at participating sites. However, we noted common themes across interviews and diverse study sites. Because the study included urban and suburban Massachusetts EDs, it is possible that selected participants are not representative of all EDs with low admission rates. However, we stratified sites by several hospital factors, including ED volume, teaching status, and trauma center designation; therefore, we believe our findings represent many EDs. We identified high-performing sites by analyzing an administrative database that did not include data on mortality. However, we included balancing measures including repeat ED visits and hospitalizations for any cause within 7 days or related causes within 30 days. Furthermore, other studies have demonstrated relatively low mortality after ED visits for chest pain among both admitted and discharged patients.^{5,25} We did not include prompts to address all potential factors contributing to ED admission rates, as we wanted to empirically identify unsolicited recurrent themes; however, we included some limited probes to improve question clarity. We conducted our study in 2014, shortly after the publication of the HEART (History, Electrocardiogram, Age, Risk factors and Troponin) score validation study, and only one EP mentioned incorporating the HEART score into clinical decision-making.^{26,27} It is possible that more emergency physicians now utilize these guidelines, but unlikely given prior evidence demonstrating slow adoption of evidence-based practices.²⁸

CONCLUSION

Our qualitative study of selected Massachusetts EDs with lower than average ED admission rates for chest pain identified several key findings. Robust systems to ensure follow-up care after ED discharge are critical to facilitate outpatient management. Seamless integration of resources such as expedited stress testing and cardiology consultation into clinical processes are effective alternatives to hospitalization and can reduce emergency physicians' perception of the risk of adverse outcome associated with outpatient management. Except in the presence of a dedicated observation unit, clinical protocols do not play a role in the decision to admit or discharge patients after an ED visit for chest pain. Further research is needed to test whether widespread adoption of these practices can reduce variation in ED chest pain admission rates and improve patient outcomes.

REFERENCES

- Owens PL, Barrett ML, Gibson TB, et al. Emergency department care in the United States: a profile of national data sources. *Ann Emerg Med.* 2010;56:150–165.
- Cotterill PG, Deb P, Shrank WH, et al. Variation in chest pain emergency department admission rates and acute myocardial infarction and death within 30 days in the Medicare population. *Acad Emerg Med.* 2015;22:955–964.
- Amsterdam EA, Kirk JD, Bluemke DA, et al.; American Heart Association Exercise, Cardiac Rehabilitation, and Prevention Committee of the Council on Clinical Cardiology, Council on Cardiovascular Nursing, and Interdisciplinary Council on Quality of Care and Outcomes Research. Testing of low-risk patients presenting to the emergency department with chest pain: a scientific statement from the American Heart Association. *Circulation.* 2010;122:1756–1776.
- Mahler SA, Riley RF, Hiestand BC, et al. The HEART Pathway randomized trial: identifying emergency department patients with acute chest pain for early discharge. *Circ Cardiovasc Qual Outcomes.* 2015;8:195–203.
- Sabbatini AK, Nallamothu BK, Kocher KE. Reducing variation in hospital admissions from the emergency department for low-mortality conditions may produce savings. *Health Aff (Millwood).* 2014;33:1655–1663.
- Venkatesh AK, Dai Y, Ross JS, et al. Variation in US hospital emergency department admission rates by clinical condition. *Med Care.* 2015;53:237–244.
- Pines JM, Mutter RL, Zocchi MS. Variation in emergency department admission rates across the United States. *Med Care Res Rev.* 2013;70:218–231.
- Krumholz HM, Lin Z, Drye EE, et al. An administrative claims measure suitable for profiling hospital performance based on 30-day all-cause readmission rates among patients with acute myocardial infarction. *Circ Cardiovasc Qual Outcomes.* 2011;4:243–252.
- Mohammed MA, Manktelow BN, Hofer TP. Comparison of four methods for deriving hospital standardised mortality ratios from a single hierarchical logistic regression model. *Stat Methods Med Res.* 2016;25:706–715.
- Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res.* 2005;15:1277–1288.
- Thomas DR. A general inductive approach for analyzing qualitative evaluation data. *Am J Eval.* 2006;27:237–246.
- Wong MK, Wang JT, Czarnecki A, et al. Factors associated with physician follow-up among patients with chest pain discharged from the emergency department. *CMAJ.* 2015;187:E160–E168.
- Czarnecki A, Wang JT, Tu JV, et al. The role of primary care physician and cardiologist follow-up for low-risk patients with chest pain after emergency department assessment. *Am Heart J.* 2014;168:289–295.
- Czarnecki A, Chong A, Lee DS, et al. Association between physician follow-up and outcomes of care after chest pain assessment in high-risk patients. *Circulation.* 2013;127:1386–1394.
- Health Quality Ontario. Effect of early follow-up after hospital discharge on outcomes in patients with heart failure or chronic obstructive pulmonary disease: a systematic review. *Ont Health Technol Assess Ser.* 2017;17:1–37.
- Baker H, Oliver-McNeil S, Deng L, et al. Regional hospital collaboration and outcomes in Medicare heart failure patients: see you in 7. *JACC Heart Fail.* 2015;3:765–773.
- Reames BN, Shubeck SP, Birkmeyer JD. Strategies for reducing regional variation in the use of surgery: a systematic review. *Ann Surg.* 2014;259:616–627.
- James BC, Savitz LA. How Intermountain trimmed health care costs through robust quality improvement efforts. *Health Aff (Millwood).* 2011;30:1185–1191.
- Richards F 3rd, Pitluk H, Collier P, et al. Reducing unnecessary Medicare hospital admissions for chest pain in Arizona and Florida. *Prof Case Manag.* 2008;13:74–84; quiz 85.
- Dharmarajan K, Wang Y, Lin Z, et al. Association of changing hospital readmission rates with mortality rates after hospital discharge. *JAMA.* 2017;318:270–278.
- Hess EP, Hollander JE, Schaffer JT, et al. Shared decision making in patients with low risk chest pain: prospective randomized pragmatic trial. *BMJ.* 2016;355:i6165.
- Pearson SD, Goldman L, Orav EJ, et al. Triage decisions for emergency department patients with chest pain: do physicians' risk attitudes make the difference? *J Gen Intern Med.* 1995;10:557–564.
- Wilson M, Welch J, Schuur J, et al. Hospital and emergency department factors associated with variations in missed diagnosis and costs for patients age 65 years and older with acute myocardial infarction who present to emergency departments. *Acad Emerg Med.* 2014;21:1101–1108.
- Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health.* 1999;89:1322–1327.
- Obermeyer Z, Cohn B, Wilson M, Jena AB, Cutler DM. Early death after discharge from emergency departments: analysis of national US insurance claims data. *BMJ.* 2017;356:j239.
- Six AJ, Backus BE, Kelder JC. Chest pain in the emergency room: value of the HEART score. *Neth Heart J.* 2008;16:191–196.
- Poldervaart JM, Reitsma JB, Backus BE, et al. Effect of using the HEART Score in patients with chest pain in the emergency department: a stepped-wedge, cluster randomized trial. *Ann Intern Med.* 2017;166:689–697.
- Balas EA, Boren SA. *Yearbook of Medical Informatics: Managing Clinical Knowledge for Health Care Improvement.* Stuttgart, Germany: Schattauer Verlagsgesellschaft mbH; 2000.