

Alternative Dispositions for Emergency Department Patients



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KEYWORDS

- Alternative dispositions • Observation unit • Home hospital • Rapid follow-up clinic
- Evidence-based clinical pathways • Accelerated diagnostic pathways

KEY POINTS

- Use of alternative dispositions from the emergency department may help reduce emergency department crowding through increasing inpatient bed capacity.
- There is an array of alternative dispositions that can deliver equivalent outcomes at lower costs and with shorter lengths of stay and greater patient satisfaction compared with inpatient admission for select clinical conditions.
- Adoption of alternative dispositions requires institutions to build processes and resources to promote their use. These processes and resources include investments in rapid follow-up clinics, observation units, and home hospital programs, as well as development and implementation of validated evidence-based clinical pathways.

ALTERNATIVE DISPOSITIONS AS A TOOL TO TACKLE EMERGENCY DEPARTMENT CROWDING

Emergency department (ED) crowding is a continuing challenge, resulting in increased morbidity and mortality and decreased patient satisfaction. Patients with greater than 12 hours of ED boarding have been shown to have significantly higher mortality than those with shorter lengths of stay.¹ Studies have also found ED crowding is associated with delayed antibiotics and fluids in sepsis² and increased mortality in patients with out-of-hospital cardiac arrest.³

Admitted patients waiting for inpatient beds are a primary driver of ED crowding. Evidence suggests that there is a subset of these patients for whom an alternative

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disposition can safely and effectively replace inpatient admission, and that this may help to alleviate both hospital and ED crowding.⁴

Strategies to decrease admissions from the ED when another disposition might be reasonable include:

- Rapidly referring ED patients to outpatient diagnostics and therapies
- Hospitalizing patients in observation units using evidence-based protocolized care pathways
- Hospitalizing patients at home through home hospital programs
- Community-based interventions, such as telemedicine, emergency medical services (EMS)-directed pathways, and expanded clinic access, to avoid or bypass the ED
- Use of care coordination and policies such as the Medicare skilled nursing facility (SNF) waiver to place appropriate patients in rehabilitation facilities, bypassing inpatient admission

Adoption of these admission alternatives can be supported with evidence-based clinical pathways that support the alternative plan as safe (eg, within the acceptable standard of care), as well as patient engagement via shared decision making⁵ (SDM; Fig. 1).

TOOLS TO SUPPORT ALTERNATIVE DISPOSITIONS: EVIDENCE-BASED CLINICAL PATHWAYS AND SHARED DECISION MAKING

Evidence-Based Clinical Pathways

Clinicians are most familiar with inpatient hospitalization as the setting for the work-up of a potentially dangerous patient complaint that remains unresolved after a standard

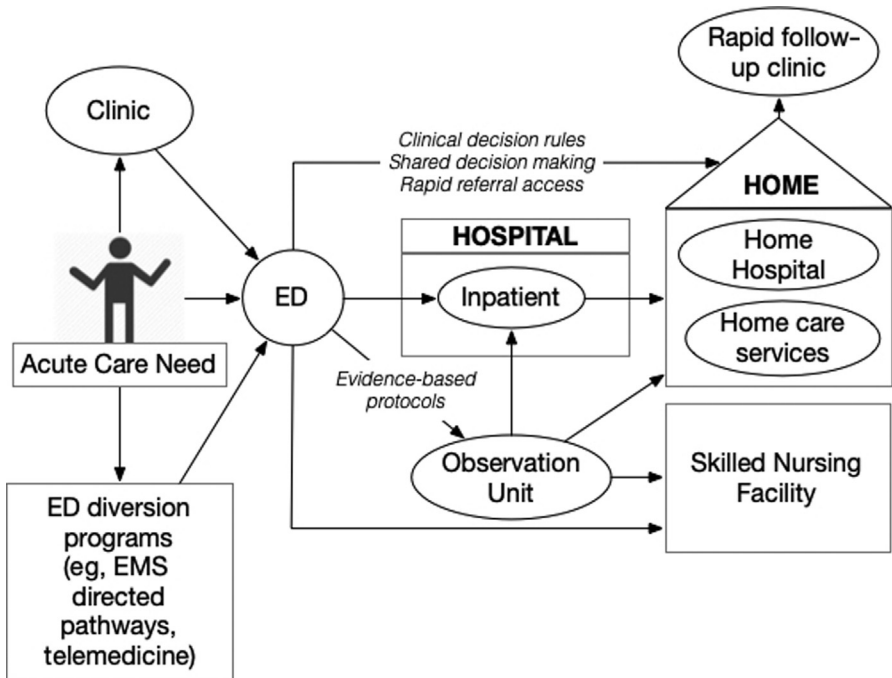


Fig. 1. Alternative dispositions.

ED visit. Clinicians and patients have little incentive to choose an alternative strategy such as observation or discharge to a rapid follow-up clinic without evidence of safety and efficacy. Creation and validation of accelerated diagnostic pathways (ADPs) and decision rules (collectively referred to as evidence-based clinical pathways) can provide this guidance and reassurance.⁵ There are dozens of such validated pathways that seek to reduce unnecessary laboratory or radiology testing or admission.⁵ These pathways are particularly attractive for gray-zone conditions, in which there exists clinical equipoise between different dispositions, and for which researchers have noted the greatest variation in admission decisions.⁶ These protocols can help support a patient's or clinician's choice of a disposition other than inpatient admission.

There are many barriers to the acceptance of a new ADP, including a perceived loss of clinical decision-making autonomy on the part of the clinicians; lack of acceptance of the pathway among referring outpatient clinicians and specialists; questions as to the reliability of the outpatient follow-up system; and lack of agreement about whether the researcher's definition of equivalence and safety matches that of the patient, clinician, and medicolegal community.^{5,7} Although there are a host of examples of validated clinical decision rules, most cannot alone promise the level of rule-out certainty that clinicians and patients may want.

Emergency physicians in the United States are typically held to a low level of risk tolerance, generally less than 1% risk of missing a serious diagnosis,⁸ and few advanced diagnostic pathways can ensure that level of sensitivity. For example, a recent meta-analysis found that the widely accepted HEART (history, electrocardiography, age, risk factors, troponin) score diagnostic pathway missed 3.3% of patients with a major adverse cardiac event, raising the question of whether this level of risk is tolerable to the medical community.⁹ Some conditions, such as heart failure, carry a high baseline risk of poor outcomes. An emergency physician may be reluctant to be last clinician to treat such high-risk patients before discharge, even when alternatives to inpatient admission are appropriate.¹⁰

Validated clinical decision rules likely offer some protection to clinicians against malpractice. One study found that, of 60 malpractice cases brought against clinicians for failure to order head computed tomography (CT) between 1972 and 2014, the 10 that were found in favor of the plaintiff all were cases in which a relevant decision rule suggested imaging or further observation.¹¹ Moreover, when used in conjunction with an observation unit or rapid follow-up clinic, these pathways can offer reassurance while still avoiding unnecessary hospitalizations.⁵ Chest pain has probably generated the greatest number of such validated decision rules, but, here as well, most studies have shown safety when the tool is paired with an alternative disposition, such as observation or rapid clinic follow-up.^{12–16} One recent study integrated use of the HEART score advanced diagnostic pathway with rapid referral to a specialty chest pain clinic, with an estimated 20% reduction in inpatient hospital health care costs.¹⁷

However, clinical pathways do not affect admission rates if clinicians do not know them or use them. Given the increased use of electronic health medical records, some clinicians have studied the integration of electronic clinical decision support systems (CDSSs) to standardize and promote use of validated decision rules.¹⁸ One recent study of CDSSs with patients with pulmonary embolism found its use safely reduced inpatient admissions.¹⁹ ED leaders can also promote pathway use by engaging local stakeholders to adapt and incorporate pathways into institutional guidelines. This process helps ensure the pathway meets the expectations of all the clinicians that might treat a particular patient, helps reduce confusion and conflict, and establishes a shared local standard of care.²⁰

SHARED DECISION MAKING

SDM is another tool to support choosing an alternative disposition to admission in cases of diagnostic uncertainty.⁵ Although definitions vary, SDM is generally described as the process of engaging patients to make a health care decision in collaboration with their clinician. It also presumes the provision of evidence-based information in an accessible format combined with consideration of the patient's specific circumstances and concerns.²¹ Studies of SDM suggest that patients' risk tolerance is often higher than that of physicians, and thus SDM may result in fewer admissions.⁵ One randomized controlled trial (RCT) found that, when patients with low-risk chest pain were provided with a visual display of their clinician's pretest probability of acute coronary syndrome, they more frequently decided against admission and further cardiac testing, with equivalent outcomes and increased satisfaction.²² A more recent RCT found that patients being considered for hospitalization in an observation unit for cardiac testing were more involved in the decision making and chose to go home 15% more often when they engaged in a structured SDM process, without an increase in major adverse cardiac events.²³

The practice of SDM can be complex, and simply providing patients with evidence has been found insufficient in helping them to reach an informed decision. Instead, SDM implies a conversation that incorporates evidence; conveyance of uncertainty; and consideration of the patient's unique situation, goals, and preferences.²⁴ Physicians generally seem to support the concept of SDM,²⁵ although, in practice, it seems there are many obstacles to widespread adoption, including concerns about how to discuss cost, convey clinical uncertainty, and engage with patients of varying backgrounds.²⁶ There have been calls for development of better technologies to support effective SDM, as well as integration of SDM skills into medical education and continued research on how to best implement and evaluate this practice.^{27–29}

THE OPTIONS FOR ALTERNATIVES TO ADMISSION FROM THE EMERGENCY DEPARTMENT: RAPID FOLLOW-UP CLINICS, OBSERVATION UNITS, AND HOME HOSPITAL PROGRAMS

Rapid Follow-up Clinics

EDs serve many patients who face challenges accessing outpatient medical services. Without the ability to correct this access problem, clinicians may admit patients for conditions that could otherwise be managed outside of the hospital.³⁰ As a result of hospital crowding, the United Kingdom has aggressively targeted diagnosis and treatment of so-called ambulatory care-sensitive conditions for diversion from the inpatient setting to rapid follow-up clinics.³¹ US Health care reform has similarly tried to extend outpatient resources through accountable care organizations, increased insurance access, and implementation of financial incentives to coordinate care and reduce avoidable inpatient costs. However, even insured patients may have difficulty coordinating outpatient care in a timely fashion. Moreover, night and weekend care in the ED is often not amenable to coordination with outpatient clinicians.⁵

Access to rapid follow-up clinics following an ED visit has been shown to be a safe and often cost-effective substitution for inpatient admission for a variety of carefully selected conditions, such as pulmonary embolism,^{32,33} febrile neutropenia,³⁴ and diverticulitis.^{35,36} One recent study of an emergency department diabetes rapid-referral program in Boston, Massachusetts, found patients who presented to the ED with dysglycemia but who were not in hyperglycemic crisis could be effectively and safely managed through rapid referral to an outpatient diabetes clinic.³⁷ A key component of this program was the ability of the emergency physician to directly schedule

the patient for an appointment, regardless of time of day of presentation, and to discharge the patient with a specific appointment time. Compared with historical controls, enrolled patients were more than 10% less likely to be hospitalized or return to the ED within the following year, had more than \$5000 less in institutional health care expenditures, and achieved greater hemoglobin A1c reductions.³⁷ Transitional care clinics have also shown some promise in creating a venue for patients not already engaged in primary care, and 1 study showed patients that followed up in these clinics had fewer subsequent ED visits.³⁸ Similarly, creation of an outpatient quick diagnosis unit in Spain resulted in significant decreases of more than half of inpatient hospitalizations compared with historical controls³⁹ (**Box 1**).

Observation Units

Observation units offer an alternative to inpatient admission for ED patients for whom discharge home seems unsafe or logistically unavailable.⁴⁰ These units have expanded in number and scope over the past 40 years and, by 2016, 44.6% of US EDs had an observation unit.⁴¹ **Table 1** includes examples of conditions that require diagnostics and/or therapies that can commonly be managed in an observation unit.

Effect of observation units on emergency department length of stay, boarding, and crowding

Some studies have investigated observation units as a way to reduce ED length of stay (LOS) and ED crowding. There is variable experience with the effect of a unit on ED LOS, with most reporting at least modest reductions in ED LOS after implementation. The organization and policies of the unit affect this impact. For instance, 1 study in Canada found that an observation unit that was built by taking beds away from the main ED resulted in slightly longer or equivalent LOS for those patients.⁴² A recent small pilot study described reductions in ED LOS with a protocol to move patients with chest pain directly to an observation unit from triage after an initial clinician screening examination using a protocol based on the HEART score. However, these gains were limited by delays in transporting patients between the ED and the observation unit.⁴³

In many hospitals, patients with behavioral health emergencies are a large contributor to ED crowding, given the lack of inpatient psychiatric beds and the resulting long LOS for these patients. One recent study found that creation of a dedicated psychiatric ED observation unit helped reduce ED LOS to less than a quarter of what it was before intervention.⁴⁴ It also resulted in lower inpatient psychiatric admission rates, suggesting that investment in upfront full evaluation and treatment may reduce unnecessary use of scarce inpatient psychiatric beds.⁴⁴ Increasingly, EDs can now bill for observation services for psychiatric patients with extended stays, which may help in the development of best practices and protocols for this population.⁴⁵

Box 1

Key points for successful use emergency department outpatient follow-up clinics as alternatives to admission

Create processes to allow direct outpatient clinic follow-up scheduling from the ED, regardless of time of day or day of week, in order to have patients leave with a specific appointment date and time in hand

Link follow-up clinic systems to use of a clinical diagnostic pathway that is accepted by both the referring ED and accepting specialty clinic

Table 1 Common observation conditions	
Diagnostic Observation	Therapeutic Observation
Abdominal pain	Allergic reaction
Back pain	Asthma/COPD
Chest pain	Atrial fibrillation
Gastrointestinal bleed	Congestive heart failure
Mild traumatic brain injury	Dehydration/electrolyte abnormality
Nephrolithiasis	Dysglycemia
Psychiatric emergency	Headache
Neurologic complaint (TIA symptoms or seizure)	Infections: cellulitis, pneumonia, pyelonephritis
Syncope	Pulmonary embolism
Trauma	Transfusion

Abbreviations: COPD, chronic obstructive pulmonary disease; TIA, transient ischemic attack.

Observation units can also serve as a setting to perform expedited work-up and placement of patients who need postdischarge rehabilitation but who do not have a medical condition requiring inpatient admission. Observation units are an ideal setting for physical therapy assessments and engagement of case management. The Affordable Care Act’s provision for an SNF waiver can facilitate rapid placement of patients requiring postdischarge rehabilitation care while avoiding the traditional 3-night inpatient Medicare requirement for coverage of the rehabilitation stay. A recent study of the Medicare Shared Savings Program reported cost savings among hospitals that used this program.⁴⁶ It is hoped that further expansion of the SNF waiver program will help support this workflow.

Definitions and evidence of value

Observation unit care has been shown to be significantly higher value than care of observation status patients in inpatient areas without protocolized care.⁴⁷ Studies have shown that observation units deliver equivalent outcomes with reduced hospital LOS for a variety of conditions, including heart failure,⁴⁸ transient ischemic attacks,^{49,50} syncope,^{40,41} and new-onset atrial fibrillation.⁵¹ A systematic review of 139 studies of observation units found that advantages were shown in every study.⁵² A recent Cochrane Review of available trials of short-stay units, encompassing observation units, also suggests that these units produce cost and time savings as well as improved patient satisfaction.⁵³

Care delivered in an observation unit and care that is under the observation status are related but not the same. Observation is a billing status defined by the Centers for Medicare and Medicaid Services (CMS) as care used to determine whether inpatient admission is indicated that should span less than 2 midnights. Observation can and does therefore take place in any part of the hospital.⁴⁰ In contrast, observation care in an observation unit implies cohorting of patients within 1 location and treatment according to specific protocols, guidelines, and administrative processes. Units generally aim to serve patients with an 80% chance of discharge within the time frame outlined by CMS and a diagnostic or therapeutic question that is amenable to evidence-based protocolized care.^{40,54} Patients treated within an observation unit usually, but not always, come under an observation billing status if cared for elsewhere in the hospital.

Observation best practices

A well-run observation unit with clear protocols and good administrative oversight has been shown to be most effective in delivering high-value care.^{40,55} Many of the advantages stem from the shorter length of hospitalization achieved in these units compared with care provided in inpatient areas of the hospital. Best practices to support these time efficiencies include agreements with hospital leadership to prioritize observation patients for testing and consultations. This prioritization can be challenging for community practices, where consultants often have other responsibilities during the workday and may not have the flexibility to see a patient within a rapid time frame. Other strategies include encouraging disposition of patients on work-up completion, regardless of time of day.

Best practices also include choosing the right type of patient for a given observation unit. Not all observation units can manage all patients classified as observation, and some patients who are in observation status may be better served by an inpatient admission. For instance, although there is growing evidence that observation units can provide high-quality, efficient, and safe care for elderly and psychiatric patients, care of these special populations necessitates resources that are not available in every observation unit. When an observation unit first opens, it is typical to focus on a narrow set of conditions best supported by the literature as amenable to observation care (eg, chest pain, dehydration). Over time, as the staff gain experience and confidence with their observation capabilities, more challenging diagnoses (eg, congestive heart failure) are added to attempt to capture the maximum opportunity for cohorting the hospital's observation patients into 1 unit.

In contrast, observation units can provide high-value care to patients who might otherwise meet inpatient criteria because of intensity of treatment but are not expected to stay in the hospital more than 2 days.⁴⁰ Analysis of the 2007 National Hospital Ambulatory Medical Care Survey (NHAMCS) showed that patients who were inpatients for fewer than 2 days shared similar characteristics to observation patients and represented a possible area for expansion of these units.⁵⁶ An analysis of 2010 NHAMCS data predicted that, nationally, 11.7% of short-stay patients could be treated in a dedicated observation unit with a savings of up to \$8.5 billion annually.⁴⁷ Placement of short-stay patients into observation units likely makes more sense at institutions that can backfill those inpatient beds with patients that have more complex needs or in institutions that are facing an ED crowding crisis.⁴⁰

Ownership of the observation unit is another important consideration. Most observation units are run by the ED staff and accept only patients that originate from the ED. Some clinicians have argued that a more centralized model that accepts postsurgical and other types of patients may also be feasible and offer even greater cost and time efficiencies.⁵⁷ Others worry that opening units up to a variety of clinicians would create confusion, cause deviation from protocolized care, and result in inefficiencies.⁴⁰ Success of either model requires coordination among services and agreement on clear protocols.

Possible concerns and pitfalls of observation units

Despite their proven value, observation units can still be prone to misuse, and some clinicians warn that they can promote and protect sloppy decision making. One interview-based study with physicians in the United Kingdom and United States found that many clinicians view the observation unit as a safe space, where decisions made for medicolegal concerns, social problems, or decision fatigue can be hidden from and thus unchallenged by the rest of the hospital.⁵⁸ A study of emergency physician disposition decision making echoes this; the investigators concluded that the availability of

an observation unit can support structured, evidence-based decision making, but it can also serve as a venue to avoid or delay making disposition decisions.⁵⁹ A related concern is that, given an observation unit, clinicians may choose to hospitalize patients that would otherwise have been appropriate for discharge, thus reducing the positive effects of observation units on patient LOS, costs, and hospital crowding. One study investigated patients with chest pain who were managed in an observation unit and predicted their disposition (admission or discharge) if that unit had not existed. Their model suggested that approximately half of those patients would have been discharged home had observation not been an option. However, their model could not determine whether observation was the safer or more efficient disposition for these patients.⁶⁰ This possible unintended consequence can likely be managed by creation of clear and protocolized observation pathways that include criteria for disposition home directly from the ED and a review process to catch and correct pitfalls of observation. Moreover, other studies have found that observation units can reduce admissions without also reducing discharges: 1 single-center before-and-after study of observation for acute exacerbations of chronic obstructive pulmonary disease found that inpatient admissions decreased 12% for this condition after implementation of an observation unit without affecting the proportion of patients directly discharged⁶¹ (Box 2).

Home Hospital

Definitions and evidence base

Hospital at home programs offer another alternative to admission by shifting the location of care from the institution to the home for appropriate patients. There are many models for delivering acute care in the home, including home-based or office-based infusion programs and visiting nurse and physical therapist programs to promote early discharge, as well as more intensive home hospitalization programs.⁶² There are 3 pathways to home hospital that can directly affect the ED and hospital capacity, collectively referred to as substitutive home hospital programs:

Emergency department substitution A community clinician refers the patient to the home hospital team in an effort to avoid a patient presenting to the ED. For example, a community clinician in the clinician's office may have diagnosed cellulitis in a patient that requires intravenous (IV) antibiotics. Instead of directing the patient to the ED or

Box 2

Key points for effective use of observation units as an alternative to inpatient admission

Encourage use of protocolized care through defined protocols and order sets. When possible, consider integrating these protocols into the electronic medical record.

Create systems that encourage clinicians to define clear goals and end points for the period of observation. Discourage use of observation for patients for whom another disposition is unclear or difficult, because of specialist push-back or incomplete work-up.

Consider carefully the scope of observation for the institution, which differs depending on resources and competing inpatient bed demands, including:

- Whether short-stay patients are well served in an observation unit
- Whether to accept more complex patients with anticipated longer observation duration (eg, >2 midnights)

Transport delays can minimize the gains an observation unit might provide with regard to decreasing ED LOS and ED crowding.

hospital, the community clinician can admit the patient to the home hospital team, who can then establish an IV, draw basic laboratory tests, and start IV antibiotics. This pathway saves both ED and hospital capacity.

Hospital substitution An emergency physician refers the patient to the home hospital team in an effort to avoid a hospitalization. For example, an emergency physician may have diagnosed a patient with pneumonia who requires hospitalization (eg, new oxygen requirement, need for IV therapies). Instead of hospitalizing the patient, the emergency physician can admit the patient to the home hospital team, who can then continue IV antibiotics, arrange oxygen as necessary, and reassess the patient's clinical status. This pathway saves hospital capacity and indirectly improves ED capacity by reducing boarding burden.

Inpatient length-of-stay substitution The admitting clinician refers the patient to the home hospital team to reduce the patient's hospital LOS. For example, a hospitalist may have stabilized a patient with congestive heart failure where the risk of decompensation has decreased, but the patient may require at least twice-a-day IV diuretics. Instead of continuing to hospitalize the patient for additional days, the hospitalist can transfer the care to the home hospital team, who can continue the IV diuretics, arrange to continue oxygen as necessary, and reassess the patient's clinical status. This pathway saves hospital and ED capacity by reducing the number of bed days used.

Substitutive home hospital programs have many reported benefits, including lower cost; increased patient satisfaction; lower rates of hospital-acquired infections, falls, and delirium; and a reduction in the need for continued institutional-based care such as rehabilitation after the hospitalization.^{63–69} The home hospital concept has particular appeal for the care of elderly patients, for whom hospitalization has been shown to often cause harm through increased nosocomial infection, excessive noise, sensory deprivation, social isolation, and prolonged bed rest.^{56–58}

Several RCTs have reported benefits of home hospital compared with inpatient care for a variety of conditions, including heart failure,⁶³ community-acquired pneumonia,⁶⁴ cellulitis,⁶⁵ and congestive obstructive pulmonary disease.^{66,67} A 2009 meta-analysis of home hospital RCTs suggested significantly lower mortality at 6 months following discharge for home hospital patients; the reduction seen at 3 months was not statically significant.⁶⁸ A more recent Cochrane Review found that the home hospital strategy likely results in little or no difference in mortality outcomes but may increase the chance of the patient remaining at home following hospitalization and may result in greater patient satisfaction for appropriately selected patients and conditions.⁶⁹ Multiple studies have also shown significantly lower costs associated with the home hospital model.^{66–68}

To date, most substitutive home hospital programs have been located in Canada, western Europe, New Zealand, and Australia, where, in Victoria, 2.5% of all inpatient admissions in 2008 were to a home hospital program.⁷⁰ There is much more limited experience in the United States. A nonrandomized study in Baltimore, Maryland, reported promising outcomes, with fewer complications such as delirium, higher patient and family satisfaction, and lower costs for patients treated at home compared with in a traditional acute hospital.⁷¹ A small RCT of a pilot home hospital program in Boston, Massachusetts, found that patients had significantly more physical activity in the home hospital group and median costs were about half those of inpatient hospitalization. There was no detected difference in outcomes or satisfaction, although the small size of the pilot would make these differences difficult to detect.⁷²

Organization of home hospital programs

Given the limited experience with substitutive home hospital programs in the United States, it is difficult to point out best practices in terms of organization, staffing, and protocols.

Home hospital programs incorporate 24-hour nurse and clinician coverage, with daily clinician visits and more frequent nursing visits. Patients within the programs have access to many of the services of the associated acute hospital, such as interpretation of imaging or video consultation with specialists.^{71,72} Most use a hub-and-spoke model that enrolls patients within a defined catchment area close to the central facility, which limits the candidacy of otherwise-ideal patients for this program.

There are obvious challenges within this model to effective delivery of hospital-level care in the home. Although the ED operates 24 hours a day, the home hospital program may only be available to admit patients during certain hours. For example, a vendor may not be available after hours to deliver required durable medical equipment, such as oxygen. The outpatient pharmacy may also be unavailable after hours to provide an IV antibiotic for the patient's initial dose at home. The hub-and-spoke model creates obvious logistical challenges to expansion of services to a wider catchment area. Also, because of the need to travel from patient to patient, clinicians must navigate traffic, prioritize the order of rounding on patients, and maintain a flexible admission census. Technologies, such as remote telemetry and video visits, may help to mitigate these challenges. Also, there may also be opportunities to shift some of the in-home monitoring and service delivery to a mobile integrated health care model, using medical workers such as community paramedics who are already located closer to the patient's home.⁷³ Although this model has not yet been used in a US-based home hospital program, paramedics have been used successfully in other similar programs. For instance, New York City paramedics helped to treat approximately 2000 homebound individuals enrolled in an advanced illness management program, reducing use of the ED and inpatient setting to manage acute exacerbations.⁷⁴

Like observation units, home hospital programs must choose their patients wisely. These programs may not be equipped to transport and still maintain care of patients that require advanced imaging such as MRI or invasive procedures such as cardiac catheterization. Furthermore, although patients are being monitored, rapid response to decompensation is limited and likely to require engagement of EMS, ideally using a mobile integrated health care model. These limitations require programs to have clearly defined admission criteria and robust screening processes to avoid a return to the acute hospital setting.

Clear payment structures have also yet to be defined, and this likely also limits home hospital expansion in the US health care market.⁷¹ However, overall, home hospital programs seem to offer a viable alternative to traditional inpatient care by offering a

Box 3

Key points for effective use of home hospital programs as alternatives to inpatient admission

Choose patients wisely using clear inclusion and exclusion criteria.

Elderly patients may experience more harms than others in an institutional hospital setting and may be particularly well served by a home hospital program.

There are challenges to expanding the catchment area of programs. Exploring alternative staffing models, such as the use of a mobile integrated health care model and paramedics for some of the care delivered, may help address these.

setting that may be a more scalable and less costly alternative to building more hospital beds to safely provide care to patients with acute illness requiring an inpatient level of care (**Box 3**).

SUMMARY

Hospital crowding continues to compromise the ability of EDs to deliver safe and effective care to their patients. Alternatives to inpatient admission can help relieve crowding by providing another pathway out of the ED. Observation units and home hospital programs both offer alternatives to traditional inpatient admission. ADPs may be used alone or in conjunction with these dispositions to help support patients and clinicians in choosing a testing and treatment strategy that either avoids further work-up or relocates it to the less expensive and more efficient setting outside of the ED and hospital. In many cases, these alternatives also seem to be less costly and more efficient means to deliver equivalent quality of care compared with traditional inpatient admission. However, barriers of patient access, perceived medicolegal risk, and concerns over patient safety in the presence of diagnostic uncertainty will continue to pose challenges to widespread adoption of these strategies at some institutions.

DISCLOSURE

The authors have nothing to disclose.

REFERENCES

1. Singer AJ, Thode HC Jr, Viccellio P, et al. The association between length of emergency department boarding and mortality. *Academic Emergency Medicine*, vol. 18. John Wiley & Sons, Ltd (10.1111); 2011. p. 1324–9.
2. Gaieski DF, Agarwal AK, Mikkelsen ME, et al. The impact of ED crowding on early interventions and mortality in patients with severe sepsis. *Am J Emerg Med* 2017; 35:953–60.
3. Cha WC, Cho JS, Shin SD, et al. The impact of prolonged boarding of successfully resuscitated out-of-hospital cardiac arrest patients on survival-to-discharge rates. *Resuscitation* 2015;90:25–9.
4. Moskop JC, Geiderman JM, Marshall KD, et al. Another look at the persistent moral problem of emergency department crowding. *Ann Emerg Med* 2019;74: 357–64.
5. Schuur JD, Baugh CW, Hess EP, et al. Critical pathways for post-emergency outpatient diagnosis and treatment: tools to improve the value of emergency care. *Acad Emerg Med* 2011;18:e52–63.
6. Venkatesh AK, Dai Y, Ross JS, et al. Variation in US hospital emergency department admission rates by clinical condition. *Med Care* 2015;53:237–44.
7. Than M, Herbert M, Flaws D, et al. What is an acceptable risk of major adverse cardiac event in chest pain patients soon after discharge from the Emergency Department?: a clinical survey. *Int J Cardiol* 2013;166:752–4.
8. McCausland JB, Machi MS, Yealy DM. Emergency physicians' risk attitudes in acute decompensated heart failure patients. *Acad Emerg Med* 2010;17:108–10.
9. Van Den Berg P, Body R. The HEART score for early rule out of acute coronary syndromes in the emergency department: a systematic review and meta-analysis. *Eur Heart J Acute Cardiovasc Care* 2016;7:111–9.

10. Ò Miró, Peacock FW, McMurray JJ, et al. European Society of Cardiology – Acute Cardiovascular Care Association position paper on safe discharge of acute heart failure patients from the emergency department. *Eur Heart J Acute Cardiovasc Care* 2016;6:311–20.
11. Lindor RA, Boie ET, Campbell RL, et al. Failure to obtain computed tomography imaging in head trauma: a review of relevant case Law. Jang T, editor. *Acad Emerg Med* 2015;22:1493–8.
12. 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.
13. Asher E, Reuveni H, Shlomo N, et al. Clinical outcomes and cost effectiveness of accelerated diagnostic protocol in a chest pain center compared with routine care of patients with chest pain. *PLoS One* 2015;10. e0117287–10.
14. Huis In 't Veld MA, Cullen L, Mahler SA, et al. The fast and the furious: low-risk chest pain and the rapid rule-out protocol. *West J Emerg Med* 2017;18:474–8.
15. Ljung L, Lindahl B, Eggers KM, et al. A rule-out strategy based on high-sensitivity troponin and HEART score reduces hospital admissions. *Ann Emerg Med* 2019; 73:491–9.
16. Fernando SM, Tran A, Cheng W, et al. Prognostic Accuracy of the HEART score for prediction of major adverse cardiac events in patients presenting with chest pain: a systematic review and meta-analysis. *Acad Emerg Med* 2019;26:140–51.
17. Yau AA, Nguyendo LT, Lockett LL, et al. The HEART pathway and hospital cost savings. *Crit Pathw Cardiol* 2017;16:126–8.
18. Dayan PS, Ballard DW, Tham E, et al. Use of traumatic brain injury prediction rules with clinical decision support. *Pediatrics* 2017;139:e20162709.
19. Vinson DR, Mark DG, Chettipally UK, et al. Increasing safe outpatient management of emergency department patients with pulmonary embolism: a controlled pragmatic trial. *Ann Intern Med* 2018;169:855–65.
20. Baugh CW, Clark CL, Wilson JW, et al. Creation and implementation of an outpatient pathway for atrial fibrillation in the emergency department Setting: Results of an Expert Panel. Hiestand BC, editor. *Acad Emerg Med* 2018;25:1065–75.
21. Makoul G, Clayman ML. An integrative model of shared decision making in medical encounters. *Patient Educ Couns* 2006;60:301–12.
22. Kline JA, Zeitouni RA, Hernandez-Nino J, et al. Randomized trial of computerized quantitative pretest probability in low-risk chest pain patients: effect on safety and resource use. *Ann Emerg Med* 2009;53:727–35.e1.
23. 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.
24. Hargraves I, Leblanc A, Shah ND, et al. Shared decision making: the need for patient-clinician conversation, Not Just Information. *Health Aff (Millwood)* 2016; 35:627–9.
25. Kanzaria HK, Brook RH, Probst MA, et al. Emergency physician perceptions of shared decision-making. *Acad Emerg Med* 2015;22:399–405.
26. Zeuner R, Frosch DL, Kuzemchak MD, et al. Physicians' perceptions of shared decision-making behaviours: a qualitative study demonstrating the continued chasm between aspirations and clinical practice. *Health Expect* 2015;18: 2465–76.
27. Agoritsas T, Heen AF, Brandt L, et al. Decision aids that really promote shared decision making: the pace quickens. *BMJ* 2015;350:g7624.

28. Elwyn G, Frosch DL, Kobrin S. Implementing shared decision-making: consider all the consequences. *Implement Sci Biomed Cent* 2015;11:1–10.
29. Hess EP, Grudzen CR, Thomson R, et al. Shared decision-making in the emergency department: respecting patient autonomy when seconds count. *Acad Emerg Med* 2015;22:856–64.
30. Hunter AEL, Spatz ES, Bernstein SL, et al. Factors Influencing Hospital Admission of Non-critically Ill Patients Presenting to the Emergency Department: a Cross-sectional Study. *J Gen Intern Med* 2015;31:37–44.
31. Hamad MMAA, Connolly VM. Ambulatory emergency care - improvement by design. *Clin Med* 2018;18:69–74.
32. Zondag W, Exter den PL, Crobach MJT, et al. Comparison of two methods for selection of out of hospital treatment in patients with acute pulmonary embolism. *Thromb Haemost* 2017;109:47–52.
33. Piran S, Le Gal G, Wells PS, et al. Outpatient treatment of symptomatic pulmonary embolism: A systematic review and meta-analysis. *Thromb Res* 2013;132:515–9.
34. Mamtani M, Conlon LW. Can we safely discharge low-risk patients with febrile neutropenia from the emergency department? *Ann Emerg Med* 2014;63:48–51.
35. Jackson JD, Hammond T. Systematic review: outpatient management of acute uncomplicated diverticulitis. *Int J Colorectal Dis* 2014;29:775–81.
36. Conley J, O'Brien CW, Leff BA, et al. Alternative strategies to inpatient hospitalization for acute medical conditions: a systematic review. *JAMA Intern Med* 2016;176:1693–702.
37. Palermo NE, Modzelewski KL, Farwell AP, et al. Open access to diabetes center from the emergency department reduces hospitalizations in the subsequent year. *Endocr Pract* 2016;22:1161–9.
38. Elliott K, W Klein J, Basu A, et al. Transitional care clinics for follow-up and primary care linkage for patients discharged from the ED. *Am J Emerg Med* 2016;34:1230–5.
39. Bosch X, Jordán A, López-Soto A. Quick diagnosis units: avoiding referrals from primary care to the ED and hospitalizations. *Am J Emerg Med* 2013;31:114–23.
40. Mace SE. *Observation Medicine: Principles and Protocols*. 2017.
41. Rui P, Kang K, Ashman JJ. National Hospital Ambulatory Medical Care Survey: 2016 emergency department summary tables. 2016. Available at: https://www.cdc.gov/nchs/data/ahcd/nhamcs_emergency/2016_ed_web_tables.pdf
42. Cheng AHY, Barclay NG, Abu-Laban RB. Effect of a multi-diagnosis observation unit on emergency department length of stay and inpatient admission rate at two canadian hospitals. *J Emerg Med* 2016;51:739–47.e3.
43. Williams J, Aurora T, Baker K, et al. Triage to observation: a quality improvement initiative for chest pain patients presenting to the emergency department. *Crit Pathw Cardiol* 2019;18:75–9.
44. Parwani V, Tinloy B, Ulrich A, et al. Opening of psychiatric observation unit eases boarding crisis. *Acad Emerg Med* 2018;25:456–60.
45. McKenzie D, Granovsky M. Extended ED mental health care now reportable as observation. Dallas Texas: ACEP Now. American College of Emergency Physicians; 2019.
46. OEI HOOIG. ACOs' Strategies for Transitioning to Value-Based Care: Lessons From the Medicare Shared Savings Program (OEI-02-15-00451; 07/19). 2019 Jul pp. 1–44.
47. Ross MA, Hockenberry JM, Mutter R, et al. Protocol-driven emergency department observation units offer savings, shorter stays, and reduced admissions. *Health Aff* 2013;32:2149–56.

48. Schrager J, Wheatley M, Georgiopolou V, et al. Favorable bed utilization and re-admission rates for emergency department observation unit heart failure patients. *Acad Emerg Med* 2013;20:554–61.
49. Jarhult S, Howell M, Barnaure-Nachbar I, et al. Implementation of a rapid, protocol-based TIA management pathway. *West J Emerg Med* 2018;19:216–23.
50. Stead LG, Bellolio MF, Suravaram S, et al. Evaluation of transient ischemic attack in an emergency department observation unit. *neurocrit care*, vol. 10. Humana Press Inc; 2008. p. 204–8.
51. Decker WW, Smars PA, Vaidyanathan L, et al. A prospective, randomized trial of an emergency department observation unit for acute onset atrial fibrillation. *Ann Emerg Med* 2008;52:322–8.
52. Baugh CW, Mace SE, and MPMP, 2017. The Evidence Basis for Observation Medicine in Adults Based on Diagnosis/Clinical Condition. *Observation Medicine: Principles and Protocols*. books.google.com; 2017.
53. Strøm C, Stefansson JS, Fabritius ML, et al. Hospitalisation in short-stay units for adults with internal medicine diseases and conditions. *Cochrane Effective Practice and Organisation of Care Group*. *Cochrane Database Syst Rev* 2018;(8):CD012370.
54. Ross MA, Granovsky M. History, principles, and policies of observation medicine. *Emerg Med Clin* 2017;35:503–18.
55. Conley J, Bohan JS, Baugh CW. The establishment and management of an observation unit. *Emerg Med Clin* 2017;35:519–33.
56. Wiler JL, Ross MA, Ginde AA. National study of emergency department observation services. *Acad Emerg Med* 2011;18:959–65.
57. Shah S, Subbarao K, Noonan MD, Hinrichs B. A new look at observation units: evidence-based approach. *JHA* 2015;5(6):115. <https://doi.org/10.5430/jha.v4n6p115>.
58. Martin GP, Wright B, Ahmed A, et al. Use or abuse? A qualitative study of physicians' views on use of observation stays at three hospitals in the United States and England. *Ann Emerg Med* 2016;69:284–92.e2.
59. Wright B, Martin GP, Ahmed A, et al. How the availability of observation status affects emergency physician decisionmaking. *Ann Emerg Med* 2018;72:401–9.
60. Blecker S, Gavin NP, Park H, et al. Observation units as substitutes for hospitalization or home discharge. *Ann Emerg Med* 2016;67:706–13.e2.
61. Budde J, Agarwal P, Mazumdar M, et al. Can an emergency department observation unit reduce hospital admissions for COPD exacerbation? *Lung* 2018;196:267–70.
62. Leff B. Defining and disseminating the hospital-at-home model. *CMAJ* 2009;180:156–7.
63. Tibaldi V, Isaia G, Scarafioti C, et al. Hospital at home for elderly patients with acute decompensation of chronic heart failure: a prospective randomized controlled trial. *Arch Intern Med* 2009;169:1569–75.
64. Richards DA, Les J Toop, Epton MJ, et al. Home management of mild to moderately severe community-acquired pneumonia: a randomised controlled trial. *Med J Aust* 2005;183:235–8.
65. Corwin P, Toop LES, McGeoch G, et al. Randomised controlled trial of intravenous antibiotic treatment for cellulitis at home compared with hospital. *BMJ* 2005;330:129.
66. Nicholson C, Bowler S, Jackson C, et al. Cost comparison of hospital- and home-based treatment models for acute chronic obstructive pulmonary disease. *Aust Health Rev* 2001;24:181–7.

67. Davies L, Wilkinson M, Bonner S, et al. "Hospital at home" versus hospital care in patients with exacerbations of chronic obstructive pulmonary disease: prospective randomised controlled trial. *BMJ* 2000;321:1265–8.
68. Shepperd S, Doll H, Angus RM, et al. Avoiding hospital admission through provision of hospital care at home: a systematic review and meta-analysis of individual patient data. *CMAJ* 2009;180:175–82.
69. Shepperd S, Iliffe S, Doll HA, et al. Admission avoidance hospital at home. Cochrane Effective Practice and Organisation of Care Group. *Cochrane Database Syst Rev* 2016;10:S29–67.
70. Montalto M. The 500-bed hospital that isn't there: the Victorian Department of Health review of the Hospital in the Home program. *Med J Aust* 2010;193:598–601.
71. Leff B, Burton L, Mader SL, et al. Hospital at home: feasibility and outcomes of a program to provide hospital-level care at home for acutely ill older patients. *Ann Intern Med* 2005;143:798–808.
72. Levine DM, Ouchi K, Blanchfield B, et al. Hospital-level care at home for acutely ill adults: a pilot randomized controlled trial. *J Gen Intern Med* 2018;33:729–36.
73. Vision Statement on Mobile Integrated Healthcare (MIH) & Community Paramedicine (CP). 2015 Mar pp. 1–3.
74. Abrashkin KA, Poku A, Ramjit A, et al. Community paramedics treat high acuity conditions in the home: a prospective observational study. *BMJ Support Palliat Care* 2019. <https://doi.org/10.1136/bmjspcare-2018-001746>.