



HHS Public Access

Author manuscript

Healthc (Amst). Author manuscript; available in PMC 2021 November 23.

Published in final edited form as:

Healthc (Amst). 2021 September ; 9(3): 100545. doi:10.1016/j.hjdsi.2021.100545.

Practical alternative to hospitalization for emergency department patients (PATH): A feasibility study

Austin S. Kilaru^{a,b,*}, David Resnick^c, Danielle Flynn^d, Avanti Rangnekar^c, Madeline Snyder^f, Kehinde Oyekanmi^b, Denise Fitzpatrick^b, Zachary F. Meisel^b, David A. Asch^{a,c}, Krisda H. Chaiyachati^{c,e}

^aNational Clinician Scholars Program at the University of Pennsylvania and Corporal Michael J. Crescenz VA Medical Center, Philadelphia, PA, USA

^bCenter for Emergency Care Policy and Research, Department of Emergency Medicine, Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA, USA

^cPenn Medicine Center for Health Care Innovation, University of Pennsylvania, USA

^dPenn Medicine at Home, University of Pennsylvania Health System, Philadelphia, PA, USA

^eDivision of General Internal Medicine, Department of Medicine, Perelman School of Medicine at the University of Pennsylvania, USA

^fPenn State College of Medicine, Hershey, Pennsylvania USA

Abstract

Objective: We sought to determine the feasibility of the Practical Alternative to Hospitalization (PATH) program, an intervention that offers ED clinicians an outpatient care pathway for patients initially designated for inpatient admission or observation.

Methods: We evaluated a novel care delivery model that was piloted at a tertiary academic medical center in December 2019. An advanced practice provider screened patients designated for inpatient admission or observation and identified eligible participants. Outpatient services were customized for each patient but primarily included care coordination and monitoring through telemedicine and home health services. The primary feasibility outcome was the proportion of eligible patients who were enrolled in the program, as well as patient outcomes after discharge including return ED visits and averted ED boarding time.

Results: A total of 199 patients were designated for inpatient admission or observation during PATH program hours. Of 52 eligible patients, 30 (58%) were enrolled. The mean participant age

*Corresponding author. 1303 Blockley Hall, 421 Guardian Drive, Philadelphia, PA 19104, USA. austin.kilaru@pennmedicine.upenn.edu (A.S. Kilaru).

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.hjdsi.2021.100545>.

An abstract of this manuscript was accepted for oral presentation at the Society for Academic Emergency Medicine national meeting (2020) but was not presented due to the Covid-19 pandemic.

was 62.5 years (SD 17.5), and 25 (83%) had non-Hispanic Black race/ethnicity. The most common disease conditions were chest pain, heart failure, and hyperglycemia. 4 (13%) enrolled patients returned to an ED within 30 days. We estimate that ED boarding time was reduced by 8.2 h (SD 8.1) per patient.

Conclusion: Emergency physicians and patients were willing to use a novel service that provided an alternative disposition to hospitalization.

Implications: alternative payment models that seek to reduce hospital utilization and cost may consider strengthening systems to monitor and coordinate care for patients after ED discharge.

Keywords

Emergency medicine; Care coordination; Delivery innovation; Hospital utilization; Home health

1. Introduction

Variation in the rate of hospital admission from emergency departments (EDs) has been observed between regions, hospitals, and providers even after adjustment for disease condition, illness severity, and sociodemographic factors.^{1,2} Patients are admitted at the discretion of emergency providers who weigh the marginal benefits of hospitalization with the risks of discharge. However, many admissions are for conditions with low clinical severity, often resulting in short hospital length-of-stay.³ A meaningful proportion of admitted patients may not require the level of clinical care provided in hospitals and could instead receive appropriate care in an alternative setting.⁴

Hospital admissions from the ED comprise between 15 and 20% of all total US health expenses, and the share of hospitalizations that originate from the ED increases each year.⁵ The decision to admit patients has major implications for costs to patients and the healthcare system. Low-acuity admissions exacerbate hospital crowding and workforce strain.⁶ Finally, there are risks associated with hospitalization, particularly during the Covid-19 pandemic.⁷ Many patients may prefer to recover at home with outpatient management if safe and effective to do so.

Prior efforts to prevent hospital admissions have sought to broadly strengthen primary care access or divert ED visits to alternative settings.⁸ In recent years, the increased classification of hospitalized patients under observation status has reduced cost and hospital length-of-stay but has not always encouraged high-value care.⁹ The Hospital-at-Home model, in which patients are admitted to hospital-level services provided in the home, has demonstrated effectiveness with regard to safety, quality, and cost.¹⁰ However, Hospital-at-Home has not been widely implemented due to lack of reimbursement and resource intensity.

We sought to determine the feasibility of an intervention to offer ED clinicians an alternative disposition pathway for patients initially designated for inpatient admission or observation. The Practical Alternative to Hospitalization (PATH) program offers patients a personalized package of outpatient services upon discharge. The goal of this study was to determine whether emergency providers and patients would use this service if available and to describe patient outcomes subsequent to discharge home.

2. Methods

2.1. Study design and setting

We evaluated the feasibility of a novel care delivery model in the ED of an academic urban medical center. The PATH program was available for 14 days from 10:00 a.m.–6:00 p.m. over a 4-week period in December 2019. The program deployed advanced practice providers (APP) who actively practice emergency medicine as the PATH clinician. The program was developed in response to sustained problems with high ED boarding times and hospital capacity strain at this institution. The intervention received internal funding for clinical and administrative personnel, including the advanced practice provider, from the Penn Medicine Center for Health Care Innovation. Other patient care costs were reimbursed through standard processes. This project was reviewed and qualified as a quality improvement study by the University of Pennsylvania Institutional Review Board.

2.2. Selection of participants

Participants were adult ED patients who had been identified as needing inpatient observation or admission by the patient's attending emergency physician. The PATH APP screened all patients with inpatient bed requests placed during study hours for eligibility. Patients were eligible if they had one of a wide range of presumptive diagnoses (Table E1). Patients were eligible if they were deemed stable by realtime chart assessment, including vital signs, history, physical exam, and testing; had active insurance and access to a primary care provider; and lived within 12 ZIP codes surrounding the hospital. Patients were excluded if an inpatient procedure or surgery was planned or if they resided in a nursing or rehabilitation facility. Among patients requiring home infusion services, patients with difficult intravenous access were excluded.

The PATH APP consulted each eligible patient's attending emergency physician to discuss whether an alternative outpatient plan could be appropriate and the services each patient may require after discharge. The attending emergency physician made the final decision to whether a patient might be a candidate for the program based on review of the patient's history, physical exam findings, social circumstances, and results of diagnostic testing. If necessary, the attending physician and PATH APP re-evaluated the patient in-person. No formal risk stratification tools were required to be used, although clinicians could apply them at their discretion. If discharge home was determined feasible by the attending emergency physician, the PATH APP collaborated with the clinical team to identify medical needs that would allow safe discharge home. The PATH APP then approached the patient and family to discuss the home environment, including co-habitants, home safety, and mobility concerns, and engage in shared decision-making regarding preferences for inpatient versus outpatient care. Patients and their families were allowed to opt out of PATH and proceed with inpatient admission or observation.

2.3. Intervention

The PATH intervention comprised of care coordination with ambulatory providers and close monitoring of patients including home health services when appropriate. These services

were customized to individual patient needs. The PATH APP collaborated with an ED case manager to implement an outpatient care plan.

All patients were scheduled for outpatient appointments with their primary care clinician or relevant specialist. Urgent outpatient testing, including stress tests and echocardiograms, were arranged. Patients eligible for home health could be enrolled in home skilled nursing (start-of-care within 24 h), physical or occupational therapy, wound care, and social work. Additional social needs, including transportation, were addressed. Home nurses also could draw labs in the home when necessary. Patients that needed a short-term course of intravenous medications, such as antibiotics or diuretics, were enrolled in home infusion services. Finally, patients were provided with new or refilled medications at the time of ED discharge, as well as durable medical equipment including walkers, canes, and bedside commodes.

Following discharge, all patients received a next-day scheduled telephone call from the PATH APP to monitor symptoms, adjust treatment plans, and address patient or family concerns. Family members and caregivers were also called to verify the patient's clinical status and ensure adherence to the management plan. Patients were provided with 24/7 access to a nurse telephone triage service which could contact an on-call PATH clinicians if needed. Patients were discharged from the PATH service after attending a relevant outpatient appointment or if their symptoms resolved without need for ongoing care.

2.4. Outcomes, measurement, and analysis

The primary feasibility outcome was the proportion of eligible patients enrolled in the PATH program and discharged from the ED. This outcome was chosen to understand the estimate the potential impact on hospital admissions if this program were scaled. Secondary patient outcomes focused on patient safety and quality and included enrollment in home health; return ED visits, admissions, or observation stays; adverse events at home including death or transport to hospital via ambulance; duration of enrollment in PATH; and time to first outpatient appointment. Secondary outcomes were determined from 30-day review of the electronic medical record and follow-up telephone calls to patients. We determined whether return ED visits were related to the initial encounter by chart review of the ED encounters as performed by two emergency physicians who were unaffiliated with the program and blinded to the intervention. We calculated the number of healthy days at home (HDAH) over the 30-day follow-up period.¹¹ Finally, we estimated averted ED boarding time by determining the time-to-departure for the next patient awaiting admission in the queue for the specific ward designated for the discharged patient. Patient characteristics were obtained from the electronic medical record. Descriptive statistics were used to summarize patient characteristics and outcomes. Analyses were conducted using Stata, version 15.1 (StataCorp LLC).

3. Results

A total of 139 patients were admitted with inpatient status and 60 as observation during the hours the service was available. There were 52 patients who met eligibility criteria, of which 30 (57%) were enrolled in the PATH intervention. Of the 22 eligible patients who were not

enrolled, 13 (59%) were declined by the emergency physician as requiring hospital-level care, with reasons stated as concern for impending worsening (7), concern for successful and timely completion of outpatient plan (3), and unacceptable deviation from standard practice pattern (3). An additional 3 (14%) patients were declined upon evaluation by the PATH APP, 3 (14%) were not enrolled because the PATH APP was enrolling other patients, and 3 (14%) were declined by the patient or family.

The mean age of enrolled patients was 62.5 years (SD 17.5). Of the enrolled patients, 22 (73%) were intended for admission with observation status. The most common disease conditions were chest pain, heart failure, and hyperglycemia. Additional characteristics are listed in Table 1.

Enrolled patients had an average of 29.0 (SD 2.9) healthy days at home during the 30 days following the ED encounter (Table 2). 4 (13%) patients returned to an ED within 30 days, of which 2 encounters were related to the initial ED presentation. No patients died at home, and 1 (3%) patient required ambulance transport to the hospital. 16 (53.3%) patients were provided with home health. Average time from screening to ED discharge was 2.7 (SD 1.0) hours. Patients enrolled in the study were estimated to have avoided, on average, of boarding time in the ED.

4. Discussion

We provided an alternative outpatient disposition to 15% of all patients intended for inpatient admission or observation and over half of patients deemed eligible for the intervention. We demonstrated that ED clinicians, as well as patients and families, were willing to consider an alternative outpatient care plans for some patients rather than proceed with hospitalization. All of these patients would have been admitted to the hospital had the service not been available. In addition, few patients returned to the hospital within 30 days of enrollment.

In contrast to the Hospital-at-Home model, the enrolled patients required relatively low-intensity interventions, such as coordination and enrollment in home health, that used existing health system infrastructure and resources.¹⁰ Importantly, patients in this program were able to obtain appropriate care without the need for hospital-level services such as daily nursing care, physician rounding, or hospital equipment. It is widely understood that not all hospitalized patients necessarily require that level of care, but this determination is typically made *after* the patient has been hospitalized. This program seeks to expand point-of-care options available to emergency clinicians *before* this decision is made, through deploying resources which may be available to many health systems and hospitals. For example, many hospitals and emergency departments deploy case managers that may perform many of the care coordination and discharge planning tasks performed by the advanced practice provider in our model. Future iterations of this model may rely on existing systems and personnel but are likely to require strengthened systems to facilitate discharge and follow patients actively over subsequent days.

Emergency medicine has increasingly relied upon a significant body of evidence and risk-stratification tools to guide disposition for select disease conditions. Rather than focus on specific disease conditions, this study followed a novel approach by giving clinicians and patients an alternative option between inpatient care and discharge home without services. Previous studies have described potential patients that might have been discharged or simulated changes to hospital occupancy, but few studies have attempted to actually discharge those patients home.⁸ We hypothesize that emergency physicians were willing to accept this intervention because it reduced the perceived risks of discharge and improved confidence in outpatient monitoring and management, although further investigation is needed to understand perceptions of these services among clinicians. More than address over-triage on the part of emergency physicians, the goal of this intervention is to provide just enough post-discharge services to allow clinicians to reconsider the complex, multifaceted decision of whether or not patients can be safely managed at home. It is important to emphasize and families were involved in this complex decision process and allowed to opt out of this service.

Notably, the most common disease condition enrolled was low-to-moderate-risk chest pain, a condition for which there is significant variation in disposition among clinicians despite evidence-based risk stratification tools and shared decision-making strategies. The intervention in this study might be viewed as an implementation strategy to assist clinicians in making evidence-based decisions regarding disposition, beyond a strategy for mitigating risk following discharge. Indeed, better evidence to guide management of specific disease conditions can strengthen the effectiveness of this care model. However, it is important to note that risk stratification tools designed for emergency department disposition do not factor in novel approaches to patient monitoring and care coordination at home, relying on the traditional, binary options of hospitalization and discharge.

The Covid-19 pandemic has generated a surge of interest in management of patients in the home setting.¹² Many interventions have been attempted to improve care coordination and outpatient follow-up for patients discharged from the ED.¹³ Home monitoring services and post-discharge pathways are increasingly available to emergency departments, particularly in integrated health systems. In the future, alternative payment models, such as the Maryland All-Payer Model, in which hospitals and providers assume more financial risk for the direct costs of their care will pressure emergency clinicians to discharge more patients.^{14,15} In addition to potential cost savings, alternative settings for care have the potential to alleviate significant nationwide problems with hospital capacity strain and ED boarding. For these reasons, there will be increasing need for coordinated systems that safely transition patients from the ED to home.^{4,6}

Importantly, increased efforts to reduce hospital admissions must not exacerbate racial disparities and systemic racism. The majority of patients in this study were of self-reported Black race, and the study hospital serves a majority Black population. However, it will be essential to determine that the care provided to patients through this type of program is effective, safe, and equitable for all patients.

This study has several limitations. As a study focused on feasibility, we are unable to conclude whether enrollment in PATH has equivalent safety and effectiveness compared to inpatient care. Another limitation is that ED physicians might have declared intention to admit patients to obtain PATH services for patients actually intended for discharge; to avoid this possibility, the PATH team assisted in the care for 4 additional patients that had not been planned for inpatient disposition. A limitation is that this study did not calculate and compare the costs of providing the intervention as compared to standard care, so cannot provide an estimate of any additional costs incurred or saved through the program. Another limitation is that this study was only offered during an 8-h period during weekdays when case management, outpatient scheduling, and other services are available. However, EDs care for patients throughout all hours of the day and week, and the feasibility of this intervention during those hours was not examined in this study. Finally, this program may not be generalized to other emergency departments although many hospitals face similar problems with regard to ED boarding, avoidable admissions, and lack of coordination and monitoring for patients discharged to home.

5. Conclusion

Emergency physicians and patients were willing to use a new model of care that provided outpatient services at home rather than in the hospital. Future randomized studies are needed to determine whether the care provided at home is effective and safe as compared to inpatient care. Capitated payment models may increasingly exert pressure to reduce costly inpatient hospital utilization. To do so, practical approaches are needed to reduce risk for patients and physicians after ED discharge through strengthened monitoring and care coordination programs.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The authors would like to acknowledge the invaluable support from the staff of the Penn Presbyterian Medical Center Emergency Department, including John Flamma, Chris Edwards, Sean Foster, Leighann Mazzone, and the team of physicians and nurses. The authors would also like to acknowledge contributions from Roy Rosin, Shivan Mehta, Chris Snider, and Michael McAllister at the Penn Medicine Center for Health Care Innovation. Finally, the authors would like to acknowledge contributions from Gillian Sissman.

References

1. Caines K, Shoff C, Bott DM, Pines JM. County-level variation in emergency department admission rates among US medicare beneficiaries. *Ann Emerg Med*. 10 2016;68(4):456–460. 10.1016/j.annemergmed.2016.03.019. [PubMed: 27085370]
2. 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(9):1655–1663. 10.1377/hlthaff.2013.1318. 9. [PubMed: 25201672]
3. MEDPAC. Hospital short-stay policy issues; 2020. Accessed June 1 <http://www.medpac.gov/-documents/-reports>.

4. Schuur JD, Baugh CW, Hess EP, Hilton JA, Pines JM, Asplin BR. Critical pathways for post-emergency outpatient diagnosis and treatment: tools to improve the value of emergency care. *Acad Emerg Med*. 2011;18(6):e52–63. 10.1111/j.1553-2712.2011.01096.x. 6. [PubMed: 21676050]
5. Smulowitz PB, Honigman L, Landon BE. A novel approach to identifying targets for cost reduction in the emergency department. *Ann Emerg Med*. 2013;61(3):293–300. 10.1016/j.annemergmed.2012.05.042. 3. [PubMed: 22795188]
6. Bukhman AK, Baugh CW, Yun BJ. Alternative dispositions for emergency department patients. *Emerg Med Clin North Am*. 2020;38(3):647–661. 10.1016/j.emc.2020.04.004. 8. [PubMed: 32616285]
7. Mao F, Greysen SR. Quantifying the risks of hospitalization-is it really as safe as we believe? *J Hosp Med*. 2020;15(1):62–63. 10.12788/jhm.3282. 1. [PubMed: 31869303]
8. American college of emergency physicians. ED crowding solutions; 2020. Accessed June 1 https://www.acep.org/globalassets/sites/acep/media/crowding/empc_crowding-ip_092016.pdf.
9. Baugh CW, Schuur JD. Observation care-high-value care or a cost-shifting loophole? *N Engl J Med*. 2013;369(4):302–305. 10.1056/NEJMp1304493. 7 25. [PubMed: 23883376]
10. Levine DM, Ouchi K, Blanchfield B, et al. Hospital-level care at home for acutely ill adults: a randomized controlled trial. *Ann Intern Med*. 2020;172(2):77–85. 10.7326/M19-0600. 1 21. [PubMed: 31842232]
11. Burke LG, Orav EJ, Zheng J, Jha AK. Healthy Days at home: a novel population-based outcome measure. *Healthc (Amst)*. 2020;8(1): 100378. 10.1016/j.hjdsi.2019.100378. 3. [PubMed: 31708403]
12. Bekelman JE, Emanuel EJ, Navathe AS. Outpatient treatment at home for medicare beneficiaries during and after the COVID-19 pandemic. *J Am Med Assoc*. 6 3 2020; doi:10.1001/jama.2020.9017.
13. Katz EB, Carrier ER, Umscheid CA, Pines JM. Comparative effectiveness of care coordination interventions in the emergency department: a systematic review. *Ann Emerg Med*. 2012;60(1):12–23 e1. 10.1016/j.annemergmed.2012.02.025. 7. [PubMed: 22542309]
14. Galarraga JE, Black B, Pimentel L, et al. The effects of global budgeting on emergency department admission rates in Maryland. *Ann Emerg Med*. 2020;75(3): 370–381. 10.1016/j.annemergmed.2019.06.009. 3. [PubMed: 31455571]
15. Baehr A, Nedza S, Bettinger J, Marshall Vaskas H, Pilgrim R, Wiler J. Enhancing appropriate admissions: an advanced alternative payment model for emergency physicians. *Ann Emerg Med*. 2020;75(5):612–614. 10.1016/j.annemergmed.2019.09.008. 5. [PubMed: 31806259]

Table 1

Characteristics of patients eligible for PATH intervention, by enrollment status.

Patient Characteristics	Eligible patients (N = 52)	
	Enrolled (N = 30) No. (%)	Not Enrolled (N = 22) No. (%)
Age, mean (SD)	61 (18)	67 (13)
Sex		
Female	19 (63)	15 (68)
Male	11 (37)	7 (32)
Race/Ethnicity		
Non-Hispanic Black	25 (83)	20 (91)
Non-Hispanic White	3 (10)	2 (9)
Asian	2 (7)	0 (0)
Hispanic	0 (0)	0 (0)
Intended Admission Status		
Observation	22 (73)	11 (50)
Inpatient	8 (27)	11 (50)
Primary Payer		
Medicaid	12 (40)	7 (32)
Medicare	11 (37)	13 (59)
Commercial	7 (23)	2 (9)
Recent Hospital Admission (30 days)	2 (7)	1 (5)
ED Encounter Diagnosis		
Chest pain	8 (27)	4 (18)
CHF exacerbation	4 (13)	3 (14)
Hyperglycemia	4 (13)	1 (5)
Skin and soft tissue infection	2 (7)	0 (0)
Nausea / vomiting	2 (7)	3 (14)
UTI / pyelonephritis	2 (7)	2 (9)
Syncope	2 (7)	0 (0)

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Patient Characteristics	Eligible patients (N = 52)	
	Enrolled (N = 30) No. (%)	Not Enrolled (N = 22) No. (%)
Viral syndrome	1 (3)	0 (0)
Pneumonia	1 (3)	4 (18)
COPD / asthma exacerbation	1 (3)	3 (14)
Other	3 (10)	2 (9)

Table 2

Outcomes for patients enrolled in PATH intervention.

Outcome	Enrolled (N = 30) No. (%)
Healthy days at home over 30 days, mean (SD)	29.0 days (2.9)
Return ED Visit (30 days)	
Total	4 (13%)
Discharged upon return ED visit	1 (3%)
Admitted upon return ED visit	3 (10%)
Diagnosis related to initial ED encounter	2 (7%)
Time to return ED visit, mean (SD)	11.3 days (7.0)
Adverse events (30 days)	
Death	0 (0%)
Ambulance hospital transport	1 (3%)
Enrolled in home health	
Home health only	14 (47%)
Home infusion only	1 (3%)
Home health and home infusion	1 (3%)
No home health	14 (47%)
Time to enrollment and ED discharge, mean (SD)	2.7 hours (1.0)
Estimated ED boarding time averted, mean (SD)	8.2 hours (8.1)
Duration of PATH enrollment, mean (SD)	7.0 days (2.7)
Attended outpatient appointment (30 days)	28 (93%)
Time to first outpatient appointment, days (SD)	4.7 (3.8)
Outpatient testing provided	
Home laboratory testing	2 (7)
Exercise stress test	6 (20)
Nuclear medicine stress test	2 (7)
Transthoracic echocardiogram	1 (3)