

Predictors and Reasons Why Patients Decline to Participate in Home Hospital: a Mixed Methods Analysis of a Randomized Controlled Trial



David M Levine, MD MPH MA^{1,2} , Mary Paz, BS³, Kimberly Burke, BS⁴, and Jeffrey L Schnipper, MD MPH^{1,2}

¹Division of General Internal Medicine and Primary Care, Brigham and Women's Hospital, Boston, MA, USA; ²Harvard Medical School, Boston, MA, USA; ³Division of Gastroenterology, Massachusetts General Hospital, Boston, MA, USA; ⁴University of Massachusetts Medical School, Worcester, MA, USA.

BACKGROUND: Acute care at home (“home hospital”) compared to traditional hospital care has been shown to lower cost, utilization, and readmission and improve patient experience and physical activity. Despite these benefits, many patients decline to enroll in home hospital.

OBJECTIVE: Describe predictors and reasons why patients decline home hospital.

DESIGN: Mixed methods evaluation of a randomized controlled trial.

PARTICIPANTS: Patients in the emergency department who required admission and were accepted for home hospital by the home hospital attending, but ultimately declined to enroll.

INTERVENTION: Home hospital care, including nurse and physician home visits, intravenous medications, remote monitoring, video communication, and point-of-care testing.

APPROACH: We conducted a thematic content analysis of verbatim reasons for decline. We performed bivariate comparisons then multivariable logistic regression to identify patient characteristics associated with declining participation.

KEY RESULTS: Two hundred forty-eight patients were eligible to enroll, and 157 (63%) declined enrollment. Patients who declined and enrolled were of similar age (median age, 74 vs 75 years old; $p = 0.27$), sex (32% vs 36% female; $p = 0.49$), and race/ethnicity ($p = 0.26$). In multivariable analysis, patients were significantly more likely to decline if they initially presented at the community hospital compared to the academic medical center (53% vs 42%; adjusted OR, 2.2 [95% CI, 1.2 to 4.2]) and if single (37% vs 24%; adjusted OR, 2.5 [95% CI, 1.2 to 5.1]). We formulated 10 qualitative categories describing reasons patients ultimately declined. Many patients declined because they felt it was easier to remain in the hospital (20%) or felt safer in the hospital than in their home (20%).

CONCLUSIONS: Patients who declined to enroll in a home hospital intervention had similar sociodemographic characteristics as enrollees except partner status and declined most often for perceptions surrounding safety at home and the ease of remaining in the hospital.

Prior Presentations Society of General Internal Medicine - National conference; Washington, DC, 2019.

Received October 27, 2020

Accepted April 14, 2021

Published online May 5, 2021

TRIAL REGISTRATION: NCT03203759

KEY WORDS: home hospital; hospital at home; refusal.

J Gen Intern Med 37(2):327–31

DOI: 10.1007/s11606-021-06833-2

© Society of General Internal Medicine 2021

INTRODUCTION

Hospitals are the standard of care for acute illness in the USA, but hospital care is expensive and potentially unsafe and uncomfortable, particularly for older individuals.^{1,2} A “home hospital” is the substitutive provision of home-based acute care services usually associated with a traditional inpatient hospital.³ Prior work suggests home hospital can reduce cost, maintain quality and safety, and improve patient experience for select acutely ill adults who require traditional hospital-level care.^{4–15}

Despite these benefits, many patients decline to participate in a home hospital model over traditional hospitalization. Findings of decline rates vary widely, between 10 and 60%.^{8,11,16} Prior work on patients who decline to participate suggests that those from a lower socioeconomic background⁵ or without caregiver support at home may be more likely to decline.⁶ It remains unclear exactly what drives patients to decline an evidence-based care model. Much of the home hospital literature focuses on intervention efficacy, yet a focus on patients who decline to enroll may better allow for home hospital program designs that reach and are acceptable to larger populations.

METHODS

Study Design and Participants

This investigator-initiated study was approved by the Mass General Brigham IRB and registered at clinicaltrials.gov, record NCT03203759. All participants who enrolled provided written informed consent. The IRB approved limited data collection for patients who declined enrollment (e.g., limited demographic information, reason for declining).

We previously reported quantitative findings from the first pilot randomized controlled trial (RCT) in the USA¹⁷ and subsequent replication in a larger population.¹¹ We conducted our RCT between June 12, 2017, and January 16, 2018, at Brigham and Women's Hospital (an academic medical center) and Brigham and Women's Faulkner Hospital (affiliated community hospital). Briefly, patients were eligible to enroll if they required admission as specified by the emergency department physician, lived within our catchment area, and were acutely ill from a medical condition such as infection, heart failure, or asthma. Patients were ineligible if they required critical care, an invasive procedure, or advanced imaging, among other criteria.¹¹ We approached all eligible patients. In this mixed methods analysis, we examined patients who declined to enroll in the home hospital study.

Participants and Randomization

We previously described selection criteria in detail.¹¹ Briefly, adult participants were recruited in the emergency department (ED) and were eligible for inclusion based on their home's geographic location, their illness type, and their acuity. Participants were only approached for enrollment following determination by the ED that admission was necessary. After meeting criteria and providing written informed consent, participants were randomized to usual care or home hospital. Participants who declined to enroll did not consent to the study.

Home Hospital Intervention

We previously described the home hospital intervention in detail.¹¹ Briefly, all patients received at least one daily visit from an attending general internist and two daily visits from a registered nurse (Partners HealthCare at Home), with additional visits performed as needed. Also tailored to patient need, participants could receive medical meals and the services of a home health aide, social worker, physical therapist, and/or occupational therapist.

Home hospital could provide most of the acute care services expected of a traditional hospital, including respiratory therapies (e.g., oxygen), intravenous medications (Smiths Medical, St. Paul, Minnesota), and continuous monitoring (VitalConnect, San Jose, CA). We mandated no treatment pathways or algorithms.

Participants randomized to the control group received usual care in the hospital from an attending general internist (usually a hospitalist) or cardiologist.

Data Sources

Data for patients were collected through standard structured fields in the electronic health record (EHR).¹¹ For partner status, we combined all statuses that connoted a patient was partnered, including married and life partnered. For those who declined to enroll, a study research assistant asked the patient

to provide a reason and captured the first sentence of their response verbatim in writing.

Statistical Analysis

To understand predictors and reasons why patients declined to be in the study, we employed a mixed methods approach. For quantitative data, we present descriptive data with means and confidence intervals and medians and interquartile ranges (IQRs), as appropriate.⁸ To estimate the effect of a patient's sociodemographic covariates on decision to enroll, we used multivariate logistic regression, including all covariates in Table 1. All tests for significance used a 2-sided *p*-value of 0.05. We performed analyses in SAS v9.4 (Cary, NC, USA) and RStudio v3.4.2 (RStudio Team, MA, USA).

Qualitative Analysis

For qualitative data, three authors (DML, KB, and MP) independently reviewed the verbatim reasons for declining enrollment and formulated codes for each. These codes were then as a group refined into a final codebook of themes for declining enrollment. All 3 authors then independently coded each verbatim reason for declining enrollment, with disagreements adjudicated by consensus using standard qualitative analysis methods.⁹ Themes from these verbatim responses were generated by the reviewers iteratively through discussion. In addition to this qualitative thematic analysis, we present the response frequency of each category.

RESULTS

Patient Demographics

A total of 248 patients were eligible to enroll, and 157 (63%) declined enrollment. Patients who declined were comparable to those who enrolled (Table 1). Both groups were of similar age (median age, 74 vs 75 years old; *p* = 0.27), sex (32% vs 36% female; *p* = 0.49), race/ethnicity (*p* = 0.26), primary language (*p* = 0.49), insurance status (*p* = 0.49), and were admitted for similar diagnoses (*p* = 0.24). Statistically significant bivariate differences existed between the two groups for partner status (24% of patients who declined were partnered vs 37% of patients who enrolled; *p* = 0.03), comorbidity count (9 vs 8; *p* = 0.04), and hospital admission in the last 6 months (50% vs 36%; *p* = 0.03). Clinically, but not statistically, significant differences between those who declined and enrolled included having a code status of full code (87% vs 77%), diagnosis of "other" (11% vs 19%), and presenting to the community (as opposed to academic) hospital (53% vs 42%).

Predictors of Declining Enrollment

Multivariable modeling demonstrated that patients were significantly more likely to decline enrollment if they initially

Table 1 Patient Characteristics and Adjusted Odds of Declining Home Hospital

	Declined (n = 157)	Enrolled (n = 91)	Unadjusted p-value ^a	Adjusted OR (95% CI) ^b
Age, years, median (IQR)	74 (24)	75 (23)	0.2734	1.0 (1.0,1.0)
Female, n (%)	50 (32)	33 (36)	0.4883	1.0 (0.5,1.9)
Race/Ethnicity, n (%)			0.2632	
White	77 (49)	46 (51)		Referent
Black	34 (22)	20 (22)		0.8 (0.4,1.9)
Latino	40 (25)	16 (18)		2.8 (0.5,15.6)
Asian	4 (3)	6 (7)		0.8 (0.2,3.9)
Other	2 (1)	3 (3)		0.5 (0.1,4.3)
Partnered, n (%) ^c	38 (24)	34 (37)	0.0304	0.4 (0.2,0.8) ^d
Primary language, n (%)			0.4908	
English	121 (77)	69 (76)		Referent
Spanish	28 (18)	14 (15)		0.7 (0.1,4.0)
Other	8 (5)	8 (9)		2.0 (0.5,8.0)
Insurance, n (%)			0.4907	
Private	38 (24)	20 (22)		Referent
Medicare	82 (52)	42 (46)		1.0 (0.5,2.4)
Medicaid/None	8 (5)	8 (9)		0.3 (0.1,1.1)
Medicare + Medicaid	29 (18)	21 (23)		0.5 (0.2,1.4)
BMI, median (IQR)	27 (7)	26 (9)	0.7123	1.0 (0.9,1.0)
Smoking status, n (%)			0.4466	
Active	14 (9)	12 (13)		Referent
Never	82 (52)	49 (54)		2.1 (0.7,5.7)
Prior	61 (39)	30 (33)		2.6 (0.9,7.3)
Medication count, median (IQR)	13 (8)	12 (12)	0.7619	1.0 (0.9,1.0)
Comorbidity count, median (IQR)	9 (11)	8 (8)	0.0432	1.1 (1.0, 1.1)
Code status: Full code, n (%) ^c	136 (87)	70 (77)	0.0550	2.1 (0.9,5.0)
Hospital admission in last 6 months, n (%) ^c	79 (50)	33 (36)	0.0349	1.4 (0.7,2.6)
Emergency department visit in last 6 months, n (%) ^c	64 (41)	32 (35)	0.4187	0.9 (0.5,1.8)
Community hospital presentation, n (%) ^b	83 (53)	38 (42)	0.1137	2.2 (1.2, 4.2) ^d
Diagnosis, n (%)			0.2355	
Infection	72 (46)	44 (48)		Referent
Heart failure	36 (23)	17 (19)		1.5 (0.66, 3.3)
COPD/asthma	32 (20)	13 (14)		2.0 (0.82, 4.9)
Other	17 (11)	17 (19)		0.51 (0.21, 1.2)

^aBivariate comparison (Wilcoxon for continuous variables; chi-squared for categorical variables)

^bMultivariable logistic regression predicting the adjusted odds of declining home hospital care, adjusted for all variables in the table

^cReferent is the converse

^dStatistically significant. Adjusted p-value for partnered, 0.0121. Adjusted p-value for community hospital presentation, 0.0122

Abbreviations: BMI, body mass index; COPD, chronic obstructive pulmonary disease; IQR, interquartile range

presented at the community hospital compared to the academic medical center (53% vs 42%; adjusted OR of declining, 2.2 [95% CI, 1.2 to 4.2]) and significantly less likely to decline enrollment if they were partnered (24% vs 37%; adjusted OR, 0.4 [95% CI, 0.2 to 0.8]) (Table 1). Comorbidity count, code status, and diagnosis were not significant in multivariable modeling.

Reasons for Declining Enrollment

We formulated 10 qualitative categories describing reasons patients ultimately declined enrollment (Table 2). Many patients declined because they felt it was easier or more comfortable to remain in the hospital (20%), or they felt safer in the hospital than in their home (20%). Several (16%) patients did not enroll because the emergency department or other clinician

Table 2 Reasons Patients Declined Enrollment

Theme for declining enrollment	Illustrative quote	n (%)
Fear/safety at home	"I feel more safe in the hospital with these symptoms."	31 (20)
Comfort/ease/desire to stay in traditional hospital	"I am comfortable here. I do not want to leave the hospital now."	31 (20)
Clinician/ED declines for patient factors	Per clinician: "Patient should stay in hospital for initial diagnosis of right heart failure."	25 (16)
Simply declines without reason	"I'm not feeling up to it today."	18 (11)
Non-therapeutic home	Per daughter: "We have bed bugs in the house."	17 (11)
Concern for caregiver burden	Per son: "It will be too difficult and stressful for my mom to have [my dad] at home."	10 (6)
Other reason	Per wife: "You can't bring IV things into my home."	10 (6)
Could not reach caregiver	Daughter (proxy) not present to sign consent or reachable by phone.	7 (4)
No response captured	-	5 (3)
Facility time constraints	Per clinician: "Patient needs to go up [to the medicine floor] now."	3 (2)

declined, despite the home hospital physician desiring the patient on her/his service. Smaller proportions of patients declined for concerns regarding the non-therapeutic nature of their home (11%) and concern for caregiver burden (6%).

DISCUSSION

In this mixed methods analysis of a randomized controlled trial of home hospital care, we demonstrated that patients who declined to enroll had generally similar sociodemographic characteristics to those who enrolled and declined most often for perceptions surrounding safety at home and the ease of remaining in the hospital. Our findings point to some clear areas that might improve enrollment and are also reassuring that disparities in enrollment do not appear to exist for the sociodemographic and clinical characteristics we were able to measure.

Although generally similar to enrollees, those declining enrollment were more likely to present to the community hospital. Among other differences between the community hospital and academic medical center in this study, we postulate a key driver of this observation is that there is often no bed available at the academic medical center, requiring a patient to await a bed in the emergency department in less-comfortable surroundings. Another possibility is that patients receive private rooms at the community hospital while most of the general medicine rooms at the academic medical center are shared with another patient, although this presumes prior knowledge of the hospital. Other possibilities that would require additional qualitative approaches to investigate include potential differences in admitting workflows at both hospitals, familiarity and comfort with the community hospital versus the academic medical center, different attitudes toward innovative interventions at the two hospitals, and patient belief that their condition requires the expertise of the academic medical center.

Those declining enrollment were less likely to be partnered. Our data do not allow us to fully explain this finding. It is possible that this measure serves as a surrogate for support at home; that is, those without partners had less support at home and may have felt they could not cope at home, despite the additional care provided by the home hospital team. However, often unpartnered older adults are cared for by their family or have other care arrangements that provide excellent support at home. Or, a patient's partner may even require the patient's support. In future work, it will be important to determine the key support levers to ensure these patients can feel, and in fact are, supported adequately when home hospitalized.

Those declining most often cited safety and comfort issues. For over 100 years, Americans have made the understandable assumption that the safest and best place to receive acute care is in the hospital, yet this may not be the case. In a recent randomized controlled trial,¹¹ and other non-randomized studies,^{8,9} various investigators have shown that the hospital (usual

care) arm fared worse than home hospital (intervention) arm on multiple patient-centered outcomes including readmission and physical activity. Whether the patients who declined to be in the study would also have benefitted from being hospitalized at home remains unanswered. Those citing perceived comfort and safety of the hospital as a reason for declining to participate could be correct. They also may be citing this reason as a cover for reasons more difficult to discuss, such as a non-therapeutic home.

More than 15% of patients did not enroll due to clinician factors, despite the home hospital physician's desire to enroll the patient. Perhaps an emergency medicine or outpatient physician was uncomfortable with the idea of home hospital care. This likely represents an area of further collaboration and awareness among emergency medicine and outpatient physicians to find the best care pathway for mutual patients. Measuring and sharing data on home hospital's outcomes with physician stakeholders is likely an important method to improve enrollment.

Examining home hospital from an equity lens is paramount. We want to ensure that home hospital care is available to all who qualify clinically and desire it, and we recognize that there are many important social, cultural, and familial factors that may go into a patient's decision. In general, our findings are reassuring that there was no association between a patient's decision to enroll and their age, sex, race/ethnicity, language, or insurance status.

We note that non-therapeutic home situations unfortunately were at the root of declining home hospital for about 10%, while another 10% declined without reason (and may have represented a non-therapeutic home situation, lack of trust in the health care system, suspicion that the care would be subpar at home, and other concerns). We have anecdotally noted the power of home hospital to intervene in homes facing adverse social determinants of health, yet further work is needed to help patients feel empowered by this opportunity and to better understand which determinants an intervention like home hospital can aid best. For example, lowering the stigma of a non-therapeutic living situation would likely reduce declines. However, safety, comfort, and clinician issues encompassed the majority of reasons for declining, not unmet social needs. Future work should include the development of an equity framework for home hospital.

Some hypothesized that participating in research may have been a driving reason for declining enrollment. However, we note that only one patient (captured in the "other reason" category) cited concerns with participating in a research study, particularly one where the control group was usual care.

Our work builds on others. Saenger and colleagues recently showed that 67% of patients accepted a similar home hospital intervention, roughly the inverse of our study.¹⁶ Unlike our findings, they noted older age, sex, insurance, and admission diagnosis were all associated with the decision to accept or decline home hospital care, although they did not capture other sociodemographic characteristics, notably partner status or

community versus academic setting, which were significant in our analysis. A direct comparison to Saenger's reasons for declining home hospital is challenging. Notably, only 3% of patients in our study were unable to provide a reason for declining, compared to 35% in the Saenger study. Importantly, their study was not a controlled trial (all patients were offered home hospital), patients may have been approached earlier in their course (i.e., before being told they needed to be admitted and had already come to terms with staying in the hospital), and some patients were enrolled directly from outpatient clinics or from home, all of which could have affected the proportion of patients who declined, the patient population, and the reasons for declining.

Our study has limitations. First, despite using a mixed methods approach, we did not obtain granular qualitative data that may have come with a semi-structured interview. This may have helped us further understand reasons for declining home hospital care. Second, we were not able to obtain as rich a set of sociodemographic characteristics for those who declined as we were limited by our study protocol to data abstracted from the EHR. There could be additional unmeasured predictors. Third, our study was performed at 2 sites, limiting generalizability, although we had a diverse sample. Fourth, small sample sizes in some of the measured variables may have left our multivariable analysis underpowered.

CONCLUSIONS

Patients who declined home hospital care had similar sociodemographics to those who enrolled and most often cited safety and the ease of remaining in the hospital. Social support at home was likely paramount to a patient's decision. Important future work includes optimizing home hospital for all patients and their clinicians to better inform discussions of the risks, benefits, and alternatives of traditional hospitals.

Acknowledgements: The authors would like to acknowledge the clinicians who cared for all of the patients in this study during their time of need. The authors also graciously acknowledge the various departments at Brigham Health who were instrumental to the success of the home hospital program: Cardiology, Emergency Medicine, General Internal Medicine and Primary Care, Hospital Medicine Unit, Pharmacy, Laboratory, and Population Health.

Corresponding Author: David M Levine, MD MPH MA; Division of General Internal Medicine and Primary Care, Brigham and Women's Hospital, Boston, MA, USA (e-mail: dmlevine@bwh.harvard.edu).

Funding Brigham and Women's Hospital President's Fund.

Declarations:

Conflict of Interest: None of the study's commercial vendors participated in design, analysis, interpretation, preparation, review, or approval. Dr. Levine is the recipient of funding from Biofourmis for an investigator-initiated study of machine learning warning scores for acutely ill patients, both traditionally and home hospitalized. Dr. Schnipper was the recipient of funding from Mallinckrodt

Pharmaceuticals for an investigator-initiated study of opioid related adverse drug events in post-operative hospitalized patients. Otherwise, the authors declare that they do not have a conflict of interest.

REFERENCES

1. FastStats - Health Expenditures. Accessed December 3, 2018. <https://www.cdc.gov/nchs/fastats/health-expenditures.htm>
2. Hung WW, Ross JS, Farber J, Siu AL. Evaluation of the Mobile Acute Care of the Elderly (MACE) service. *JAMA Intern Med.* 2013;173(11):990-996. <https://doi.org/10.1001/jamainternmed.2013.478>
3. Leff B. Defining and disseminating the hospital-at-home model. *CMAJ.* 2009;180(2):156-157. <https://doi.org/10.1503/cmaj.081891>
4. Caplan GA, Sulaiman NS, Mangin DA, Aimonino Ricauda N, Wilson AD, Barclay L. A meta-analysis of "hospital in the home". *Med J Aust.* 2012;197(9):512-519. <https://doi.org/10.5694/mja12.10480>
5. Board N, Brennan N, Caplan GA. A randomised controlled trial of the costs of hospital as compared with hospital in the home for acute medical patients. *Aust N Z J Public Health.* 2000;24(3):305-311. Accessed February 17, 2017. <http://www.ncbi.nlm.nih.gov/pubmed/10937409>
6. Caplan GA, Coconis J, Board N, Sayers A, Woods J. Does home treatment affect delirium? A randomised controlled trial of rehabilitation of elderly and care at home or usual treatment (The REACH-OUT trial). *Age Ageing.* 2006;35(1):53-60. <https://doi.org/10.1093/ageing/afi206>
7. Montalto M, Lui B, Mullins A, Woodmason K. Medically-managed Hospital in the Home: 7 year study of mortality and unplanned interruption. *Aust Health Rev.* 2010;34(3):269-275. <https://doi.org/10.1071/AH09771>
8. 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(11):798-808. Accessed February 15, 2016 <http://www.ncbi.nlm.nih.gov/pubmed/16330791>
9. Federman AD, Soones T, DeCherrie L V., Leff B, Siu AL. Association of a Bundled Hospital-at-Home and 30-Day Postacute Transitional Care Program With Clinical Outcomes and Patient Experiences. *JAMA Intern Med.* 2018;178(8):1033. <https://doi.org/10.1001/jamainternmed.2018.2562>
10. 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.* Published online 2018:1-8. <https://doi.org/10.1007/s11606-018-4307-z>
11. 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. <https://doi.org/10.7326/M19-0600>
12. Levine DM, Pian J, Mahendrakumar K, Patel A, Saenz A, Schnipper J. Hospital-Level Care at Home for Acutely Ill Adults: A Qualitative Evaluation of a Randomized Controlled Trial. *J Gen Intern Med.* Published online 2021.
13. Levine DM, Desai MP, Ross J, Como N, Anne Gill E. Rural Perceptions of Acute Care at Home: A Qualitative Analysis. *J Rural Heal Off J Am Rural Heal Assoc Natl Rural Heal Care Assoc.* Published online January 2021. <https://doi.org/10.1111/jrh.12551>
14. Levine DM, Desai MP, Ross JB, Como N, Holley S. Scoping and testing rural acute care at home: a simulation analysis. *BMJ Innov.* Published online 2021. <https://doi.org/10.1136/bmjinnov-2020-000592>
15. Pian J, Cannon B, Schnipper JL, Levine DM. Burnout Among Staff in a Home Hospital Pilot. *J Clin Med Res.* 2019;Accepted.
16. Saenger P, Federman AD, DeCherrie L V., et al. Choosing Inpatient vs Home Treatment: Why Patients Accept or Decline Hospital at Home. *J Am Geriatr Soc.* Published online May 6, 2020;jgs.16486. <https://doi.org/10.1111/jgs.16486>
17. 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.* Published online February 6, 2018. <https://doi.org/10.1007/s11606-018-4307-z>

Publisher's Note: Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.