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Home Visits In Internal Medicine Graduate Medical Education

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Abstract: Home-based care training is largely absent from internal medicine (IM) graduate medical education, and home-based care program evaluation largely focuses on resident attitudes and satisfaction, rather than impact on practice or the patient experience. In the 2015-16 academic year, the Yale Primary Care Internal Medicine residency program (YPC) incorporated required home visits for all PGY-1s and PGY-2s. These visits are intended to build unique clinical skillsets, enhance education about the role of psychosocial determinants of health, and potentially impact resident wellbeing. A qualitative method was used to evaluate this program with the goal of characterizing the impact of one-time home visits as an educational intervention for resident trainees, and as a home-based clinical care experience for patients. From July –Oct 2016 semi-structured interviews were conducted with YPC residents who had participated in home visits (n=9) and with visited patients from the resident panels (n=10). Patient and randomly chosen control charts were also reviewed for socio-demographics, healthcare utilization and co-morbidities (Charlson Co-morbidity Index) and data was analyzed using chi-squared significance testing. Interview analysis identified emerging themes. Key provider topics included: 1. Educational value; 2. Patient impact; and 3. Impact on burnout. Key patient topics included: 1. Provider relationship impact; 2. Improved communication; and 3. Resource connections. This work is unique in evaluating the impact that one-time visits with residents, can have for patients. As time investment and funding are often obstacles to program implementation in graduate medical education, this implies that even infrequent home visit opportunities can be a worthwhile addition to residency training for both residents and patients.

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Introduction

Physicians have been visiting patients and providing home-based care for decades. As recently as 1930, 40% of physician encounters were done in the home (1). Over the 20th century, as medical care became more specialized, and systems of care delivery and payment evolved, these visits became less frequent, dropping to <1% by 1980. Home-based care today is primarily provided for those who are unable to come to the office due to accessibility or frailty and is provided by a fraction of primary care physicians, as well as palliative care and geriatric physicians.

Recently home-based care has been making a comeback. According to Medicare data, between 2000 and 2007 physician home visits increased from 1.5 million to almost 2 million (1). This may in part be due to changes in Medicare reimbursements and billing code definitions, making it more financially feasible for physicians to make home visits part of their practice (1). A thorough review of the literature was not able to uncover more recent estimates, however according to calculations done by this author [AR], based on 2016 Medicare utilization data, this number has continued to rise to 2.6 million in 2016 (2). However, despite this increase, as a percentage of outpatient visits billed to Medicare, home visits overall make up only ~1% of all outpatient visits billed to Medicare[1] (2). Likewise, in terms of reach, from 2011-2014, only ~2% of Medicare beneficiaries received medical care at least once in the home (3) and despite an increase in number of visits, fewer overall physicians are making home visits (4).

[1] Defined as # services billed as home visit CPT codes vs # services billed as home visit or office visit CPT codes in CY2016. Does not include assisted living facility visits.

Home-based medical care covers a wide range of types of care delivery- varying by who is providing that care, by the type of care or goals of the care provided, and by timeframe over which the care is delivered. Figure 1 depicts a visual overview of the different types of home-based care provided by physicians. A key differentiation between home-based care programs is whether they provide longitudinal comprehensive primary care, where every primary care interaction is done in the patients' home, versus integrated models, where patients receive some combination of home-based and office-based care. This may include visits after a patient leaves the hospital to support the transition home, preventive visits done one-time or on a regular basis to identify issues in the home that are affecting a patients' health such as home safety evaluations or medication reconciliations, and/or visits done to inform specific identified issues such as frequent admissions or concern for medication management.

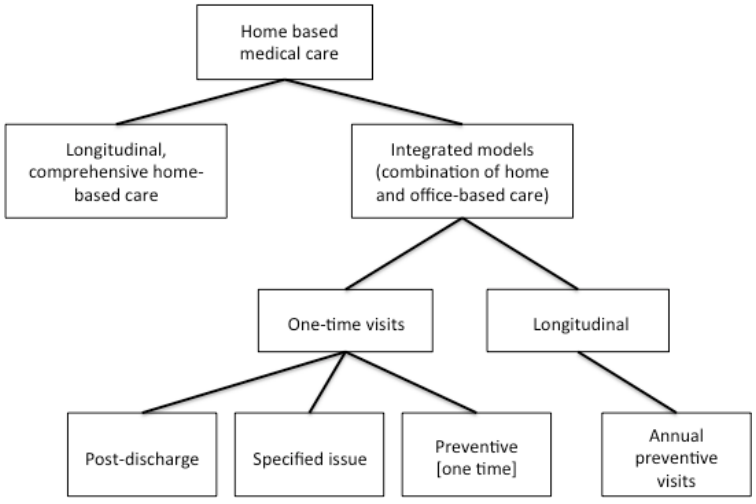


Figure 1: Overview of different types of home-based medical care

Significant research exists showing the benefits of providing medical care in the home, some of which is summarized below. However, despite its long history, there is still significant discussion over the optimal model of home-based care delivery and the desired goals of home-based care programs. Further, questions remain over the ideal targets of these interventions: who might benefit the most and for whom the care is cost-effective.

In light of the recent uptrend in home visits, and the important role of home-based care in our modern healthcare system, the role of home visits in graduate medical education have received more focus. Residents have voiced that they feel that home-based care is an important part of care delivery and that they do not feel adequately trained to provide that care (5). Likewise, major health provider organizations including the American Medical Association and the American college of Physicians have encouraged increased focus on education and exposure to home-based care (1). However, despite this increased focus, the patient perspective, namely understanding the patient experience of home visits, particularly when delivered by trainees, is notably missing from the literature.

In addition to being an important part of comprehensive primary care education, home visits have been associated with higher levels of practice satisfaction (6) and can help to foster the patient-physician relationship, creating opportunities to develop more satisfying relationships with patients (7-9). In a time where there is increased focus on resident wellbeing and methods to reduce burnout, this provides a potential opportunity to contribute to resident feelings of meaning in their work.

A deeper dive on some of the above mentioned topics will shed light what has been learned over the years and which areas require further research for home visit

programs to be more optimally utilized in healthcare and medical education systems today.

Benefits of Home-Based Care

Longitudinal Approaches to Home-Based Care

The most robust research on home-based care focuses on longitudinal, comprehensive home-based primary care programs and tends to focus on homebound patients, often elderly, who are unable to attend an ambulatory clinic. These programs have been shown to have positive functional and qualitative outcomes. Program evaluations and systemic reviews have suggested that home-based primary care leads to fewer hospitalizations and readmissions, fewer skilled nursing facility (SNF) and long term care admissions, and reduced ED visits and hospital bed days (10-14). Qualitative improvements include increased quality of life for both patients and caregivers, lower caregiver burden, and increased rate of preventative health screenings (10, 11, 15).

The VA has had a Home Based Primary Care (HBPC) program for patients with advanced chronic diseases and disabilities since the 1970s (16). Since the 1980s they have been showing significant cost savings in addition to increased patient and caregiver satisfaction (17). Recent analyses have found costs to be ~12% lower than projected and hospitalizations to be ~25% lower than in periods without home-based care (18). Outside the VA, studies of other home-based primary care programs have begun to show similar results. Two recent matched cohort studies, one looking at a traditional fee for service model and one in an integrated health care/health insurance system, found higher up front costs but significant long-term savings particularly at end of life for elderly, medically complex patients receiving home-based primary care (19, 20). These studies suggest that

what has been shown for decades in the contained system of the VA still plays out in more traditional payment structures and settings.

Importantly, the literature points to team-based and coordinated care being a key component of success for home-based care. A systematic review found that a key characteristic that was shared by many successful home-based primary care programs, was the existence of inter-professional teams and, in particular, holding regular inter-professional care meetings (10). Another program found that moving to a team care model that included a nurse practitioner, a social worker, and an administrative assistant improved physician satisfaction and increased the number of patients they were able to serve, without negatively impacting hospitalizations, readmissions or patient satisfaction (21). One author noted that "[integrated services] may provide better coordination of services and prevent unnecessary admissions. Another possible factor leading to lower utilization may [be] the [Home Care Program's] ability to connect these patients with needed community resources" (13).

Among longitudinal home-based care initiatives there is wide variation in program design, and some disagreement over the effectiveness of different models. Some provide routine ambulatory care in the patient's home (seeing patients as needed based on severity of illness), while others have standardized monthly visits, regardless of patient health status, either by an NP or physican. Programs often continue to follow patients during hospitalizations, admitting and treating patients under the program MD, or at least coordinating a discharge plan before transition back home (10, 13, 15). Many also provide mechanisms for urgent calls and/or 24 hour telephone call access (10, 13).

Integrated Home-Based Care Models

As an alternative to longitudinal care, some institutions have established integrated or mixed home-based care models, which bring together home-based and ambulatory care. These programs range from discharge management and transitional care to one-time or regular preventative home visits for the elderly and chronically ill. Discharge planning tends to focus on the time directly after discharge, providing intensive home-based care until the patient is stabilized and with the aim to reduce unnecessary readmissions (22).

While there has been significant literature supporting the importance of non-longitudinal programs, the specific outcome findings have been mixed. A number have found reduction in overall mortality and reduced admissions to long-term care and nursing home facilities, but impact on functional and health status is mixed (1, 12, 23, 24), and some reviews suggest no effect at all (25). One explanation given for mixed results is varying inclusion criteria and trial characteristics. A number of recent systemic reviews and meta-analyses have focused on preventive home visits, but programs included vary significantly in terms of goals of the intervention and who is involved- both patients and personnel (25, 26). Visits may encompass a wide range of goals including falls prevention, multidimensional geriatric assessment (medical, functional, psychosocial and environmental), medication review and/or providing referrals to services. Personnel conducting the visits may include physicians, social workers, therapists, nurses, and/or other health professionals and providers. Additionally, many of the studies were conducted outside the United States. This can make comparability difficult given vast differences in health care systems and payment structures. More recently, a 2015 study looked at Medicare beneficiaries enrolled in the *HouseCalls* program, which provides an

annual home visit by a physician or nurse practitioner as well as care coordination with the patient's primary care provider (27). *HouseCalls* is a program offered by UnitedHealth Group to members of qualified Medicare Advantage Plans regardless of underlying health conditions. The researchers used a difference in difference approach to analysis and found a reduction in hospital and nursing home admissions and an increase in office visits.

Importantly, the existing literature primarily evaluates and describes programs focused on specific populations such as elderly, hospital discharges or the chronically ill. Other integrated models such as those focusing on non-homebound, non-elderly patients for one-time consultative visits or to intensively address a short-term medical issue are not well described (22).

Some authors have pointed out that the primary value of the home visit lies in the opportunity to observe pieces of the patient experience, which can't be assessed effectively in the clinic. One author notes:

> Exploring the patient's environment yields a wealth of new information that is both quantitative, such as previously missed diagnoses or discrepancies in medication regimens, and qualitative in terms of grasping what the person can do and what the support system can provide. A home visit can uncover illicit drug or alcohol abuse, environmental contributors to frequent falls, incontinence, and early signs of dementia or caregiver burnout, all of which may go unnoticed during an office visit. (1)

Home visits allow physicians to evaluate at home health maintenance procedures such as wound and respiratory care practices and provide feedback as well as more qualitative measures such as the home dynamic, particularly interactions between caregivers and patients. The ability to assess these types of factors may directly lead to reductions in

hospitalizations and mortality in part because “these programs identify new or worsening medical problems or social conditions that could lead to patient decline or death” (1).

Importantly, not only have home visits been found effective in assessing home environments, they have been shown to be *significantly more effective* than that same assessment done in a clinic setting. In one study trained geriatric nurse specialists did a standardized assessment covering demographics, caregiver information, impairments in daily life, support, home environment and medical problems as well as a battery of cognitive and functional testing in both clinic and home environments (28). They found that when the same assessment was completed in the clinic as in the home only ~2% of patients had complete agreement between the evaluations and a much higher portion (94%) identified at least one problem only through the home visit vs only through the clinic visit (4%). Furthermore, a high proportion of problems identified only through the home visit were serious problems, and the clinic-based assessment often underrated the severity of problems it did identify. Overall, the authors found that “a structured, comprehensive clinic-based home assessment…was neither comparable to a home visit nor adequate in detecting serious problems”.

Deciding Whom to Care for in the Home

Evaluating which patient populations benefit most from home-based care is another area requiring further research. There is moderate evidence to suggest that frail or sicker patients are more likely to benefit from home-based care, but the current evidence is not fully sufficient (14). One review suggested while home-based care may provide benefit to a wide variety of patients, patients who are less ill may show smaller or no cost savings from such a program. They suggested that further research comparing patient

characteristics such as location and housing might be fruitful (14). Recent studies looking at cost savings have tended to focus on Medicare costs, specifically targeting frail and/or homebound, elderly patients, most recently through the *Independence at Home* demonstration project (19, 20, 29, 30). Research on preventive, multi-dimensional interventions have suggested that low-risk elderly individuals might benefit in the long run, but may have higher up front costs (31). More research is required to understand the cost effectiveness of such interventions. In contrast, existing research suggests that higher risk elderly individuals are likely to benefit from interventions targeting specific, known problems (31).

Graduate Medical Education and Home-Based Care

Home-based care is largely absent from internal medicine (IM) graduate medical education. A 2001 review of internal medicine residency programs found that only 25% had mandatory training and a third offer no instruction at all (32). Further, a needs assessment of internal medicine residents found that there is demand for such experiences and that IM residents do not feel prepared to deliver home-based care despite a desire to do so (5). When offered, home-based care experiences in training are well received by both patients and participants (33-36), but program evaluations tend to be small, reliant on anecdotal data, and many focus on resident satisfaction and attitudes, rather than changes in practice or understanding of patient experience (15, 34, 37). Program evaluations that focus on learner impact have found improvements in knowledge; learner understanding of patients' home and community issues, and social determinants of health; and have "permitted them to provide better care" (15, 33, 37, 38). Additionally, interdisciplinary teams have allowed residents to learn how to better leverage other

members of a team such as social workers, to “use systems to promote communication across specialties”, and to access community resources (37). Importantly, at least one study of pediatric residents found that the program effects were sustained at 14-22 months post intervention (33). However, most studies evaluated impact only immediately following the intervention or at most at a one year follow-up. Of note, home-based care effectively allows residents to develop skills in each of the key competencies as defined by ACGME, making it not only a potentially important part of the learning process, but also an efficient one (39).

Home-based care has been integrated into residency training in a wide variety of ways- ranging from an ongoing longitudinal program to focused care transition education to one-time visits during intern year, and all have found at least anecdotal evidence of positive impact on their residents (34, 40, 41). However, despite many programs implementing such initiatives, there is limited robust, long-term, non-anecdotal evidence to support incorporation into IM residency curricula, which is important given the significant time and funding required (9, 42-44). In our literature search, we have found only three studies characterizing long-term (>1 year) clinically meaningful changes in IM resident understanding of patient context (34, 45, 46) and two were based on self-reported retrospective surveys. A couple others recently have reported on the impact over the course of intern year (38, 47). No studies were identified that followed-up initially identified changes in IM residents more than a year past the end of a home-based care program. Particularly, the impact of one-time primary care visits with non-homebound patients is not well described (22). This is important as one-time visits can be implemented with less initial time and funding investment up front than ongoing home-based primary care programs. One IM residency program recently implemented

nonmedical one-time home visits for all first-year residents (38). An analysis of written reflections following the visit and again at the end of the year suggested that the visits impacted the depth of the patient relationship, were a source of professional fulfillment and would likely impact future practice.

Evaluation of Training in Home-Based Care: Lacking the Patient Perspective

There is a notable absence of patient perspective within the research on home-based care in residency training. While home-based care has been shown to increase quality of life for patients and caregivers (10), reduce hospitalizations and emergency room visits (10, 13, 48) and allow for identification of previously missed diagnoses (1), evaluations of programs as part of graduate medical education primarily focus on the resident experience. A review of the literature found one study which assessed patient satisfaction (35), but none that more deeply explored the patient experience. In particular, there has been a noted lack of research into the association between educational and patient outcomes and there has been a call for research in this area (49). As one author writes: “In particular, more explicit determination of the association between educational outcomes and patient outcomes remains an important challenge”. There is significant room for exploration of these issues, particularly “[articles that] link educational interventions to patient outcomes can better inform educational practice” (49). Even the assertion of an improved physician-patient relationship after home visits, while widely accepted, relies on largely anecdotal evidence. The development of interventions that have the potential to augment patient-resident relationships is particularly important given the high rates of resident provider turnover and challenges to maintaining continuity with patients in graduate medical education (50-52). Demonstrating that

integrating home-based care into graduate medical education is not only important for the residents, but also could have significant positive impact on their patients, could provide the impetus for more programs to incorporate home-based care into their training.

Burnout and Graduate Medical Education

Burnout is an ongoing, historically underrecognized problem in graduate medical education. Estimates of prevalence are wide ranging- anywhere from 18% to as high as 82% (53). One review in 2007 found that less than 1% of burnout literature focuses on medical residents (53). While this has been a growing area of focus over the last decade, it still remains an area requiring significant attention. Burnout has been associated with depression and suboptimal patient care (54, 55). Successful interventions addressing burnout have focused on control, defined as influence over work environment, clinical meaning, defined as "satisfaction with clinical & human aspects of patient care" and self-awareness, defined as the "ability to pay attention on purpose, in the present moment and non-judgmentally" (56, 57). Additionally, more recent research has found that certain coping strategies are potentially protective against burnout in medical residents. These include active coping i.e., trying to do something to address problems when they arise, and acceptance i.e., being able to accept a situation and live with it (58). As a result of the high rates of burnout, there has been a recent call for action regarding wellbeing in graduate medical education and strategies for mitigating burnout are under investigation (59).

Home visits offer a possible opportunity for mitigating burnout among residents. Physicians who conduct home visits report higher levels of practice satisfaction (6) and opportunities to develop more satisfying relationships with patients (7-9), both of which

are components of 'meaningful work', which is suggested as a mitigator for burnout (56, 60). Additionally, an association has been suggested between patient-centered orientation among physicians, such as increased empathy and attention to a patient's psychosocial context, and improved wellbeing (57, 61). This suggests that if home visits improve patient-centered orientation, they could also contribute towards improved resident wellbeing. Bringing this together points to home visits as a possible mechanism through which to address burnout in residency- or at least to build characteristics in residents, which might mitigate burnout. Improving practice satisfaction, building more satisfying relationships and all together improving resident feeling of 'meaningful work' could be powerful strategies by which to contribute to improved resident wellbeing, and thereby might be another important motivator for incorporation of home visits into IM residency curricula.

Conclusion and Next Steps

While outcomes from home-based care integrated into residency education are overwhelmingly positive, the evidence is still not strong. Much of it is anecdotal, and when there are formal evaluations they often focus on resident experience and satisfaction, and tend to be focused on longitudinal home-based care or transitional care experiences. There is likewise little research into the long-term impact on residents and how these programs impact future patient encounters. In addition, programs vary significantly in design. There is wide variation in length of home-based care involvement, patient contact hours, and which patients are targeted for home visits (e.g., high utilization vs homebound vs all) (37). Exploring these aspects of effective program

design could provide important information to residency programs looking to incorporate aspects into their own educational experience.

Additionally, the patient perspective from these programs is glaringly absent. Given the established positive effects of longitudinal home-based primary care, and more mixed outcomes from integrated/mixed programs, understanding the way that patients experience such a program is an important consideration. Successfully linking graduate medical education outcomes with patient outcomes, or at least improved patient experience could be a valuable argument for implementation of such programs, and a response to the call for such interventions (49).

The Yale Primary Care Internal Medicine residency program (YPC) home visit program started in 2012 as a series of day-long ambulatory education sessions focused on the hospital-to-home transition. Teams of 2-3 residents +/- an attending physician conducted home visits on recently discharged patients. The focus was on medication reconciliation and identifying action items to prevent readmission. Initial informal patient evaluations indicated that the visits were universally well received with key themes including increased patient comfort, doctors demonstrating care and concern, and increased time and availability of the physician during the visit (62). Additionally, there were unprompted requests by patients to repeat the visits. Growing out of this experience, a resident needs assessment indicated a desire to receive more training in home visits and that residents felt that patients on their panels would benefit from home visit opportunities. The needs assessment also revealed residents' desire for an interdisciplinary team to be engaged in the visits - particularly to include a visiting nurse, pharmacist, and/or social worker. Thus, a two-week elective was added in 2013 and subsequently grew in popularity, enrolling 2-6 residents per year (62).

Starting in the 2015-16 academic year, YPC incorporated required home visits for all PGY-1 and PGY-2 residents in addition to the optional two-week elective. Each resident engages in at least 4 half-day home visits during their training: PGY-1s are supporting team members (with a PGY-2, pharmacist, and faculty supervisor); PGY-2s lead the team, selecting patients to visit from their continuity clinic panels. In accordance with Centers for Medicare and Medicaid Services (CMS) guidelines for physician home visits, the patients are required to have a specific issue that must be addressed in the home (63). Aside from this direction, PGY-2s are free to choose whichever patient from their panel they desire. These visits aim to build unique clinical skillsets and enhance education about the role of psychosocial determinants of health. This research project sought to evaluate the feasibility of integrating one-time primary care home visits into an IM residency curriculum, as well as exploring the impact for residents on educational goals and wellbeing, and the impact on patient clinical care experience.

Purpose

This project had several objectives. The primary objective was to explore the impact of one-time primary care home visits as an educational intervention for resident trainees and as a clinical experience for patients. In order to achieve these objectives, this project sought to describe the experiences of both sets of stakeholders and to shed light on how their experiences might intersect and inform one another as synergistic educational and clinical interventions. Additionally, as part of understanding the resident perspective, this project provides insight into the patient population that residents selected for home visits, when given relative flexibility to choose any patient who they feel would benefit.

Methods

Setting and Participants

The Yale Primary Care Internal Medicine Residency Program is a three-year program which trains 18 residents per year in a large university-based hospital system. Residents who were eligible to participate in the study were those who had their continuity clinic in a hospital-based primary care center (the Yale New Haven Health Saint Raphael's Campus Adult Primary Care Center [SRC-APC]), which sees >15,000 visits per year and provides care for the medically underserved community members of New Haven.

Program Description

The YPC Home Visit program is embedded within a three-year Community Engagement Curriculum (64), with additional components that focus on physician advocacy skills and community engagement through a cultural humility lens. As part of the YPC Home Visit program, each YPC resident who has their continuity clinic at the SRC-APC engages in at least 4 home visits during their training, functioning as a supporting team member in the PGY-1 year, and as team leader in the PGY-2 year. The program goals include the development of increased understanding of the impact of psychosocial determinants of health, and skills for providing home-based care.

A YPC attending joins the team to supervise the visit; in addition to the director of the Home Visit program [TLR], other faculty who rotate through this role include YPC Chief Residents and YPC core faculty who have experience and specific interest in home-based care. A pharmacist rounds out the team, helping to evaluate the patient's medication list in advance and assisting with medication reconciliation and education

during the visit. In addition, pharmacy and/or medical students who are rotating at the SRC-APC may also join the team and if the patient has a visiting nurse, they are invited to join the team in the home as well.

As team leader, the PGY-2 is responsible for selecting a patient from their continuity panel. In accordance with CMS guidelines for physician home visits, the patients are required to have a specific issue that must be addressed in the home (63), but PGY-2s are otherwise given no objective selection criteria. Before each visit, PGY-2s call the patient to ask if the team can visit them at home and to share with the patient why they think the visit will be beneficial.

Prior to the visit, all trainees are provided with background reading on home visits, as well as a standard home visit template. On an alternating schedule, sessions include either pre-visit didactics on the logistics of delivering home-based care, or group reflection on past visits. All sessions include pre-visit team planning. Safety issues are also discussed: home visits are always done in groups and the team reserves the ability to stop the visit at any point if anyone is uncomfortable. After the visit, the faculty member conducts a team debriefing and the PGY-2 is responsible for documenting the visit in the medical record. Since the faculty member is present during the visit and patients are chosen in accordance with CMS guidelines, these are billable encounters; if the team is joined by a visiting nurse, however, the program does not bill for those sessions in order to encourage collaboration, as a visiting nurse and a physician are not able to bill for a home visit on the same day. From a faculty effort perspective, these sessions are counted toward the required number of clinic sessions.

This study was determined to be exempt by the IRB at Yale University (protocol # 1606017981).

Qualitative Design

A qualitative design was used to allow for a broader and richer understanding of the patient and resident experience and to identify areas for future quantitative analysis of impact. Semi-structured interviews were used to elucidate and describe the resident and patient care experiences. This was supplemented with a chart review process that focused on socio-demographics, healthcare utilization, and co-morbidities and was used to characterize the patient population. A secondary quantitative analysis was also done comparing patients who received home visits to a control population from clinic in order to better understand which types of patients residents choose for home visits.

Instruments

After a thorough review of the existing literature, informational interviews were conducted with stakeholders to inform interview guide development. These included leadership from the YNHH Patient Experience Council, a member of the YNHH Patient and Family Advisory Council and Yale Primary Care residency program leadership. Input from these stakeholders was then used to craft interview guides to direct semi-structured interviews (Table 1). Interview guide development was an iterative process and continued to be shaped throughout the project and informed by early interviews.

A chart review was also done and sociodemographic and healthcare utilization data was abstracted by [AR]. Sociodemographic data included gender, race, age bracket, ethnicity (Hispanic vs non-hispanic), preferred language, insurance type, and family information (marital status, children). Healthcare utilization data included the number of primary care visits, hospitalizations, ED visits, phone calls/emails/letters, and other medical encounters in the year prior to the home or office visit (depending on the group).

Patient interview guide topics	Provider interview guide topics
1. Logistics of the home visit 2. Feelings during the home visit 3. Comparison of home visit and prior office visit 4. Impact on patient-provider relationship	1. Logistics of selecting patients 2. Logistics of home visit 3. Impact on patient-provider relationship 4. Home visits as a part of residency training 5. Impact on feelings of burnout

Table 1: Overview of topics included in interview guides

The Charlson Co-Morbidity Index was used to evaluate charts for patient co-morbidity status. Co-morbidity was evaluated using both the original index (65) and an adapted index developed in 2008 to predict costs of chronic disease in primary care patients (66). The original index includes a wide range of conditions including cardiac, renal, neurological and neoplastic, among others, and uses a weighted scoring to assign a comorbidity score. This score was originally developed to predict risk of patient death (65). The index has been used widely, including in a recent study evaluating patient outcomes in a Medicare home visit program (27) and was chosen for the current study to provide a known comparison point for prior or future research. The adapted index adds depression, hypertension, skin ulcers/cellulitis, and use of warfarin to the original index in order to predict total annual healthcare costs for patients of differing co-morbidity levels.

Collection

Semi-structured interviews were conducted by [AR] with YPC residents who had participated in home visits during AY2014-16 (n=9/35, 26% completion) and with the visited patients (n=10/21, 48% completion). Residents were recruited via email (two emails were sent to graduating residents and four emails were sent to current residents) and interviewed from July-Sept 2016 by [AR]. Interviews were 30-60 minutes in length and occurred in person in a location and at a time of the resident's choosing to maximize their comfort level and confidentiality. Eligible patients were sent an introductory letter about the study and received a follow up recruitment call. They were then interviewed from Aug-Oct 2016 by [AR]. Interviews were 20-45 minutes in length and occurred over the phone at a time of the patient's choosing. A phone interpreter was used for patients who did not speak English as a first language. For two patients who were unable to complete an interview, interviews were conducted with first-degree family members who were present at the time of the home visit.

Additionally, during interviews with residents one hypothesis that emerged was that they often chose patients who were medically complex or for whom there was a piece of their health status that the resident didn't fully understand such as multiple readmissions or uncontrolled chronic illness. We quantitatively tested this hypothesis about which patients were chosen for home visits by comparing characteristics of the home visit patients and a control population. Each home visit patient was assigned five randomly chosen control patients who had been seen in clinic by the same resident on the 10 clinic days preceding the home visit. Patient and control charts were reviewed retrospectively by [AR] for socio-demographics, healthcare utilization, and co-morbidities, utilizing the Charlson Co-morbidity Index (CCI) (66, 67).

Analysis

We used a grounded theory approach for qualitative analysis. Interviews were recorded digitally and transcribed by an investigator [AR] and anonymized. For each group of interviews (patients and residents), two investigators independently coded all interviews [AR, TLR]. For each group, initial interviews were used to develop coding frameworks (one each for patients and residents), utilizing an inductive, iterative process. Investigators met regularly to address discrepancies and achieve consensus in the framework. For each group (patients and residents) once thematic saturation was reached, the respective coding framework was applied to all interviews by an investigator [AR]. The coding frameworks were then used to construct a unified concept map of the emerging themes and connections observed between the themes.

Chart review data comparing home visit patients with controls was analyzed using descriptive statistics, chi-squared significance testing, and linear regression analysis.

Results

Home Visit Patient Demographics and Comparison with Controls

Twenty-one home visit patient charts, each with five controls, were reviewed for analysis, for a total of 121 charts (two patient charts were from family members during a joint visit and were treated as one for the purpose of controls). Complete descriptive statistics are shown in Table 2. Compared to controls, patients chosen for home visits were older (mode 70-79 vs 45-54, $p=0.01$), but otherwise had no significant demographic differences (gender, racial or ethnic make-up, and private vs public insurance status). Note that 'public insurance' category includes both Medicare and Medicaid to avoid

confounding with age differences between the two groups. There was similarly no significant difference in healthcare utilization between groups (ED visits, PCP visits, hospitalizations), although patients chosen for home visits trended towards higher utilization in all categories except ED visits (Total HC utilization 17.52 ± 11.05 vs 13.42 ± 13.67, p=0.15) (Figure 2). Most importantly, home visits patients had higher co-morbidity (CCI) scores both on the original index (2.86 ± 1.77 vs 1.33 ± 1.50, p=0.001) and the adapted index (4.14 ± 1.88 vs 2.31± 1.84, p<0.001) (Figure 2). Interestingly, fitting a regression model to the data suggested that dementia and cerebrovascular disease rates were significantly higher among patients chosen for home visits and were potential drivers of the overall difference in co-morbidity levels.

		Home visit N=21 (%)		***Control N=100 (%)***		***P-Value***
Gender	***M***	10	(48%)	43	(43%)	0.70
	F	11	(52%)	57	(57%)	
Age	***15-35***	1	(5%)	13	(13%)	**0.01***
	35-54	5	(24%)	46	(46%)	
	55-74	8	(38%)	35	(35%)	
	75+	7	(33%)	6	(6%)	
Race	***African American***	13	(62%)	57	(58%)	0.92
	White	5	(24%)	20	(20%)	
	Other	3	(14%)	22	(22%)	
Insurance	***Public***	17	(81%)	72	(72%)	0.40
	Private/other	4	(19%)	28	(28%)	

Table 2: Descriptive statistics of patients chosen for home visits and assigned controls

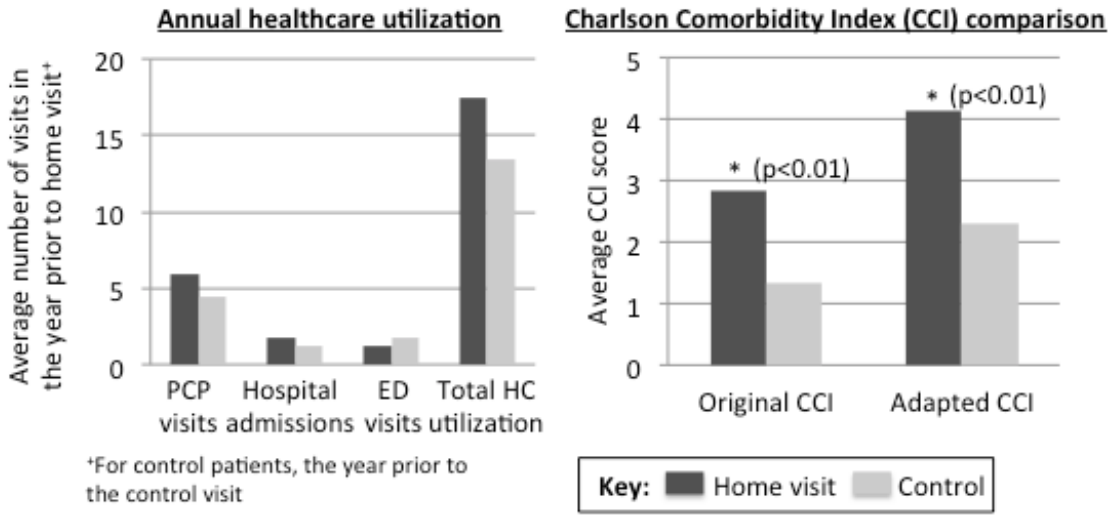


Figure 2: Healthcare utilization and co-morbidity scores of patients chosen by residents for home visits compared to controls

Qualitative Results

As is described above, analysis using a grounded theory approach was used to identify themes and sub-themes from resident and patient interviews (Table 3). Analysis of resident interviews identified three key themes: educational impact, individual patient impact, and burnout impact. Each of these high level themes were made up of several sub-themes which are outlined below. Representational quotes of each sub-theme are shown in Table 4. Analysis of patient interviews similarly identified three key themes: provider relationship impact, communication impact, and resource connections. These were similarly made up of several sub-themes, each outlined below with representational quotes found in Table 5. These themes were then used to construct a unifying concept map, which illustrates primary outcomes of the patient and resident experiences of home visits and mediators of those outcomes. The concept map is shown and described below.

	Theme	Subtheme
Residents	Educational impact	Informing future encounters with other patients
		Exposure to models of care
	Patient impact	Appropriate patients for home visits
		Improving patient-provider relationships
		Informing patient advocacy needs
	Burnout impact	Sense of meaning in work
		Balance of overwhelming and reinvigorating
		Being in the community
Patients	Provider relationship impact	More personal relationships
		Show physician home life
		Reflection of care for patient
		Higher potential for future disappointment
	Communication impact	Relaxed atmosphere
		More time
	Resource connections	Physician as advocate for patient
		Benefit of multidisciplinary team
		Concern that can't do things at the home

Table 3: Themes and sub-themes identified from interviews

Residents

1) Educational impact:

Informing future encounters with other patients: Many residents noted how the things they learned during the home visit would impact their approach to office visits with other patients in their future practice. One resident participant noted: "You're just more aware and open to discussing issues such as access to medicines and nutrition and home environment because you have seen it for yourself" [R-02]. Most often residents

brought up questions that they plan to ask in future interactions after having seen the importance in the patients' homes, such as "[not only] who lives at the home, but also who spends a significant amount of time at the home…there's actually a lot of people in the home that may or may not impact their health" [R-04]. Regarding medication management they brought up, "who helps patients manage their meds, and if it's them how do they organize that" [R-04] or "I'm going to change this med- what are you going to do with the old set of meds that you have at home?" [R-04]. One resident highlighted that it influenced agenda prioritization during short visits, noting: "In a busy clinic visit you have 20 minutes for a patient who really needs an hour you're going to sacrifice the things you don't think are as important….but once you see these issues impact the patient's shortness of breath has much as making the diagnosis of COPD or pneumonia you give more time to those issues" [R-02].

Exposure to models of care: Exposure to home visits as a model of care and a multidisciplinary approach were mentioned as valuable experiences. Residents noted that going on home visits made them "more open to the approach- it's fine to go visit patients in their home" [R-01] and that, "just having exposure to patient care in more settings- I think [sic] just makes our training a little bit more well rounded" [R-05]. Several residents also noted that this model of care really resonated with them and "allowed me [sic] to see that there was a way to deliver the kind of primary care that I believed in" [R-03]. However, of note, one resident had a misperception that they couldn't bill for a home visit like a regular clinic visit. The multidisciplinary exposure was most appreciated as a means to better understand the roles of other providers noting that "it's [e.g., visiting nurses] something we're usually prescribing to patients, so it's good to see the outcome"

[R-02] and that "by seeing what other peoples' roles are, we get a better understanding of what our own roles should be" [R-03].

2) Individual patient impact:

Which patients were most appropriate for home visits: When asked about the reasons why specific patients were selected for home visits, concern about how the patient was managing at home was frequently mentioned, as was a desire to better understand factors responsible for patient's health and/or see how things were done at home. For example the residents pointed to times when "you got the feeling that there was something more. So I thought doing a home visit…would really give us a lot more insight" [R-02]. Particularly, residents mentioned patients who were frequently re-admitted to the hospital or repeatedly presented to the ED and they wanted to better understand why. In other cases, the residents were never able to see the patient in clinic because they were in the hospital so frequently: "I would always get discharge summaries from outside hospitals that he was hospitalized again…and so I felt very helpless in terms of being his primary care doctor" [R-01]. Residents also mentioned more logistical reasons for doing home visits on a particular patient, such as not having enough time in clinic to address their issues due to medical or social complexity, or patients having difficulty getting to appointments.

Improving patient-provider relationships: Residents frequently discussed how the visit enabled them to better understand difficulties that their patients faced (e.g., "able to discover that he's illiterate" [R-03]) and "to have a better context as to who they are as a person and their surrounding community" [R-06]. This in turn allowed them to "make more achievable realistic goals for him [sic] to act on in his home environment" [R-01]

and "tailor my [sic] health advice to something they're actually able to achieve" [R-03]. Similarly increased trust, better rapport, and overall dynamic changes after the visit were mentioned by numerous residents- particularly a move towards more honest or frank discussions at future office visits. For example, one resident noted that after a home visit during future office visits, the overall approach was "much more I know what actually is happening- you know what is actually happening- let's talk about that and see where we can go from there" [R-02]. Residents also mentioned feeling a closer connection, that it "felt like more like she [sic] belonged to me as a patient…even though we really just chatted for half an hour and didn't really do much medical stuff during the home visit" [R-05].

Informing patient advocacy needs: Several residents noted that the information learned during home visits allowed them to be better advocates for their patients. This was primarily mentioned in the context of improving access to services or creating more tailored care plans, for example to provide "concrete recommendations on medication management" [R-01] or "make recommendations on additional stalls, grip handles…to minimize his [sic] risk of falls" [R-01]. However, for two residents the visit gave them specific ammunition to advocate on behalf of patients. For one this was by feeling "more justified in writing a letter to the city saying that she needed handicapped housing" [R-02]. Another resident was able to better understand a patient's illiteracy and how this has impacted his access to care: "I was able to advocate for him as his doctor to the point where I had surgeons consent to do operations…when before they had refused because they were like there's no way he can follow through…" [R-03]. Overall the resident sentiment was: "You get a better sense of what situation they're living in and that also

helps you understand what challenges they might be dealing with or what are the great things about what's in their life" [R-09].

3) Burnout impact:

Sense of meaning in work: Several residents spoke about how going on the home visits reminded them why they went into medicine in the first place and "rejuvenat[ed] [their] belief in primary care" [R-03]. They spoke of how during residency there are "so many stressful things that are keeping you from being able to focus on....help[ing] the individual in front of you" and that home visits allow time to spend dedicated time with patients and "reminds you why you did this" [R-02].

Balance of overwhelming and reinvigorating: Residents commonly spoke about how the visits brought up both feelings of being overwhelmed by all the challenges their patients face (that the residents may not be able to impact), as well as being reinvigorated by learning more about their patients as people, and feeling empowered by the ability they now have to advocate for them. One resident described this balance as: "Even though it was physically draining it was spiritually rejuvenating" [R-03]. However, it was also noted that the sense of being overwhelmed or drained wasn't lasting and didn't outweigh the positives: "It's certainly not a feeling that you're like 'oh I don't want to do this anymore'…because then they come into the office and you just have a different relationship" [R-02].

Being in the community: Several residents mentioned the benefit of just "go[ing] out of the hospital and see[ing] the community so much [sic] of our patients live in" [R-06] and that "just driving through the community or walking through the community to

go to a patient's home…reminds us that we're not practicing in these tiny silos, we're practicing within a community still" [R-09].

Theme	Subtheme	Representative quote
Educational impact	Informing future encounters with other patients	*You're just more aware and open to discussing issues such as access to medicines and nutrition and home environment…. In a busy clinic visit you have 20 minutes for a patient who really needs an hour you're going to sacrifice the things you don't think are as important. So if they come with shortness of breath you're really going to focus on that and…you may forget to ask, 'Do you even have this inhaler I'm asking if you're using? Do you even know how to use it? How much does it cost for you to get this inhaler?' But once you see [them] impact the patient's shortness of breath as much making the diagnosis of COPD or pneumonia you give more time to [them]. [R-02]*
	Exposure to models of care	*"Just having exposure to patient care in more settings- I think just makes our training a little bit more well rounded" [R-05]* *"[It] allowed me to see that there was a way to deliver the kind of primary care that I believed in"[R-05]* *"By seeing what other peoples' roles are, we get a better understanding of what our own roles should be"[R-03]*
Patient impact	Appropriate patients for home visits	*This is a gentleman who is very engaged and very invested and is not succeeding…. His A1C was out of control…. You got the feeling that there was something more. So I thought doing a home visit where we could have more time, I could see how he injects his insulin, how he does a finger stick, would really give us a lot more insight, and it did, so that was helpful. [R-02]*
	Improving patient-provider relationships	*"I've seen her twice in the office since then and it's changed our conversations- so they're much more frank. They're much more I know what is actually happening- you know what is actually happening- let's talk about that and see where we can go from there."[R-02]* *"I think it definitely felt that she felt like more like she belonged to me as a patient…even though we really just chatted for half an hour and didn't really do much medical stuff during the home visit."[R-05]*

	Informing patient advocacy needs	*"It was after that visit I felt much more justified in writing a letter to the city saying that she needed handicapped housing"[R-02]* *"I would say 'Did you know that he's actually illiterate and he has no transportation and so when he doesn't do what you say or when he doesn't show up to his appointment it's not because he's choosing to do that or wanting to defy you, it's because he cannot follow through on the instructions that you gave him so we have to work within his limitations'…I was able to advocate for him as his doctor to the point where I had surgeons consent to do operations…when before they had refused because they were like there's no way he can follow through…" [R-03]*
Burnout impact	Sense of meaning in work	*Most people that are going into medicine they start out at least before they're burned out…you want to help the individual in front of you…you just have so many stressful things that are keeping you from being able to focus on that and when you get this opportunity to dedicate a morning to a patient- sit there on their couch, talk to them about things that are important to them, challenges they have- it reminds you why you did this. [R-02]*
	Balance of overwhelming and reinvigorating	*"Even though it was physically draining it was spiritually rejuvenating" [R-03]* *"It's certainly not a feeling that you're like 'oh I don't want to do this anymore'…because then they come into the office and you just have a different relationship."[R-02]*
	Being in the community	*Just driving through the community or walking through the community to go to a patient's home…reminds us that we're not practicing in these tiny silos, we're practicing within a community still. [R-09]*

Table 4: Provider themes and representational quotes from interviews.

Patients

1) Provider relationship impact:

<u>*More personal relationships*</u>: Patients felt that having their doctor in their home allowed them to get to know one another better. One noted: "They know what things are like, how do you live like and it's like they become family" [P-02]. Importantly, this

translated to a better, more comfortable relationship at the clinic and a comfort in calling their provider if they had a problem.

Show physician home life: Patients spoke of how showing their physician their home made them feel like their PCP knows them better - both the things they are proud of and the obstacles they face. Specifically, they mentioned that they felt there were things they could "show him better than tell him [sic]" [P-05]. Additionally, they noted that they could speak more clearly about things at future office visits such as the food in their kitchen or accessibility issues in their homes.

Reflection of care for patient: Many patients mentioned feeling like their PCP visiting their home was a reflection of how much the PCP cares about them and feeling special that their doctor would take time to visit. They stated that it was "nice doctors came into your home. It showed they really cared about you" [P-06] and that it "showed a little concern for me [sic] as a person" [P-07].

Higher potential for future disappointment: For at least one patient, the stronger relationship built through the home visit also led to being disappointed when they weren't able to see the same resident in clinic at their next visit or in the hospital when they were admitted. The patient's daughter noted that she understood that seeing one of a group of providers is part of a resident clinic but still found it "kind of disappointing" [P-21].

2) Communication impact:

Relaxed atmosphere: A number of patients mentioned feeling more comfortable and relaxed at home, that "it didn't seem like a doctor's visit- it just seemed like company- friends- coming over and having a conversation" [P-21]. A couple noted that this translated to being able to "speak a little more freely and a little more openly" [P-07].

The daughter of one patient noted that "she [the patient] was talking to them about how she felt…just to see my mother open up like that it was different" [P-21].

Time: While there was some disagreement, overwhelmingly more patients felt that home visits allotted more time, which allowed them to discuss more things with their doctor and feel less hurried. Patients expressed that, "there's more time at the home visits…[at the clinic] my doctor says we only got this much more time so we got to hurry up" [P-17] versus "[at home] they'll be able to examine you from head to toe, not the same at the clinic because these kinds of things are harder because of the time" [P-14].

3) Resource connections:

Physician as advocate for patient: Numerous patients mentioned that after the home visit it seemed like it was easier to get connected with needed resources such as safety equipment or in-home services such as physical therapy or nursing. For one patient, she felt that being able to show her primary care provider the accessibility issues in her home and the effect of her environmental context on her health really made the difference in getting her into a new apartment.

Benefit of multidisciplinary team: Many patients were aware that the pharmacist checked their medications during the visit. One family member noted the specific benefit of having a pharmacist who could explain medication interactions and really appreciating having the pharmacist and PCP at the visit together, noting: "When they're not together something is always missing…so just to have them in the same place at the same time I got a better understanding of the medications" [P-21].

Concern that can't do things at the home: The main drawback noted by patients and caregivers was a concern that things can't be done at home such as blood work or a

more thorough exam. One patient's family member expressed feeling that, "they didn't do nothing- they didn't examine her or anything. They checked her living environment and the pharmacist looked at the medication" [P-10]. *Of note, the potential for blood draws and immunization protocols have since been added to the YPC home visits.*

Theme	Subtheme	Representative quote
Provider relationship impact	More personal relationships	*"I felt like I got to know her better, I actually realized that…she's the same person [in the office and at home]"[P-02]* *"I would be more comfortable calling now if I have a problem" [P-10]*
	Show physician home life	*I was able to show him where I live and some of the things that I would go through as far as the stairs, and you know, the bathroom... I was able to show him better than tell him. [P-05]*
	Reflection of care for patient	*"I was very excited that he wanted to take the time out to come out- to come out and visit me" [P-05]* *"Instead of going to appointments- it was nice doctors came into your home. It showed that they really cared about you." [P-06]*
	Higher potential for future disappointment	*She gets comfortable with one person and then she has stuff going on and she has to see someone on the team and not Dr. X. So she's looking forward to seeing Dr. X but we get into the office and it's someone on the team….So that's kind of disappointing… [P-21]*
Communicati on impact	Relaxed atmosphere	*"Just to see my mother open up like that, it was different" [P-21]* *"It didn't seem like a doctor's visit it just seemed like company- friends coming over and having a conversation" [P-21]*

	More time	*"There's more time at the home visits…[at the clinic] my doctor says we only got this much more time so we got to hurry up." [P-17]* *"[at home] they'll be able to examine you from head to toe, not the same at the clinic because these kinds of things are harder because of the time." [P-14]*
Resource connections	Physician as advocate for patient	*He was able to see for his self, that ok we have to, we really do have to do this letter and this is dangerous with you living on this second floor and you have to get out. [P-05]*
	Benefit of multidisciplinary team	*"The pharmacist was able to explain exactly what this medication is going to do versus setting off another medication…she can explain the reaction and stuff like that. That was a big help."[P-21]* *"Being able to talk to the doctor and the pharmacist at the same time was interesting because it always seems like when they're not together something is missing."[P-21]*
	Concern that can't do things at the home	*At the clinic they have the opportunity to do more things like blood work. [P-14]*

Table 5: Patient themes and representational quotes from interviews.

Concept Map

The identified themes from both patient and resident interviews can be understood together through a key set of mediating factors (Figure 3) and can be visualized in a concept map (Figure 4). The patient and resident interviews together shed light on a handful of key mindset changes and development of characteristics for residents, which may mediate the relationship between home visits and identified program outcomes.

Residents spoke of how the home visits provided a more holistic view of their patients. This was shaped through an opportunity to form a more personal connection with patients, combined with working as part of an interdisciplinary team that provided a different perspective on the home environment such as a detailed medication

reconciliation or a home safety evaluation. Likewise, the post-visit debrief is intended to reinforce and bring their observations back into the clinical context. Together these may have led residents to a more patient-centered outlook, both at that visit and moving forward, as well as an increased sense of ability and/or ammunition to advocate on behalf of their patients. Additionally, the program included protected time for home visits, which provided space for residents to find a sense of rejuvenation, leading to an increased feeling of meaning in work. For patients, the protected time for a visit with their primary care provider created opportunity to tell about their lives and form a deeper connection, which in turn created increased feelings of openness and comfort.

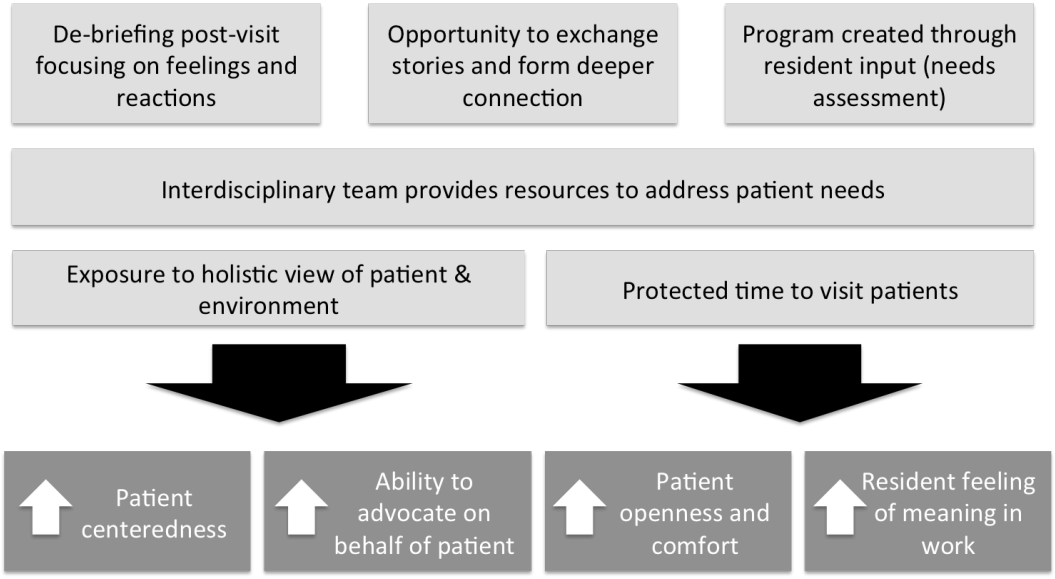


Figure 3: Deep dive into factors mediating relationship between home visits and identified themes

Figure 3 provides a visual depiction of how specific pieces of the home visit program, as described above, can lead to four key mediating components identified through the interview analysis: 1) increased patient centeredness among residents, 2) an increased perception among residents and patients of ability of resident to advocate on behalf of patients, 3) increased patient feelings of openness and comfort with their

physician and 4) for residents an increased sense of meaning in their work. These factors in turn lead to the identified program end outcomes, which are depicted in Figure 4 through a concept map. For residents, these outcomes include an increase in characteristics that have been shown to be protective of burnout such as sense of meaning in work, and a clinically meaningful increase in environmental awareness. For patients, these include increased feeling of connectedness with their physicians and a perceived increase in resource connections.

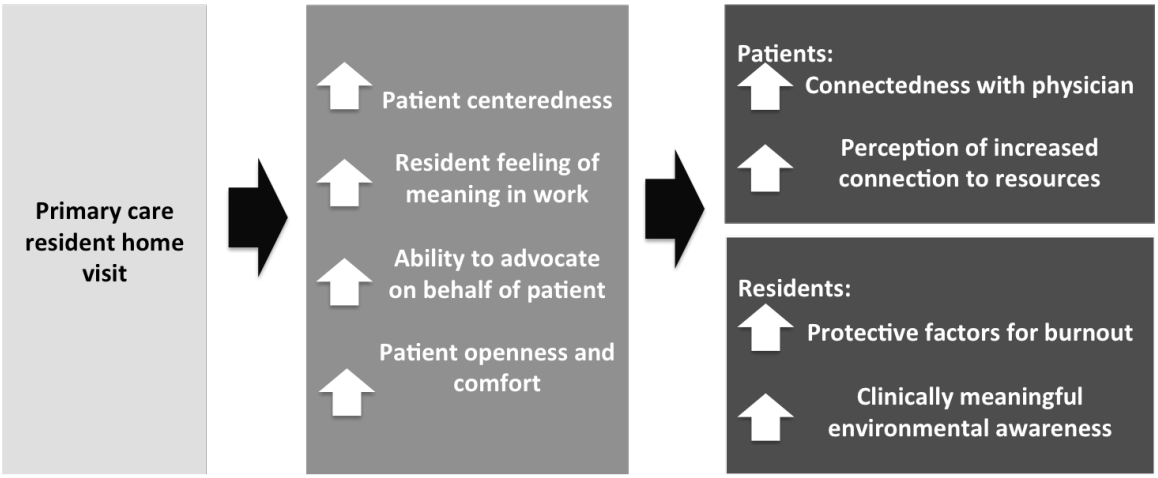


Figure 4: Concept map depicting connection between home visits and end outcomes identified through interviews

Discussion

While home-based care is acknowledged to have many positive benefits for patients (1, 22) and residents (5, 15, 33, 41), it is noticeably missing in Internal Medicine graduate medical education training (32). Further, there is a notable lack of program evaluation that links patient and educational outcomes (49). Finally, the literature on home-based care tends to focus on long term and transitional models, while other mixed or integrated models are less well described (22), particularly for non-homebound

patients. This project adds to the literature by describing one model of incorporating one-time primary care visits into an IM residency program with a focus on patient and resident experience, and the intersection of patient and educational outcomes.

The Patient Experience

Despite the many established medical and QoL benefits of home-based care for patients, there is a paucity of literature exploring the patient experience (68). We found only two recent studies that went beyond measuring patient satisfaction and delved deeper into the patient perspective (68, 69). They found that not only is home-based care preferred over standard office-based care by patients, it is also felt to promote better care, and improves satisfaction and QoL for patients. Patients felt cared for and listened to in a way not experienced at the office and caregivers felt more informed about their loved ones' medical conditions and medications. However, both studies focused on homebound patients who receive all their care at home and did not include trainees in the care delivery. The themes identified in these studies similarly arose in our interviews, confirming these findings and extending them to one-time visits as well as to home-based care delivered by trainees.

Additionally, previous work has found that for patients and caregivers, a key characteristic of high-quality home-based care is access to coordinated interdisciplinary care (70). Our patient interviews similarly identified the value of interdisciplinary care, and that patients felt that after the visit they had greater connection to social services, suggesting that one-time home visits with residents can provide this aspect of high-quality home-based care.

One challenge identified in previous work is patients feeling imposed upon, or like they had to sacrifice their sense of privacy while receiving home-based care (68). One-time visits may be able to overcome this obstacle, as patients opt-in to having the visits. Longitudinal home-based primary care is often provided to homebound patients who would not be able to receive care in the office. This was reflected in an interview with the daughter of one patient when she said that while she would not want her doctor to come to her home, she thought it was good for her mother [P-10]. Future research could explore whether patients feel less imposed upon, or more able to maintain their privacy with one-time visits versus longitudinal/comprehensive home-based primary care.

The Resident Experience

A number of the themes that emerged from our analysis of resident interviews confirmed findings from previous evaluations of home-based care training in residency. These include improvements in knowledge, skills, and attitudes towards home-based care (34), improvements in understanding of their patients' communities and barriers to care and application of this understanding to their future practice of medicine (15, 33, 38). However, our work also builds on these findings in key ways. While residents in a primary care residency are often already primed to think about psychosocial determinants of health and their clinical importance, our findings are unique in highlighting how seeing an individual patient in context can impact prioritization during a busy visit or provide context for difficult interactions. This is a finding not previously reported and suggests that even one visit can have lasting impact on future patient interactions due to an improved, clinically-relevant understanding of patient environmental context.

This work is also novel in suggesting that home visits may increase resident sense of meaning in their work, and thereby increase characteristics that have been suggested as mitgators for burnout (56, 60). Given the recent national focus on physician burnout and resident wellbeing, this suggests home visits as a potential tool to help residents maintain their sense of meaning in their work during training. Importantly, residents acknowledged that the visits can also create a temporary sense of helplessness in seeing their patients' environmental context and the obstacles they face. While this was outweighed by the feelings of rejuvenation, this emphasizes the important role of the post-visit debrief. Likewise, they felt overwhelmed by the amount of work identified to be done post-visit given competing obligations. This might be addressed by providing protected post-visit time to work together as a team to begin addressing the identified issues.

Linking Resident and Patient Outcomes

By evaluating both patient and resident experiences of home-based care, this work is in a unique position to evaluate how educational and patient outcomes may inform one another. Patient interview responses suggested that one-time home visits can be valuable jumping off points for more meaningful and effective clinic relationships. A number of patients noted how the home visit made them feel that their physician cares about them as a person and how it affected their relationship moving forward. As one of the known difficulties of resident clinics is the high rates of turnover and challenges maintaining continuity (50-52), this could serve as a means to build the resident-patient relationship. One program already successfully does this with non-medical visits for interns and found it helped to build trust and established a deeper relationship than they would have had otherwise (38). Of note, interns in the YPC program attend the visit but the patients are

from the panel of the PGY-2. It might be interesting in future work to compare the impact on the provider-patient relationship when the home visit is done during intern year, when the relationship is just being formed, versus during later years, when the resident may already have an established relationship with the patient.

However, an important tradeoff to consider is that when residents form more meaningful relationships with patients there is also more potential to be disappointed when the patient sees another team member in clinic or when the resident transitions care at graduation. One caregiver specifically lamented that her mother had formed such a deep bond with the resident that it was very difficult when she had to see another provider [P-21]. While this in part points to a larger systemic issue with turnover in resident clinics, it also brings to light to a difficult tradeoff, and a potential area ripe for further research.

Understanding which patients might benefit the most from this type of intervention is another area important both for optimizing patient experience and as an educational goal for residents. In interviews residents identified patients who are medically complex as likely benefiting from visits, as there often is not sufficient time and/or information in the clinic to provide effective care. This was supported by the patient demographic statistics, which showed that residents tended to choose patients to visit who were older and had more co-morbidities. Interestingly, residents also mentioned that the feeling that something was missing in their understanding of the patient's health status was important to the selection process (e.g. to explain multiple readmissions). This was reflected in the utilization data that showed a trend towards more hospital admissions in the home visit group than the control group. An important limitation is that the chart

review was only done on utilization within the home hospital system and these patients could have been admitted at another hospital during the examined time period.

Finally, our findings suggest that home-based care training can synergistically improve resident training in, and patient experience of patient advocacy. For residents this was reflected in feeling better prepared to advocate for patients, both for the individual patient they visited and more broadly through an enhanced understanding of psychosocial determinants of health. Correspondingly, patients reported feeling that they received more resource connections and their physician was better able to advocate for them after a home visit. In these ways, the patient and educational outcomes are intrinsically linked and are able to not only inform, but also amplify one another.

Limitations

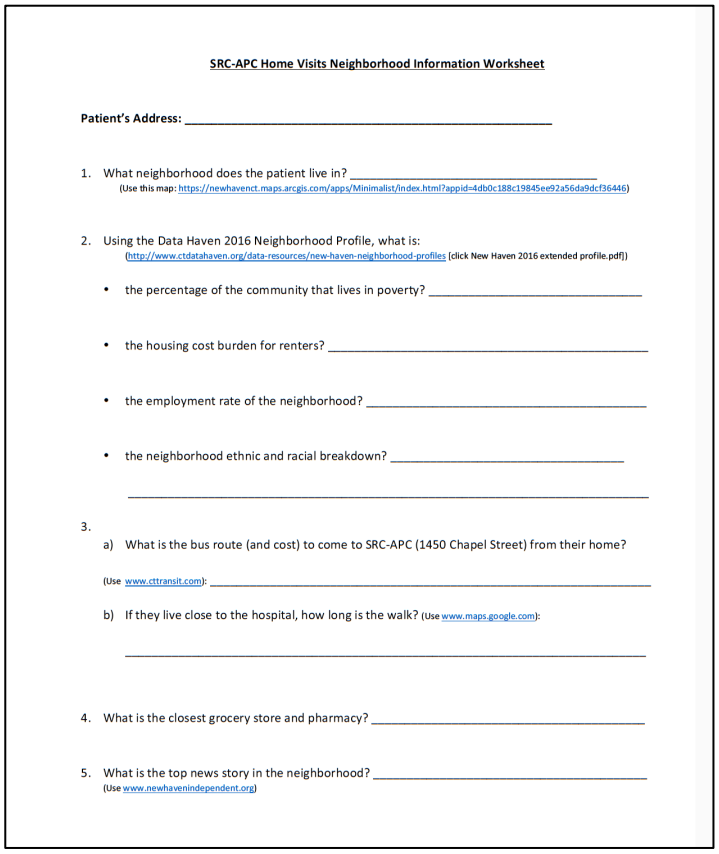
There were several limitations to our study beyond those already mentioned. First of all, the study was done with a convenience sample and the sample size was fairly limited. The program evaluation only focused on the first two years of the program, during which time only a limited number of home visits had been conducted; of those home visits, we only spoke with a quarter of the residents and half of the patients involved. Additionally, as the interviews were done through voluntary recruitment, patients and providers with negative experiences may not have chosen to be involved in the evaluation. Further, as patients chose to opt-in to the experience we didn't speak with any patients who from the outset didn't want their physician visiting them in their home. However, we did speak with one family member who expressed that while she would not have wanted the visit, she was glad to have it for her mother.

Additionally, many of the providers had already graduated and were more difficult to recruit. Of the providers we did speak with, there was a mixture of those who had completed just the elective, those who had completed just the mandatory half-days, and those who had completed both. While this can provide more diversity of perspective, it also makes it more difficult to isolate which experiences and outcomes were as a result of exposure to just the half-day curricular component versus which may require a more immersive experience. Particularly, as some providers mentioned initially feeling overwhelmed, conceivably there could be a dose-dependent relationship whereby initially the experience can be overwhelming, but the more experiences a resident has, the more it is rejuvenating, and the less overwhelming it feels. We did not survey residents on their prior experiences with home visits to be able to control for this, however it is also likely that this effect would rely on visiting a patient known to the resident, who they feel ownership for as a patient, and they would most likely not have had this type of experience prior to residency.

As the program only began in 2015, our evaluation was only able to look at the initial impact of the program and cannot evaluate whether the effects will continue. Further, since the time that the study was conducted, two additional components have been added to the curriculum for PGY-1's and medical/pharmacy students: a) using publicly available sources to gather standard background information about the neighborhood where the patient lives, including economic and health indicators, to share with the team during pre-visit team planning (Figure 5); and b) writing a one-page reflection on the experience, paying specific attention to what was learned about social determinants of health, how this experience differed from a clinic visit, and what else they would want to know about home visits (Figure 6). Additionally, as noted above,

phlebotomy and immunization protocols were added in the 2017-18 academic year with the support of pharmacist colleagues, increasing the potential comprehensiveness of the visits. However, one benefit to doing this evaluation in the first two years of its development is that the residents who participated were not aware of this opportunity when choosing where to train. As such, there is no risk that the resident group was self-selected towards those who were more interested in home visits.

Finally, the research team consisted only of physicians. There was no patient or patient/family advocate representation, which could have added valuable perspective. While patient advocates were consulted in the research project design and interview guide creation, their involvement in conducting interviews and in coding and analyzing the data could have contributed a different and important interpretation of the patient data. We also did not complete participant confirmation of our results, which could have increased the credibility.



SRC-APC Home Visits Neighborhood Information Worksheet

Patient's Address: _____

1. What neighborhood does the patient live in? _____
   (Use this map: https://newhavenct.maps.arcgis.com/apps/Minimalist/index.html?appid=4db0c188c19845ee92a56da9dcf36446)

2. Using the Data Haven 2016 Neighborhood Profile, what is:
   (http://www.ctdatahaven.org/data-resources/new-haven-neighborhood-profiles [click New Haven 2016 extended profile.pdf])
   - the percentage of the community that lives in poverty? _____
   - the housing cost burden for renters? _____
   - the employment rate of the neighborhood? _____
   - the neighborhood ethnic and racial breakdown? _____

     _____

3. a) What is the bus route (and cost) to come to SRC-APC (1450 Chapel Street) from their home?

   (Use www.cttransit.com): _____

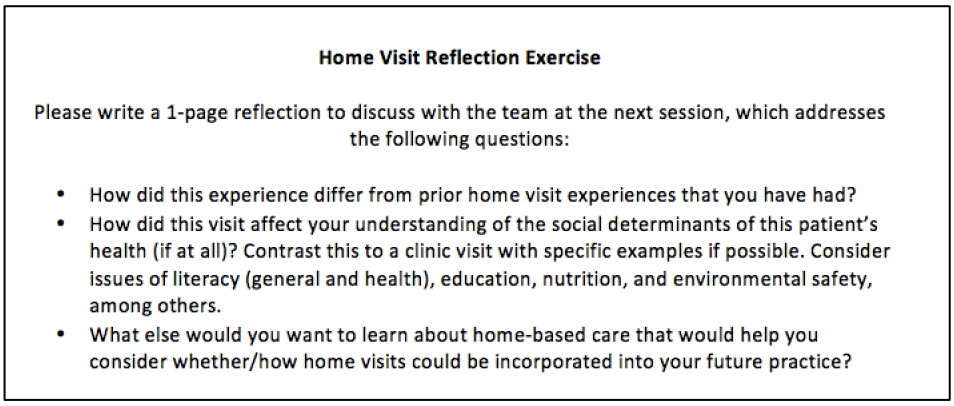
   b) If they live close to the hospital, how long is the walk? (Use www.maps.google.com):

   _____

4. What is the closest grocery store and pharmacy? _____

5. What is the top news story in the neighborhood? _____
   (Use www.newhavenindependent.org)

Figure 5: Neighborhood information worksheet completed by PGY-1s and medical/pharmacy students prior to each home visit



Home Visit Reflection Exercise

Please write a 1-page reflection to discuss with the team at the next session, which addresses the following questions:

- How did this experience differ from prior home visit experiences that you have had?
- How did this visit affect your understanding of the social determinants of this patient's health (if at all)? Contrast this to a clinic visit with specific examples if possible. Consider issues of literacy (general and health), education, nutrition, and environmental safety, among others.
- What else would you want to learn about home-based care that would help you consider whether/how home visits could be incorporated into your future practice?

Figure 6: Reflection exercise completed by PGY-1s and medical/pharmacy students after home visits

Next Steps

Next steps could include quantitative evaluation of the qualitative conclusions found in this project. Evaluating wellness and burnout with trusted and commonly used indices such as the Maslach Burnout Inventory or the Professional Quality of Life Scale could contribute to the literature in a way that is directly comparable to other interventions with similar goals. Likewise, evaluating the educational outcomes in a way that is comparable to other interventions, which may be less time consuming or expensive, may be important in evaluating the cost efficiency of the program. It may also be interesting to consider whether, as mentioned above, there may be a dose-dependent type relationship whereby going on more home visits, resulting in increased resident exposure, may reduce feelings of being overwhelmed.

For patients, considering how their views of and interactions with the healthcare system are impacted by home visits may contribute to the literature on patient experience. Specifically, comparing the impact on the individual patient-physician relationship and trust within that relationship, to the patient's broader view of and trust in the healthcare system may be interesting. Additionally, looking at changes in utilization or cost may be helpful in providing a financial case for investing in home-based care in residency training.

Looking at the longitudinal outcomes and impact of the program is another possible area for future work. Qualitative evaluations of resident and patient reflections a year or more after the visit could provide useful points of comparison, whereas a more quantitative evaluation could elucidate whether there are any objective, long lasting effects from the visits. As noted earlier, no re-evaluations were found of similar programs more than a year out from the experience.

Conclusion

In conclusion, as time investment and funding are often obstacles to program implementation, this work implies that even infrequent home visit opportunities can be a worthwhile addition to residency training. For residents, they can have educational effects that last well beyond the time of the visit and reach much deeper than the individual patient relationship. Resident wellness and patient relationship continuity are frequent areas of focus in residency program development and home visits have the potential to contribute on both fronts. For wellness, this would be via increasing feelings of meaning in work, and for relationship continuity, by providing a protected time to develop and strengthen the patient relationship.

For both residents and patients, home visits can lead to more effective and efficient office visits moving forward, and a deeper and more direct relationship. In-office conversations after the home visit often start from a place of mutual understanding and can draw on a shared experience. Further, both felt that the visits augmented residents' ability to advocate on behalf of their patients. For patients the visits were a way for them to show their doctor another piece of their life, and made them feel cared for in a way that stayed with them even months later. Sample size and potential selection bias were the primary limitations to the study.

As a whole, this work suggests significant potential for educational benefit from home visits as part of IM graduate medical education, use as a strategy to increase sense of meaning in work and thereby potentially contribute to resident wellness, and impact on patient care experience from even a one-time visit. Further studies may assess the long-term impact on resident clinical practice and wellness, and could consider evaluating how home visits impact patient interactions with the healthcare system.

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