

Urban Patient Navigator Program Associated with Decreased Emergency Department Use, and Increased Primary Care Use, among Vulnerable Patients

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Abstract

Background: Receiving non-emergent care in the Emergency Department (ED) setting may disrupt continuity of care, may lead to less effective preventive care, and often contributes to overcrowding. Community Health Worker (CHW)-driven patient navigator programs that connect patients to primary care are a promising approach to enhance quality of care for patients and to reduce preventable ED utilization.

Methods: Between July 2010 and June 2011, CHWs delivered services to 5,154 predominantly Spanish-speaking patients within 3 large, urban EDs. An evaluation was conducted to determine whether patient navigation services were associated with decreased ED visits or increased primary care visits. Clinical and administrative data were used to compare the mean number of visits 12 months before and 12 months after navigation.

Results: Eighty-six percent of patients who presented without a primary care provider had a primary care appointment scheduled upon discharge. Among patients with 6-11 ED visits prior to navigation (n=119), the mean number of visits dropped from 7.27 to 3.93 (paired t-test p<0.001). These findings persisted after adjustment for potential confounders including insurance type and age group. Increased use of primary care was concurrent with the observed decreased ED use, although a statistical test of the association between these trends was of borderline significance.

Conclusions: In this population of vulnerable patients who received CHW-driven patient navigation, ED utilization decreased after navigation, particularly among those with highest ED usage. Further research is warranted to determine whether connecting patients to primary care is the driving force behind observed reduced ED utilization and to assess whether there is a concurrent effect on hospital admissions.

Keywords: Emergency department; Public health; Community health workers; Patient navigation; Health education; System navigation

Introduction

Receiving non-emergent care in the emergency department (ED) setting may disrupt continuity of care and lead to less effective preventive care and chronic disease management for patients [1]. It also contributes to overcrowding. From 1997 to 2007, annual ED visits increased from an estimated 94.9 million to an estimated 116.8 million, an increase that is almost double what would be expected given population growth [2]; by 2011, visits increased to 136.3 million visits [3]. Since the economic downturn in 2008, much of this increase was driven by visits funded by Medicaid [4]. The resultant crowding, which affects most emergency departments (ED) but particularly those in metropolitan areas [5,6], compromises the quality of care [5,7], increases costs [8,9], delays treatment initiation [10,11], increases length of stay [10] and contributes to lengthening wait times [12].

Several factors contribute to crowding, including a lack of efficient patient movement through the process of care [13], extensive use of ED services by frequent users [8,9,14], and reliance on the ED for non-urgent or ambulatory care sensitive conditions that could be treated in primary care settings [15-17]. Because such lack of timely and effective access to primary care is a key factor in ED usage [16,18-22], numerous policymakers have called for stronger linkage between community-based health care providers and EDs [6,15].

The Patient Protection Act and Affordable Care Act have focused on care coordination with the goal of reducing avoidable ED use and hospital readmissions [10]. In a recent review of ED care coordination literature, 4 out of 7 randomized studies focused on developing a post-ED treatment plan and obtaining appropriate post-ED care were effective in improving follow-up care and reducing repeat ED visits [11-15]. To date care coordination programs have often used intensive case management or relied upon specialized, highly-paid, clinical staff, such as social workers, nurses and physicians [21-24]. There is evidence in the literature that ED-based navigator programs may be effective in increasing usage of primary care services; however, these

programs do not always observe a corresponding decrease in ED usage [25].

Community Health Workers (CHWs), who are frontline workers with a strong understanding of the communities that they serve, have been shown to bridge gaps in care by helping patients address specific barriers to health care access leading to reduced disruptions in care and, ultimately, improved health outcomes [26,27]. CHWs in primary care settings have been effective in increasing access to care for underserved populations, leading to reduced ED visits and hospitalizations [25,28]. However, the heterogeneity of outcomes has been cited as a limitation of this evidence base [29,30]. There are few ED-based patient navigator programs led by CHWs; and even fewer have demonstrated effectiveness [31]. To address this gap in the literature, an evaluation of a CHW-driven ED patient navigator program in New York City was conducted to determine whether providing lay patient navigator services in the ED setting led to a decrease in ED utilization or an increase in outpatient primary care utilization (with an affiliated patient-centered medical home program [32]). To provide needed explanatory support for overall findings, the evaluation also examined whether these changes were concurrent.

Methods

Design

This evaluation employed a pre/post design to compare the number of ED treat and release (T&R) visits in the 12 months pre-navigation to the number of T&R visits 12 months post-navigation, for all program participants served between July 2010 and June 2011.

Setting

The Patient Navigator program, established in 2009, was based in 3 (2 adult, 1 pediatric) Northern Manhattan EDs of New York-Presbyterian Hospital (NYP), and was affiliated with 6 Patient Centered Medical Homes (PCMHs) that were formally recognized by the National Committee for Quality Assurance for meeting specific standards around team-based, coordinated, patient-centered care. The

community district in which NYP is located (Washington Heights, Inwood, and Marble Hill) is predominantly Hispanic and low-income: in 2013, 72% of residents were Hispanic (of any race) and 14.5% were black, 24.2% of families had income below the Federal Poverty Level, and 38.2% were receiving Supplemental Nutrition Assistance Program benefits [33].

Participants

Patients without a primary care provider, without insurance, or who visited the ED more than 1 time in the preceding 12 months were identified in any one of three ways: via a patient status board, health care team referral or event monitoring software. CHWs working as Patient Navigators (PNs) monitored the ED status board to identify patients who were not commercially insured and who had more than 1 ED visit in the preceding 12 months. Any ED staff member could refer a patient who lacked health insurance or who was in need of a primary care physician. To supplement these referral sources, event monitoring software transmitted an email to the PNs identifying any ED patient discharged from the ED who presented to the ED more than once in the past 12 months or who did not have health insurance.

After patients were identified, the PN contacted the patient to describe the program, to obtain oral consent to receive PN services, and to screen for eligibility. During the study period, there were 80,919 patients who met the criteria to receive PN services, and these patients accounted for 112,825 visits. The 5,154 unique patients who received PN services accounted for 10,116 visits, and the 75,765 patients who did not receive PN services, and who served as a comparison group, accounted for 102,709 visits. The comparison group included individuals who were either not screened by the program or refused PN services. Table 1 presents the characteristics of the navigated patients compared to the characteristics of the non-navigated comparison group. The 5,154 patients who received PN services were given appointments in both the affiliated PCMH network (the PCMH subset, n=1,625) and outside the PCMH network (n=3,529). Analyses of post-navigation visits to a primary care provider outside the PCMH network were not studied as part of this evaluation.

Characteristic	Navigated Patients within PCMH Network (n=1,625)		Navigated Patients not in PCMH Network (n=3,529)		Did not receive PN Services (Comparison) ¹ (n=75,765)		Total (n=80,919)
	N	%	N	%	N	%	
Age group^{***}							
<1 year	95	6	101	3	6,468	9	6,664
1-4 years	93	6	114	3	5,852	8	6,059
5-14 years	136	8	202	6	9,973	13	10,311
15-17 years	34	2	81	2	2,999	4	3,114
18-24 years	165	10	658	19	9,585	13	10,408
25-34 years	269	17	697	20	11,169	15	12,135
35-64 years	634	39	1,365	39	22,517	30	24,516

65 years and older	194	12	304	8	7,202	10	7,700
Hospital^{***}							
Allen Hospital ED	361	22	1,174	33	20,055	26	21,590
Morgan Stanley Children's Hospital ED	364	22	583	17	25,153	33	26,100
NYP Columbia Campus ED	900	55	1,772	50	30,557	40	33,229
Gender							
Female	904	56	1,898	54	41,898	55	44,700
Male	714	44	1,598	46	33,866	45	36,178
Primary language^{**}							
English	439	27	1,003	28	38,736	51	40,178
Spanish	955	59	1,921	54	35,342	47	38,218
Others	231	14	605	17	1,687	2	2,523
Payor status^{***}							
Commercial	114	7	414	12	17,092	23	17,620
Medicaid Fee for Service	331	20	597	17	6,501	9	7,429
Medicaid Managed Care, Contracted	538	33	824	23	24,078	32	25,440
Medicaid Managed Care, Non-Contracted	58	4	329	9	5,976	8	6,363
Medicare Fee for Service	144	9	159	5	5,219	7	5,522
Medicare Managed Care, Contracted	51	3	88	2	2,164	3	2,303
Medicare Managed Care, Non-Contracted	9	<1	31	<1	438	<1	478
Other	9	<1	27	<1	1,405	2	1,441
Self-Pay	371	23	1,060	30	12,892	17	14,323
Missing data not presented							
¹ The comparison group excludes patients with a presenting diagnosis and/or chief complaint of psychiatric and/or substance use conditions; with missing data on presenting diagnosis; or with missing data on discharge disposition information. The comparison group includes patients with psychiatric and/or substance use histories or conditions or that are not the chief complaint or presenting diagnosis, patients with no telephone, and patients who refused PN services;							
^{***} Chi-square test p<0.001 for all group comparisons tested (Navigated PCMH vs. Navigated non-PCMH and each navigated group to the comparison group);							
^{**} Chi-square test p<0.01 for all group comparisons tested (Navigated PCMH vs. Navigated PCMH and each navigated group to the comparison group)							

Table 1: Characteristics of Emergency department T&R patients, comparing navigated patients to those who did not receive navigation services.

Intervention

The mission of the PN program was to work alongside the health care team, including providers, nurses, social workers, and care managers, to support patients to best understand, access, and utilize the health care system and to empower patients and their families to achieve optimal care plans. During the study period (July 2010-June 2011), 10 PNs provided an average of 385 hours of service per week, at a total program cost (salary & non- salary) of \$950,000.

PN services included culturally sensitive, customized education about how best to access and utilize the health care system, the scheduling of appointments with a primary care provider (for a consultation or follow-up) or specialist; and follow-up to ensure that the patient understood the next steps and that he/she attended the scheduled appointments. Patients received a minimum of 4 contacts by the PN program: initial screening contact, subsequent contact to schedule the required outpatient appointment, a reminder phone call before the appointment, and a follow up phone call after the date of the

appointment to determine adherence and, if necessary reschedule a missed appointment.

Patients with health insurance were referred to the primary care provider listed on the patient’s insurance card, unless the patient requested a new primary care provider, or to the required specialist accepting the patient’s insurance plan. Patients without insurance were referred to an internal insurance enrollment program.

Data collection

Data associated with the study group, during the study period, was extracted from the Patient Navigator service program data, patient electronic medical records, and the hospital registration and billing database. PNs collected basic health care data from participating patients, including sociodemographic characteristics (age, gender, primary language); health care access (primary care provider, insurance carrier); the type of navigation services provided, and the associated outcome.

For each patient who received PN services, T&R visit data were exported from the hospital’s clinical-administrative database, including: date, ED location, chief complaint, primary presenting diagnosis, current insurance carrier, and discharge status. In addition, primary care data were exported from the ACN-PCMH database, including date, provider, and current insurance carrier.

For the comparison group, the following variables were exported from the hospital’s clinical-administrative database for all patients with a ED T&R visit during the study period: ED location; age group; gender; primary language; current insurance carrier, primary presenting diagnosis of diabetes, congestive heart failure, or asthma, and discharge status. Only aggregate data associated with comparison group characteristics were used; individually identifying patient information were not provided to the investigators.

The protocol for data collection and analysis was reviewed and approved by the Institutional Review Boards at both Columbia University Medical Center and Public Health Solutions.

Primary outcome

The outcome for the primary study aim was a continuous variable, the mean difference between the number of T&R ED visits in the 12 months prior to the index visit and the number of T&R ED visits in the 12 months after the index visit. This outcome was also operationalized as a dichotomous variable, reduction in ED T&R visits after navigation (yes/no); patients with a mean difference of <0.0 were coded as having the outcome.

Secondary outcome

To support the primary study aim a secondary outcome was calculated: the mean difference between the number of primary care visits within the PCMH network in the 12 months prior to the index visit and the number of primary care visits in the 12 months after the index visit. This outcome was also operationalized as a dichotomous variable, increase in visits within the PCMH network after navigation (yes/no); patients with a mean difference of >0.0 were coded as having the outcome.

Statistical analysis

Data analyses were conducted using STATA 10.1 (StataCorp, College Station, TX). First, tabular analyses were conducted to describe the intervention sample. Then, the characteristics of the comparison sample were tabulated and compared to the intervention sample, with Chi-square (for categorical variables) and ANOVA (for continuous variables) tests of differences between the two groups.

The primary outcome, mean difference in ED visits before and after navigation was calculated, along with standard deviations. Analyses were repeated stratifying by characteristics at the index visit, as operationalized in Table 2, including ED location (CHONY; Milstein; Allen); age group (age <18, age 18 or older); gender; payor status; primary language; access to primary care; and frequency of ED use in the baseline period [34] Finally, the secondary outcome, mean difference with standard deviation in primary care visits before and after navigation was calculated, and stratified by the same subgroups.

Characteristic	N	ED T&R		Reduction in visits (Mean n)	
		visits before navigation (Mean n)	visits after navigation (Mean n)		
Overall	5.154	100	096	004	
Hospital	Allen Hospital ED	1.535	084	089	-006
	Morgan Stanley Children’s Hospital ED	947	178	135	0.42**
	NYP Columbia Hospital ED	2.672	082	086	-005
Gender	Female	2.802	106	103	003
	Male	2.312	093	089	005
Age group	Child (age <18 years)	868	174	132	0.42**
	Adult (age 18 and older)	4.286	085	089	-004
Language	English	1.442	109	102	007
	Spanish	2.876	092	09	002
	Spanish/English equally	795	116	108	008

	Others	41	027	071	-044
Payor Status	Commercial	528	069	055	014
	Medicaid Fee for Service	928	086	114	-0.28**
	Medicaid Managed Care, Contracted	1.362	146	118	0.27**
	Medicaid Managed Care, Non-Contracted	387	098	088	011
	Medicare Fee for Service	303	099	108	-010
	Medicare Managed Care, Contracted	139	135	132	003
	Medicare Managed Care, Non-Contracted	40	053	093	-040
	Other	36	025	039	-014
	Self-Pay	1.431	077	076	001
Access to Care	No PCP	2.416	066	082	-0.15**
	Yes, has PCP, but needs new PCP	458	108	087	021
	Yes, has PCP, no changes required	2.258	135	114	0.21**
ED usage at index visit	New user	3.020	0	053	-0.53**
	1-2 visits in baseline period	1.462	134	109	0.25**
	3-5 visits in baseline period	535	367	199	1.68**
	6-11 visits in baseline period	119	727	393	3.34**
	12+ visits in baseline period	18	1,956	1,261	6.94**

Note: Characteristics at index visit (visit at which Navigation services were initiated); PCP=Primary Care Provider; **Paired t-test p < 0.001; *p < 0.01

Table 2: Mean number of treat and release visits to emergency department in 12 month pre-navigation period and 12-month post-navigation period, for all eligible navigated patients, by subgroup characteristics (n=5,154).

To assess independence between changes in ED visits and visits within the PCMH network before and after navigation, the primary and secondary outcomes, using the dichotomous operationalization, were cross-tabulated, and tested for significance using McNemar tests, with alpha set at 0.05. These analyses were restricted to those patients in the PCMH subset with any visits to the ED in the baseline period (n=781); analyses were repeated separating adults (n=543) from children (n=238) [data not shown].

To take into account the possibility that characteristics associated with ED usage may not be independent, binary logistic regression was used to model the dichotomous primary outcome, reduction in treat and release ED visits after navigation, among patients who had any ED treat and release visit prior to navigation (n=2,134). A regression model was run, adjusting for payor status; language; age group; and baseline ED usage. The regression model was repeated among the PCMH subset with any ED visit in the baseline period (n=781 total), adjusting for the same covariates as well as any increase in visits within the PCMH network post-navigation (yes, no [ref.]) [data not shown].

Results

Characteristics of study group

The 5,154 patients who received PN services were predominantly Spanish-speaking adults who were uninsured or insured by contracted Medicaid managed care plans (Table 2). Compared to patients seen in the ED during the same time period who were not in the PN program, navigated patients were statistically significantly older, more likely to have a primary language other than English, and less likely to have commercial insurance.

Impact on ED utilization

Overall baseline ED utilization was low but there was significant variation in the number of pre-navigation visits by subgroup (Table 3). The majority of adults (n=4,286), (62%) had no ED T&R visits in the year preceding the index visit, but there were some patients who had high usage before navigation: 10% of adult patients (n=430) had 3 or more ED T&R visits before navigation, including 1.4% (n=63) with 6-11 visits in the year before navigation, and a small subset (<1%, or n=13) with 12 or more visits (average of 21.62 visits) in the baseline period [age-group specific data not shown in Table 3].

Characteristic		N (N=2,134)	All patients (N=2,134)	
			AOR (95%CI)	p-value
Age group	Age 18 and over (adult)	1638	Ref.	---
	Age <18 (child)	496	1.07(0.84, 1.35)	0.5927
Language	English	604	Ref.	---
	Others	8	1.13(0.26, 4.81)	0.8713
	Spanish	1132	0.94(0.76, 1.16)	0.5597
	Spanish/English equally	390	0.75(0.57, 0.99)	0.0415
Payor Status	Commercial/Other	191	Ref.	---
	Medicaid Fee for Service	337	0.64(0.44, 0.94)	0.0241
	Medicaid Managed Care, Contracted	754	0.69(0.49, 0.98)	0.0365
	Medicaid Managed Care, Non-Contracted	179	0.87(0.56, 1.35)	0.5235
	Medicare Fee for Service	132	0.63(0.39, 1.02)	0.0592
	Medicare Managed Care, Contracted	70	1.09(0.59, 2.03)	0.7855
	Medicare Managed Care, Non-Contracted	12	1.02(0.29, 3.6)	0.9728
	Self-Pay	459	0.94(0.65, 1.37)	0.7518
Baseline ED usage	1-2 visits in baseline period	1462	Ref.	---
	3-5 visits in baseline period	535	2.92(2.3, 3.7)	<.0001
	6-11 visits in baseline period	119	3.10(1.93, 4.98)	<.0001
	12+ visits in baseline period	18	4.21(1.21, 14.71)	0.0243

Table 3: Logistic regression model of a decrease in ED T&R visits from before navigation to after navigation, among eligible navigated patients who had any visit in the ED during the baseline period, total and by age group (n=2,134).

Children (age <18, n=868) had a higher average number of visits in the pre-navigation period than adults (1.74 vs. 0.85 visits), with some subgroups having high average number of visits pre-navigation: infants (age <1 year, 1.94 visits), children age 1-4 (2.29 visits) and children whose index visit was covered by Medicaid managed care (2.14 visits) – the payer source for the index visits of 45% of the children in the sample. More than a quarter of the navigated children had 3 or more ED T&R visits in the year pre-navigation: 21% (n=181) made 3-5 visits, 6% (n=56) made 6-11 visits, and <1% (n=5) children had 12 or more visits [age-specific data not shown in Table 3].

A statistically significant decrease in the average number of ED T&R visits was observed among patients whose index visit was covered by a contracted Medicaid Managed Care plan (1.46 to 1.18 visits, p <0.001) and among children (1.74 to 1.32 visits, p <0.001). Significant decreases were observed for nearly all subgroups of children, particularly subgroups with higher baseline ED visits: children whose

index visits were covered by contracted Medicaid managed care (2.14 to 1.52 visits, p<0.001; data not shown in table). Notably, no decreases in ED visits were observed for infants (age <1 year) after navigation (1.94 vs. 1.96 visits, p=0.91; data not shown), but significant decreases were observed for children age 1-4 years (2.29 to 1.55 visits, p <0.001; data not shown).

Substantial, statistically significant decreases were observed among the more frequent users of the ED in the pre-navigation period (Figure 1). Among patients who had any visit to the ED before navigation (n=2,134), the largest reductions in ED visits after navigation were observed among the most frequent baseline users of the ED. Patients who had 3-5 ED T&R visits in the year before navigation (n=535) had, on average, 1.68 fewer visits in the year after navigation; for those with 6-11 visits before navigation (n=119), the average number of visits declined by 3.34 visits in the year after navigation.

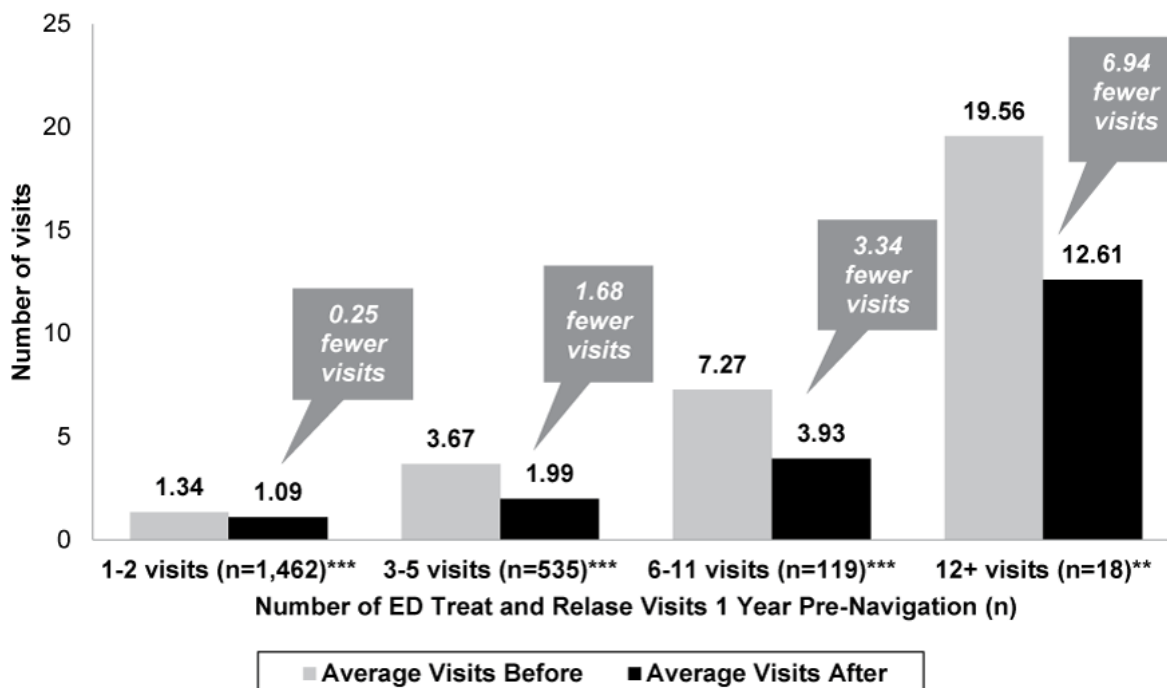


Figure 1: Magnitude of decrease in ED treat and release visits following navigation, among patients who had any visit to the ED before navigation, by level of baseline usage (n=2,134); ***Paired t-test significance test of within-person difference before and after navigation, $p < 0.001$; ** $p = 0.003$.

Because reductions in ED usage after navigation were observed for some subgroups, including among children, frequent users, and among patients with specific insurance coverage, adjusted analyses were conducted to control for the overlap among these factors (that is, that children had higher levels of baseline usage of the ED, and were more likely to be covered by specific insurance carriers). A logistic regression model was conducted (among all patients who had any visit to the ED before navigation [n=2,134]) to control for these overlapping factors. In the adjusted analyses (Table 3), baseline ED usage remained as the strongest predictor of a decline in ED usage after navigation. In these adjusted analyses, age group was no longer a significant predictor of reduced ED treat and release visits.

Linkage to primary care

Almost all (94%) navigated patients had at least one appointment scheduled by the PN upon discharge (Table 1). Among patients who had no primary care provider (n=2,419), 86% patients had an appointment scheduled with a primary care provider upon discharge and 53% were referred to an internal insurance enrollment resource.

In the subset of patients who were associated with the ACN PCMH network, decreases in ED usage were concurrent with increases in primary care usage in the post-navigation period. As shown in Figure 2, among adults in the PCMH subset (n=1,262), while there was no significant change in ED usage after navigation, the average number of visits in the PCMH network increased (1.64 visits to 2.96 visits, $p < 0.001$). Among children associated with the ACN PCMH (n=363), a statistically significant decrease in average ED T&R visits (from 2.18 visits to 1.72) was concurrent with an increase in primary care visits

(from 2.42 visits to 3.26). The independence of these two trends was tested for patients in the ACN PCMH subset who had at least one ED visit in the baseline period (n=781 of the 1,625): In total, 32.9% of the 781 patients had both an increase in primary care visits and a decrease in ED visits; McNemar test, a within-person test of independence, was of borderline statistical significance ($p = 0.0506$).

Discussion

The purpose of this study was to examine the impact of a CHW-driven, ED-based patient navigation program on patient ED utilization. Findings demonstrate that patients who had frequent ED T&R visits before navigation had significantly fewer visits in the year after navigation. Among the 535 navigated patients who had 3-5 ED visits in the year pre-navigation, on average, the number of visits decreased by 1.68 visits in the year after navigation – a difference of 898 visits within this subset alone.

In a subgroup analysis of patients with low access to care, post-navigation decreases in ED T&R visits were not observed. Underinsured patients were not heavy users of the

ED before navigation, consistent with findings from other studies [35]. The findings in this evaluation are similar: among both adults and children, those whose index visits were self-pay (not insured), and those who had no primary medical provider all had, on average, less than 1 ED T&R visit in the year before navigation. The navigated patients were linked to primary care, an essential step in addressing gaps in care. Overall, 73% of patients had a visit scheduled with a primary care provider. This is higher than the 51% of patients who

were linked to care observed in an ED-based intensive case management program [27].

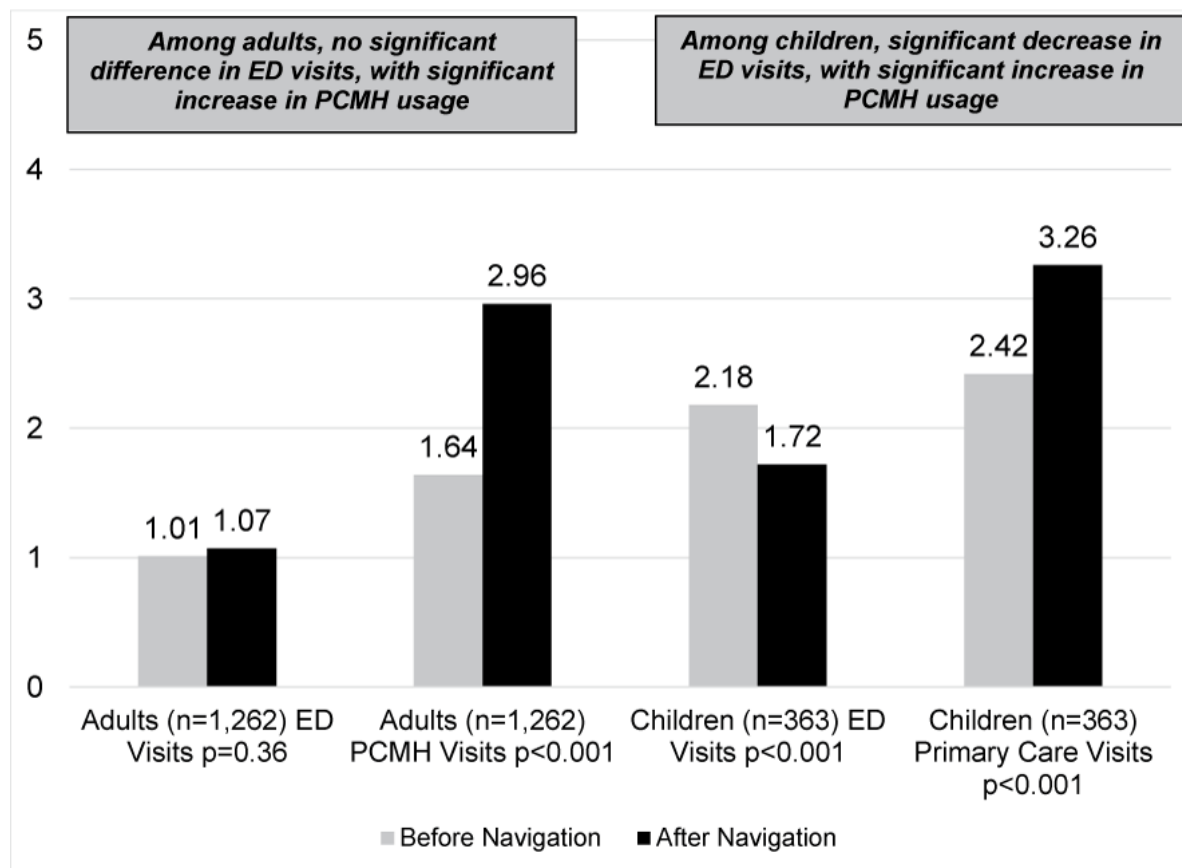


Figure 2: Changes in average number of emergency department (ED) and patient-centered medical home (PCMH) visits before and after Navigation services, among PCMH subset, by age group (age 18 and over, age <18) (n=1,625).

The observed ED usage decreases were concurrent with increases in usage of primary care within the PCMH, and tests of independence for these two changes were of borderline statistical significance.

Limitations

Despite the promising outcomes associated with the evaluation, and potential for further study, there are some limitations that warrant consideration. First, patients who received PN services are, by definition of the eligibility criteria for the program, systematically different from patients using the ED who do not meet eligibility criteria. By design, the sample (as shown in Table 1 and corresponding technical notes), includes more patients who are uninsured or underinsured, and excludes those patients with certain presenting conditions (including mental illness and substance use diagnoses). In the absence of a randomized control group or a comparison group for whom outcome data were available, the pre/post study design did not mitigate against internal selection bias and subsequent associated patterns such as regression to mean. This analysis relied upon exported clinical and administrative data, and medical data captured in use of administrative databases has been shown to have low reliability [36].

The available data in this study included only the primary presenting complaint diagnosis, not the prevalence of underlying ambulatory care-sensitive medical conditions (such as asthma or diabetes), conditions that, while not representing a large proportion of ED patients, may be most responsive to linkage with a PCMH [37]. The prevalence of PCMH priority presenting primary diagnosis [32] was low: 1% of the sample overall presented with a primary diagnosis of diabetes, <1% for congestive heart failure, and 2-3% for asthma, and there were no significant difference in these presenting diagnoses between those who did and did not receive PN services (data not shown in table). Further investigation is needed to elucidate which subgroups, as defined by health status and morbidity status, can most effectively be served with patient navigation by CHWs and to identify patients who may need more intensive case management.

Despite these limitations, however, the analysis has significant strengths including a large sample size of more than 5,000 patients and broad time period – a full two years of observation for each person in the dataset at three inter-related emergency departments. With the availability of numerous covariates, the analysis was also able to conduct analyses with sufficient statistical power to control for confounding factors such as insurance status, primary language, and

age. Most importantly, the present study was able to examine, at the individual level, changes in utilization of both ED and primary care.

Conclusions

The healthcare system can be challenging to navigate for all patient but especially those who are uninsured, living in poverty or have limited English proficiency or limited health literacy [38-42]. CHWs working as PNs in the ED can help bridge gaps in care by working as part of the health care team to provide culturally sensitive support, education, and connections to clinical and social resources for patients who are not well established with primary and specialty care, potentially addressing health care disparities [43-45]. A recent systematic review of interventions to reduce ED utilization found that patient education interventions showed the largest magnitude of effect [46]. The strong effect observed among the patients with highest use of ED care before navigation, an indicator of poor access to care, suggests that programs to link patients who have high ED utilization (regardless of insurance status) show the greatest promise for improving access to care[47].

While the present study found concurrent decreased ED usage and increased usage of primary and specialty care through the affiliated ACN, and statistical testing suggested these two trends may be related, the lack of data on care utilization outside the affiliated network limits the present study's ability to quantify the extent to which linking patients with primary care was the driving force. Despite this limitation, this study provides promising findings that suggest that a CHW -driven patient navigator program can impact the way that patients utilize the health care system. Given the decreases in ED utilization (particularly among the highest baseline users) observed in a program that deployed lay CHWs and given the dearth of evidence on the cost effectiveness of community health worker interventions future research should quantify the cost effectiveness of such interventions [48].

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