Improving Care Coordination and Reducing ED Utilization Through Patient Navigation

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ABSTRACT

OBJECTIVES: Our study examines the impact of an emergency department (ED) patient navigation program for patients in a Medicaid accountable care organization across 3 hospitals in a large health system. Our program engages community health workers to (1) promote primary care engagement, (2) facilitate care coordination, and (3) identify and address patients' health-related social needs.

STUDY DESIGN: Our study was a retrospective analysis of health care utilization and costs in the 30 days following the index ED visit, comparing individuals receiving ED navigation and matched controls. The primary outcome of interest was all-cause return ED visits, and our secondary outcomes were hospital admissions and completed primary care appointments.

METHODS: Patients with ED visits who received navigation were matched to comparable patients with ED visits without an ED navigator interaction. Outcomes were analyzed using fixed effects logistic regression models adjusted for patient demographics, ED visit characteristics, and preceding utilization. Our primary outcome was odds of a return ED visit within 30 days, and our secondary outcomes were odds of a hospitalization within 30 days and odds of having primary care visit within 30 days.

RESULTS: In our sample, there were 1117 ED visits by patients meeting our inclusion criteria with an ED navigator interaction, with 3351 matched controls. ED navigation was associated with 52% greater odds of a completed follow-up primary care appointment (odds ratio [OR], 1.52; 95% CI, 1.29-1.77). In patients with no ED visits in the preceding 6 months, ED navigation was associated with 32% decreased odds of repeat ED visits in the subsequent 30 days (OR, 0.68; 95% CI, 0.52-0.90). There was no statistically significant impact on return ED visits in those with higher baseline ED utilization.

CONCLUSIONS: Our program demonstrates that high-intensity, short-term patient navigation in the ED can help reduce ED visits in those with low baseline ED utilization and facilitate stronger connections with primary care.

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In the United States, approximately 33% of adults and 13% of children enrolled in Medicaid insurance programs report barriers to finding a doctor or delays in receiving care despite having a usual place of care.[1] These barriers include lack of access to non–emergent care settings resulting from physical and economic barriers, as well as issues related to various social factors.[2,3] Medicaid enrollees, in part because of these obstacles, have been shown to use the emergency department (ED) 6 to 7 times more often than privately insured patients.[4]

Traditionally, EDs and systems of emergency care have not been designed to actively address barriers to care, the social conditions underlying many acute presentations, or patterns of frequent utilization for low-acuity conditions. To address these challenges, the ED Navigator Program was created in March 2018 by Mass General Brigham (MGB; formerly Partners Healthcare), a large health system based in Boston, Massachusetts, that provides care for 130,000 Medicaid members and more than 700,000 patients overall enrolled in its affiliated accountable care organizations (ACOs).

The ED Navigator Program was launched at 3 of the 8 general acute care hospitals' EDs within our health system—Brigham and Women's Hospital, Massachusetts General Hospital, and North Shore Medical Center—which were selected by population health management (PHM) leadership. Supported by the system's Medicaid ACO and PHM program, each hospital hired and embedded 1 ED navigator, a layperson with experience in the health care or social services sector, into the hospital's ED. The ED navigators serve as part of the ED care team and are tasked specifically with (1) promoting primary care engagement by scheduling a post–ED discharge appointment with a primary care physician (PCP) and addressing barriers to PCP access, (2) coordinating care for patients already engaged in a PHM program and referring patient candidates to appropriate PHM programs, and (3) identifying patients' health-related social needs and facilitating connections to community-based resources. The ED navigators generally approach low- or moderate-acuity patients in person during the discharge planning phase of their ED visit. Their patient interactions are deliberately brief, given the nature of ED flow. Therefore, to be most effective during their

TAKEAWAY POINTS

In this study, patient navigation in the emergency department (ED) was associated with 52% greater odds of a completed follow-up primary care appointment. In patients with no ED visits in the preceding 6 months, navigation was associated with 32% decreased odds of repeat ED visits in the subsequent 30 days.

- Our program engages community health workers to promote primary care engagement, facilitate care coordination, and identify and address patients' health-related social needs.
- Our program demonstrates that high-intensity, short-term patient navigation can help reduce ED visits in those with low baseline ED utilization and facilitate stronger connections with primary care.

encounter, the ED navigators typically review the patient's record, prepare resource materials, and develop an engagement approach based on motivational interviewing and trauma-informed care techniques before approaching the patient in the ED. ED navigators use an internally developed social needs assessment instrument and refer patients to resources using shared resource guides, which are continually updated. Selected resources include housing, food, transportation, and employment support programs. Examples of specific referrals include connection to local housing advocates, food pantries, or public transportation assistance programs. ED navigators also use a translation phone line to ensure that they are able to address the needs of patients, regardless of language. Once a patient has been discharged, the ED navigator follows up with the patient telephonically within 72 hours or coordinates follow-up with a member of the patient's longitudinal care team.

Several other health systems across the country have implemented different ED-based care coordination models, showing variable results with respect to health outcomes, cost, and utilization.[5] However, community health worker interventions based in the ED have demonstrated some of the most promising results to date. Memorial Hermann Health System in Houston, Texas, in a quasi-experimental pre-post study with a comparison group, demonstrated that state-certified, bilingual community health workers working with uninsured and Medicaid patient populations reduced ED visits and generated cost savings ranging from $331 to $1369 per patient after 12 months.[6] In a descriptive analysis, Boston Medical Center demonstrated the ability of health promotion advocates in the ED to increase referrals to social support resources.[7] Likewise, Erlanger Health System in Chattanooga, Tennessee, performed a randomized controlled trial with patient navigators working with high ED utilizers and demonstrated a decrease in ED visits and costs.[8] Given the prior experience of ED-based care coordination and community health worker interventions, we sought to examine the efficacy of our ED Navigator Program in facilitating linkages to primary care and reducing ED visits.

METHODS

For this analysis, we used clinical and administrative data for patients enrolled in the MGB Medicaid ACO during the period of June 1, 2018 (when the ED Navigator Program was first fully implemented), to October 31, 2019.

Using electronic health records (EHRs), we identified treat-and-release ED visits to the 3 hospital EDs in which the ED Navigator Program was implemented. We excluded ED visits that were high acuity, defined as having an emergency severity index (ESI) score of 1 or 2, or having been triaged to the "acute" pod of the ED. At the hospital that does not use ESI, patients in the acute pod are determined to have a potential illness requiring immediate evaluation. ED visits occurring on Saturday and Sunday were also excluded from the analysis, as the ED Navigator Program is currently available only Monday through Friday. Overnight visits occurring during the week are often followed up by phone the following day, so these were included in the evaluation. We matched these data to Medicaid claims data and removed ED visits that we were unable to match, including ED visits occurring during date spans when patients were not aligned to the ACO or when Medicaid coverage lapsed, or ED visits for substance use services, which were not shared with the ACO. ED visits with multiple records or claims from the same day were collapsed into a single event. We further excluded ED visits for persons with fewer than 3 months of claims data available in the 6 months preceding the ED visit or fewer than 1 month of claims data in the month following the ED visit (**eAppendix A** [eAppendices available at **ajmc.com**]). We then determined the number of ED visits, hospitalizations, and PCP visits in the preceding 6 months, also based on claims.

From these data, we identified all ED visits in which ED navigation occurred, limiting the data to the first ED visit with navigation for patients who had multiple encounters with the ED navigator. We developed a matched comparison population using the ED visits from patients who never used the ED navigator and selected 3 matched comparison patients for every intervention patient matched on the number of ED visits (0, 1, 2-3, or $\geq$4), inpatient stays (0, 1, or $\geq$2), and PCP visits (0, 1, or $\geq$2) in the 6 months prior to the ED visit. Only 1 episode per patient was selected. We obtained patient demographics from our system's EHR data and Medicaid claims data.

For the evaluation, we conducted a retrospective matched analysis of health care utilization in the 30 days following the index ED visit, comparing persons who had navigation with those who did not. Our primary outcome of interest was any return ED visit (both treat-and-release ED visits and those resulting in a hospital admission) during the 30 days following the index ED visit. Our secondary outcomes of interest were any hospital admission or completed primary care appointment in the 30 days following the ED visit. We initially intended to explore missed appointments as a secondary outcome, but rates of missed appointments in both groups were markedly low, so we were unable to pursue this analysis. Thirty days was selected as the period of interest because it was felt to represent a period of time long enough for us to be

able to observe an impact from the program but short enough that any observed effect could be reasonably attributable to this brief, limited intervention. This time period was also consistent with existing literature regarding ED return visits.[9-11]

These binary outcomes were analyzed using fixed effects logistic regression models adjusted for patient age, sex, race, ethnicity, primary language, employment, behavioral health history, ED visit characteristics, hospital, and baseline utilization matching criteria in our logistic regression analysis of return ED visits and follow-up PCP visits within 30 days (**eAppendix B**). In our logistic regression analysis of hospital admissions within 30 days, we adjusted only for age, sex, hospital, baseline utilization, ED visit characteristics, overnight ED visit, acuity, and history of mood disorder, which each showed independent correlation with the dependent variable so as to avoid overfitting the model, given the small number of 30-day admissions in the sample. ED visit characteristics include acuity level (defined by ESI or triage area), overnight visit (defined as arrival and discharge occurring between 10 PM and 7 AM), ambulance arrival, and arrival as outside transfer. We used predetermined definitions based on diagnoses codes in claims data to incorporate indicators for patients' socioeconomic status or related risk factors. Pediatric status was adjusted for using an age cutoff of 20 years, which is the age used at the included hospitals to triage patients to the separate pediatric section of the ED. Included covariates were selected a priori by the study team in consultation with ED providers, ED navigators, and program leaders to account for factors that may be associated with selection by the ED navigators or those that may be independently associated with our primary and secondary outcomes.

We used fixed effects for each of the 3 included hospitals to adjust for index ED visit hospital. A subgroup analysis was performed, stratifying patients on baseline levels of ED utilization to explore the potentially variable effect of the program on each of these populations. All included variables and subgroup analyses were defined by the study group a priori.

Our analysis was conducted as part of a routine program evaluation using a data repository approved by the MGB Institutional Review Board for retrospective program evaluation.

TABLE 1. One-Way Comparisons Between Included ED Navigator and Non–ED Navigator ED Visits

Characteristic	Mean (SD)		
	ED navigator (n = 1117)	Non–ED navigator (n = 3351)	*P*
Age in years	35.5 (0.52)	29.6 (0.33)	<.0001
	n (%)		
Age category in years			<.0001
< 20	211 (19%)	1174 (35%)	
20-34	364 (33%)	871 (26%)	
35-44	188 (17%)	502 (15%)	
44-54	181 (16%)	415 (12%)	
55-64	173 (15%)	389 (12%)	
≥ 65	0 (0%)	0 (0%)	
Female	793 (71%)	2086 (62%)	<.0001
Race/ethnicity			.0006
Black	228 (20%)	548 (16%)	
Latino	494 (44%)	1405 (42%)	
White	302 (27%)	1068 (32%)	
Other	93 (8%)	330 (10%)	
Primary language			.0642
English	859 (77%)	2484 (74%)	
Ambulance arrival	146 (13%)	443 (13%)	.8984
Acuity			<.0001
ESI level 3	5 (0%)	22 (1%)	
ESI level 4	0 (0%)	3 (0%)	
MGH triage to fast track	106 (9%)	350 (10%)	
MGH triage to urgent	15 (1%)	82 (2%)	
MGH triage missing or pediatrics	704 (63%)	1514 (45%)	
ESI level 6	287 (26%)	1380 (41%)	

(*continued*)

RESULTS

There were a total of 22,557 treat-and-release ED visits by MGB Medicaid ACO patients during the study period to the hospital EDs included in the ED Navigator Program. Of these, 12,113 visits met our criteria for inclusion and were able to be matched to claims data: 1315 with an associated ED navigator encounter and 10,798 potential control visits.

After matching, our final sample included 1117 intervention patients and 3351 comparison patients. ED visits with an ED navigator encounter were more likely to involve patients who were older, female, Black, married, and employed, and who also had documented anxiety and mood disorders (**Table 1**). Intervention and comparison patients had similar claims availability in the prior 6 months (5.8 months among intervention patients and 5.8 months among comparison patients).

Primary Outcome: 30-Day Return ED Visit

Overall, we were unable to detect a statistically significant difference in the odds of returning to the ED within 30 days for patients who received ED navigation compared with those who did not (odds ratio [OR], 0.88; 95% CI, 0.71-1.08) (**Table 2**). However, among individuals with no ED visits in the preceding 6 months, the ED

TABLE 1. (*Continued*) One-Way Comparisons Between Included ED Navigator and Non–ED Navigator ED Visits

Characteristic	n (%)		*P*
Overnight ED visit	78 (7%)	1293 (39%)	<.0001
Hospital			<.0001
BWH	514 (46%)	839 (25%)	
MGH	421 (38%)	1871 (56%)	
NSMC	182 (16%)	641 (19%)	
Escorted to ED by family/friend	415 (37%)	1694 (52%)	<.0001
Employment			<.0001
Full time	214 (19%)	490 (15%)	
Part time	166 (15%)	380 (11%)	
Student	130 (12%)	617 (18%)	
Other	607 (54%)	1864 (56%)	
Marital status			.0965
Single	220 (20%)	586 (17%)	
Low socioeconomic status	22 (2%)	41 (1%)	.067
History of suboptimal housing	140 (13%)	323 (10%)	.006
History of anxiety	479 (43%)	1241 (37%)	.0005
History of mood disorder	429 (38%)	1090 (33%)	.0003
History of domestic violence	126 (11%)	381 (11%)	.9349
History of nicotine use	225 (20%)	606 (18%)	.1256
No. of ED visits in prior 6 months			>.999
0	608 (54%)	1824 (54%)	
1	237 (21%)	711 (21%)	
2-3	184 (16%)	552 (16%)	
≥4	88 (8%)	264 (8%)	
No. of admissions in prior 6 months			>.999
0	991 (89%)	2973 (89%)	
1	92 (8%)	276 (8%)	
≥2	34 (3%)	102 (3%)	
No. of PCP visits in prior 6 months			>.999
0	467 (42%)	1401 (42%)	
1	285 (26%)	855 (26%)	
≥2	365 (33%)	1095 (33%)	
Any missed appointments in prior 6 months	30 (3%)	57 (2%)	.0391

BWH, Brigham and Women's Hospital; ED, emergency department; ESI, emergency severity index; MGH, Massachusetts General Hospital; NSMC, North Shore Medical Center; PCP, primary care physician.

Navigator Program was associated with lower odds of subsequent 30-day ED presentation, with an OR of 0.68 (95% CI, 0.52-0.90) (**Table 3**). However, the results were not statistically significant for individuals with 1, 2 to 3, or more than 3 visits in the preceding 6 months (adjusted ORs, 0.99 [95% CI, 0.64-1.52]; 1.15 [95% CI, 0.72-1.82]; and 1.21 [95% CI, 0.58-2.55], respectively).

Secondary Outcomes

With regard to PCP follow-up, after adjusting for included variables, patients who received ED navigation were significantly more likely to have a PCP visit within 30 days (OR, 1.52; 95% CI, 1.29-1.77). No significant difference was observed with regard to 30-day hospital admission (OR, 0.77; 95% CI, 0.47-1.27).

DISCUSSION

In our analysis, we found that ED navigator encounters were significantly associated with a reduction in return ED visits for patients with no prior visits in the preceding 6 months, as well as increased likelihood of completing a follow-up primary care appointment in the 30 days after the index ED visit for all patients. However, we were unable to identify a statistically significant difference in subsequent ED visits and hospital admission in the ED navigator group overall.

This study demonstrated that ED navigator encounters were significantly associated with increased rates of follow-up with primary care among a Medicaid ACO patient population. Specifically, with regard to primary care, patients with an ED navigator encounter had a statistically significant 52% increase in the odds of having a follow-up primary care appointment in the 30 days following their index ED visit. Notably, primary care practices in MGB already routinely engage in attempting to schedule follow-up primary care visits for patients seen in the ED. Therefore, the increased success of ED navigators in doing so suggests added incremental value in "capturing" patients at the point of care to reengage in long-term management.

With regard to acute care utilization, we found that the effect of the ED Navigator Program on reducing ED utilization was most pronounced among ED-naïve patients (ie, those with no prior ED visits in the preceding 6 months). In contrast, there was no significant effect on utilization on more frequent ED utilizers. This could be because of several factors. First, ED-naïve visitors may be less aware of the services provided in an ED vs urgent care or primary care and, once educated about other options by ED navigators, opt to use other forms of care for access. Secondly, those with higher baseline utilization are more likely individuals with ingrained patterns of ED utilization and care-seeking behaviors, as well as chronic conditions prompting recurrent presentation. These include both chronic health and mental health conditions, low health literacy, and a multitude of social factors, such as those related to housing or transportation.[12-14] A brief 1-time encounter would be less likely to change well-established patterns of behavior or to definitively

address the underlying social or medical problems precipitating frequent ED utilization.

Based on the results of this analysis, the MGB ED Navigator Program will continue to target and support patients with lower baseline levels of ED utilization. Additional research is needed to characterize patient and program factors that may affect the overall impact of the program. To better support patients with higher ED utilization patterns, we are collecting internal data to segment this population into distinct risk groups and to correspondingly create targeted referral pathways to longitudinal population health or care management programs. In addition, the magnitude of the difference in admission rates post intervention is notable, although no statistically significant difference was observed, which could potentially be due to small numbers of admissions in both groups. Additional research could aim to explore this potential relationship further with larger sample sizes.

Historically, care coordination programs have focused on patients with high levels of utilization, but this approach has been recently called into question.[15] The results of the ED navigator intervention add to the existing literature by reflecting the potential value in targeting patients with low health care utilization but "rising risk" as well. In addition to redirecting care to more cost-effective environments in the short term, these interventions may also preempt eventual frequent utilization behavior and promote health in the long term by facilitating connections to primary care and to resources related to social determinants of health. They also illustrate that a brief 15-minute intervention can help change a patient's overall care trajectory—at least in the short term—in contrast to more costly and time-intensive long-term programs.

Limitations

The limitations of this study include generalizability, as this program and analysis are limited to a single health system and Medicaid ACO patients (not inclusive of patients who are dual eligible). The success of this program relies on being able to refer patients to existing programs and resources, which may not be available at more resource-constrained ACOs or institutions located in states with less of a robust social safety net than Massachusetts. A limitation of the program itself is that it is currently only available on weekdays. This programmatic limitation may affect the study because it is possible that the characteristics of patients visiting the ED on weekends may differ from those of patients visiting the ED during weekdays. Similarly, patients with low-acuity diagnoses seen overnight, who receive an intervention via phone, may have a different experience with the program than those who receive the face-to-face intervention.

With regard to methodology limitations, this study is a retrospective cohort analysis and not a randomized controlled trial. Therefore, it is possible that other factors may have confounded the results of our analysis. However, we accounted for this by matching patients based on baseline utilization and adjusting for potential confounders, including patient demographics, ED visit characteristics, health status, and socioeconomic status and related risk factors. Our adjustment for socioeconomic status was in part accomplished through the use of diagnosis codes in claims data. However, it is important to note that these socioeconomic diagnosis codes are infrequently used, and therefore, there is potential for misclassification.

Additionally, we were unable to match all visits recorded in our EHR with their associated claims. This is potentially because of patients churning in and out of Medicaid or our ACO (whose visits may have occurred in a brief period of lost eligibility); the exclusion of substance abuse visit claims from the data shared with our ACO; and, to a lesser extent, discrepancies in the ED dates of service as recoded in Epic and claims data (eg, as an ED encounter may span multiple days, it is possible that the date of ED arrival would not match a specific claim's date of service). Regardless of these reasons, there would be no reason to believe that there would be any relationship between unmatched ED visits and our outcomes, unaccounted for by other included variables, or other systematic patterns of their distribution that may have biased our results, with the possible exception of substance use disorders (claims information regarding substance use disorder is not provided by the state to ACOs for privacy reasons). Patients in both the case and control groups had to have claims matched to ED records. Therefore, we do not believe this would have likely significantly biased our results. Although we did adjust our analysis for chart-documented history of substance use disorder and alcohol use disorder, because of this exception, these results may not necessarily be generalized to ED visits for these conditions. Similarly, given potential causes of inability to match records, it is possible that our findings cannot be generalized to patients who may rapidly churn in and out of an ACO.

TABLE 2. Results of the Matched Multivariable Logistic Regression Comparing 30-Day Health Care Utilization Likelihood for ED Visits With an ED Navigator Encounter Relative to Those Without an ED Navigator Encounter

	Overall
Outcome	Adjusted OR (95% CI)
Return ED visit	0.88 (0.71-1.08)
Hospital admission	0.77 (0.47-1.27)
PCP visit	1.51 (1.29-1.77)

ED, emergency department; OR, odds ratio; PCP, primary care physician.

TABLE 3. Matched Multivariable Logistic Regression Results for 30-Day Return ED Visit Likelihood for ED Visits With an ED Navigator Encounter Relative to Those Without an ED Navigator Encounter Stratified by Baseline ED Utilization Rates

No. of ED visits in preceding 6 months	Adjusted OR (95% CI)
0	0.68 (0.52-0.90)
1	0.99 (0.64-1.52)
2-3	1.15 (0.72-1.82)
≥ 4	1.21 (0.58-2.55)

ED, emergency department; OR, odds ratio.

CONCLUSIONS

Our analysis suggests that care coordination through the use of community health workers embedded as navigators in the ED with high-intensity, short-term interactions can help reduce ED visits among individuals with low levels of baseline ED utilization and facilitate stronger connections with primary care in a Medicaid ACO population. Our model highlights that short-term care coordination programs are successful, particularly for patients with lower levels of baseline ED utilization, and can ultimately promote primary care engagement, as well as assistance with health-related social needs. We believe that these results can provide important insights to health systems as they consider cost-effective program options for care management to strengthen primary care engagement and address the social determinants of health. ■

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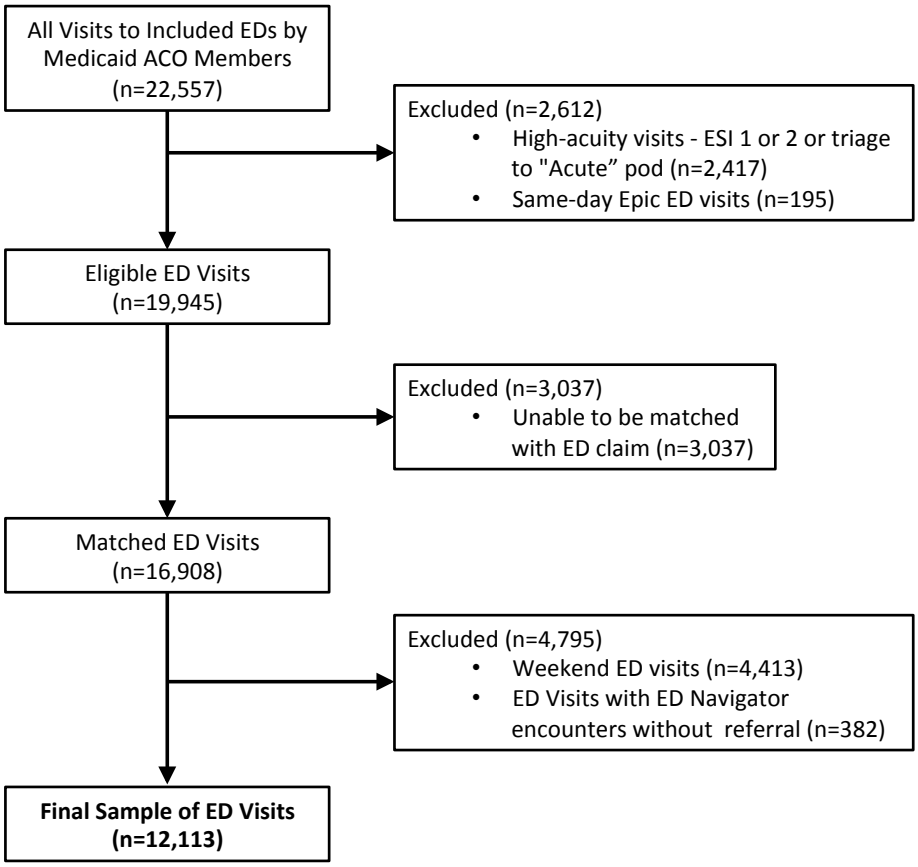
eAppendix A.
Flowchart diagram for the identification of incident ED visits



eAppendix B.
List of definitions for covariates included analysis variables

- Age: Age at time of ED Visit
- Low Socioeconomic Status: At least one ICD-10 for Social/Economic Circumstances in the 12 months prior to ED Visit (Z59.5,Z59.6,Z59.7)
- Support System: At least one Support System ICD-10 Diagnosis (Z62.820, Z62.820, Z62.822, Z62.890, Z63.0, Z63.1, Z63.31, Z63.32, Z63.4, Z63.5, Z63.6, Z63.71, Z63.79, Z63.8, Z63.9, Z60.2, V61.23, V61.24, V61.06, V61.04, V61.01, V61.03, V61.02, V60.3, V61.05, V61.25, V60.81, V61.29, V61.3, V61.20)
- History of Suboptimal Housing: At least one ICD-10 diagnosis (Z59.0, Z59.1, Z59.8, Z59.9)
- Sex, Race, Ethnicity, Marital Status, Employment Status as documented in the medical record system
- Anxiety: At least one ICD-10 diagnosis of anxiety (F40*, F41*, F43*)
- Mood disorder: at least one ICD-10 diagnosis of mood disorder (F30*, F31*, F32*, F33*, F34*, F39*)
- Hospital: Department where ED Visit occurred
- ESI Level + MGH Acuity level (see Table 1 for groupings)
- SUD: at least one ICD-10 diagnosis for SUD (F11*)
- Tobacco Use: at least one ICD-10 diagnosis for Tobacco use (F17***)**
- Domestic Violence: at least one ICD-10 Diagnosis of exposure to Domestic Violence (O9A.311, O9A.312, O9A.313, O9A.319, R45.6, T74.11XA, T74.91XA, T76.11XA, T76.21XA, Y09, Z65.4, Z69.11, Z78.9, Z91.89)

eAppendix C.

ED Navigator Manuscript: Table 2 Full Regressions

SAS Output

The LOGISTIC Procedure

Conditional Analysis

logistic regression - ED: ADJUSTED

The LOGISTIC Procedure

Conditional Analysis

Model Information

Model Information	
Data Set	WORK.OUTCOMES
Response Variable	EDpost
Number of Response Levels	2
Number of Strata	1117
Number of Uninformative Strata	466
Frequency Uninformative	1864
Model	binary logit
Optimization Technique	quasi-Newton

Observations Summary

Number of Observations Read	4468
Number of Observations Used	4468

Response Profile

Response Profile		
Ordered Value	EDpost	Total Frequency
1	0	3483
2	1	985

Probability modeled is EDpost=1.

Class Level Information

Class Level Information						
Class	Value	Design Variables				
Type	Intervention	1	0			
	Control	0	1			
female	0	1	0			
	1	0	1			
agecat	20-34	1	0	0	0	0
	35-44	0	1	0	0	0
	45-54	0	0	1	0	0
	55-64	0	0	0	1	0
	<20	0	0	0	0	1
racecat	Black	1	0	0	0	

Class Level Information

Class	Value	Design Variables
	Hispanic	0 1 0 0
	Other	0 0 1 0
	White	0 0 0 1
MaritalStatus1	0	1 0
	1	0 1
emp	Fulltime	1 0 0 0
	Other	0 1 0 0
	Parttime	0 0 1 0
	Student	0 0 0 1
hospital1	BWH	1 0 0
	MGH	0 1 0
	NSMC	0 0 1
escort	Other	1 0
	family	0 1
amb	0	1 0
	1	0 1
sud	0	1 0

Class Level Information

Class	Value	Design Variables
	1	0 1
ses1	0	1 0
	1	0 1
Support_system1	0	1 0
	1	0 1
suboptimal_housing1	0	1 0
	1	0 1
anxiety1	0	1 0
	1	0 1
mood_disorder1	0	1 0
	1	0 1
nicotine1	0	1 0
	1	0 1
dv1	0	1 0
	1	0 1
Night	0	1 0
	1	0 1

Class Level Information

Class	Value	Design Variables					
acuityboth	1	1	0	0	0	0	0
	2	0	1	0	0	0	0
	4	0	0	1	0	0	0
	6	0	0	0	1	0	0
	7	0	0	0	0	1	0
	8	0	0	0	0	0	1

Strata Summary

Strata Summary

Response Pattern	EDpost		Number of Strata	Frequency
	0	1		
1	0	4	15	60
2	1	3	47	188
3	2	2	180	720
4	3	1	424	1696
5	4	0	451	1804

Note:The following parameters have been set to 0, since the variables are a linear combination of other variables as shown.

Linear

TypeControl =	1 - TypeIntervention
agecat<20 =	1 - agecat20-34 - agecat35-44 - agecat45-54 - agecat55-64
female1 =	1 - female0
racecatWhite =	1 - racecatBlack - racecatHispanic - racecatOther
MaritalStatus11 =	1 - MaritalStatus10
empStudent =	1 - empFulltime - empOther - empParttime
sud1 =	1 - sud0
hospital1NSMC =	1 - hospital1BWH - hospital1MGH
escortfamily =	1 - escortOther
amb1 =	1 - amb0
ses11 =	1 - ses10
Support_system11 =	1 - Support_system10
suboptimal_housing11 =	1 - suboptimal_housing10
anxiety11 =	1 - anxiety10
mood_disorder11 =	1 - mood_disorder10
nicotine11 =	1 - nicotine10
dv11 =	1 - dv10
Night1 =	1 - Night0
acuityboth8 =	1 - acuityboth1 - acuityboth2 - acuityboth4 - acuityboth6 - acuityboth7

Dual Quasi-Newton Optimization

Dual Broyden - Fletcher - Goldfarb - Shanno Update (DBFGS)

Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Note:At least one element of the gradient is greater than 1e-3.

Fit Statistics

Model Fit Statistics

Criterion	Without Covariates	With Covariates
AIC	1950.923	1815.137
SC	1950.923	2026.492
-2 Log L	1950.923	1749.137

Global Tests

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	201.7858	33	<.0001
Score	192.3538	33	<.0001
Wald	173.5328	33	<.0001

Type 3 Tests

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
Type	1	1.5980	0.2062
EDpre6m	1	7.6599	0.0056
agecat	4	12.0041	0.0173
female	1	0.0743	0.7852
racecat	3	1.9165	0.5899
MaritalStatus1	1	1.4258	0.2324
Lang	1	0.0000	0.9955
emp	3	2.0377	0.5646
sud	1	1.1764	0.2781
hospital1	2	0.7494	0.6875
escort	1	0.0525	0.8188
amb	1	0.0025	0.9602
ses1	1	7.1056	0.0077
Support_system1	1	0.3891	0.5328
suboptimal_housing1	1	11.1545	0.0008
anxiety1	1	0.4211	0.5164

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
mood_disorder1	1	9.2789	0.0023
nicotine1	1	1.7203	0.1897
dv1	1	2.2518	0.1335
Night	1	70.1472	<.0001
acuityboth	5	19.0753	0.0019

Parameter Estimates

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Type	Intervention	1	-0.1329	0.1051	1.5980	0.2062
Type	Control	0	0	.	.	.
EDpre6m		1	0.1421	0.0514	7.6599	0.0056
agecat	20-34	1	0.6081	0.1877	10.4951	0.0012
agecat	35-44	1	0.4737	0.2106	5.0611	0.0245
agecat	45-54	1	0.6536	0.2151	9.2330	0.0024
agecat	55-64	1	0.5269	0.2193	5.7704	0.0163
agecat	<20	0	0	.	.	.

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
female	0	1	-0.0285	0.1047	0.0743	0.7852
female	1	0	0	.	.	.
racecat	Black	1	-0.1216	0.1474	0.6804	0.4095
racecat	Hispanic	1	-0.0519	0.1253	0.1716	0.6787
racecat	Other	1	-0.2435	0.1926	1.5991	0.2060
racecat	White	0	0	.	.	.
MaritalStatus1	0	1	0.1506	0.1261	1.4258	0.2324
MaritalStatus1	1	0	0	.	.	.
Lang		1	-0.00069	0.1232	0.0000	0.9955
emp	Fulltime	1	-0.2042	0.1944	1.1035	0.2935
emp	Other	1	-0.1785	0.1518	1.3826	0.2397
emp	Parttime	1	-0.2893	0.2085	1.9265	0.1651
emp	Student	0	0	.	.	.
sud	0	1	-0.3971	0.3661	1.1764	0.2781
sud	1	0	0	.	.	.
hospital1	BWH	1	-0.0124	0.1506	0.0068	0.9342

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
hospital1	MGH	1	0.4642	0.5464	0.7217	0.3956
hospital1	NSMC	0	0	.	.	.
escort	Other	1	0.0276	0.1205	0.0525	0.8188
escort	family	0	0	.	.	.
amb	0	1	-0.00697	0.1395	0.0025	0.9602
amb	1	0	0	.	.	.
ses1	0	1	1.2485	0.4684	7.1056	0.0077
ses1	1	0	0	.	.	.
Support_system1	0	1	-0.1514	0.2427	0.3891	0.5328
Support_system1	1	0	0	.	.	.
suboptimal_housing1	0	1	-0.5272	0.1579	11.1545	0.0008
suboptimal_housing1	1	0	0	.	.	.
anxiety1	0	1	-0.0740	0.1140	0.4211	0.5164
anxiety1	1	0	0	.	.	.
mood_disorder1	0	1	-0.3673	0.1206	9.2789	0.0023
mood_disorder1	1	0	0	.	.	.

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
nicotine1	0	1	-0.1719	0.1310	1.7203	0.1897
nicotine1	1	0	0	.	.	.
dv1	0	1	-0.2257	0.1504	2.2518	0.1335
dv1	1	0	0	.	.	.
Night	0	1	-0.8886	0.1061	70.1472	<.0001
Night	1	0	0	.	.	.
acuityboth	1	1	0.2516	0.5176	0.2363	0.6269
acuityboth	2	1	-10.9114	405.8	0.0007	0.9785
acuityboth	4	1	-0.6451	0.1820	12.5636	0.0004
acuityboth	6	1	0.5958	0.3321	3.2186	0.0728
acuityboth	7	1	0.2465	0.5379	0.2101	0.6467
acuityboth	8	0	0	.	.	.

Odds Ratios

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Type Intervention vs Control	0.876	0.713	1.076

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
EDpre6m	1.153	1.042	1.275
agecat 20-34 vs <20	1.837	1.272	2.654
agecat 35-44 vs <20	1.606	1.063	2.427
agecat 45-54 vs <20	1.922	1.261	2.930
agecat 55-64 vs <20	1.694	1.102	2.603
female 0 vs 1	0.972	0.792	1.193
racecat Black vs White	0.885	0.663	1.182
racecat Hispanic vs White	0.949	0.743	1.214
racecat Other vs White	0.784	0.537	1.143
MaritalStatus1 0 vs 1	1.162	0.908	1.488
Lang	0.999	0.785	1.272
emp Fulltime vs Student	0.815	0.557	1.193
emp Other vs Student	0.837	0.621	1.126
emp Parttime vs Student	0.749	0.498	1.127
sud 0 vs 1	0.672	0.328	1.378
hospital1 BWH vs NSMC	0.988	0.735	1.327

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
hospital1 MGH vs NSMC	1.591	0.545	4.641
escort Other vs family	1.028	0.812	1.302
amb 0 vs 1	0.993	0.755	1.305
ses1 0 vs 1	3.485	1.392	8.728
Support_system1 0 vs 1	0.859	0.534	1.383
suboptimal_housing1 0 vs 1	0.590	0.433	0.804
anxiety1 0 vs 1	0.929	0.743	1.161
mood_disorder1 0 vs 1	0.693	0.547	0.877
nicotine1 0 vs 1	0.842	0.651	1.089
dv1 0 vs 1	0.798	0.594	1.072
Night 0 vs 1	0.411	0.334	0.506
acuityboth 1 vs 8	1.286	0.466	3.547
acuityboth 2 vs 8	<0.001	<0.001	>999.999
acuityboth 4 vs 8	0.525	0.367	0.749
acuityboth 6 vs 8	1.814	0.946	3.479
acuityboth 7 vs 8	1.280	0.446	3.672

LS-Means

Type LS-Means

Type Least Squares Means

Type	Estimate	Standard Error	z Value	Pr > |z|	Mean	Standard Error of Mean
Intervention	-2.0893	67.6315	-0.03	0.9754	0.1101	6.6285
Control	-1.9565	67.6314	-0.03	0.9769	0.1239	7.3388

The LOGISTIC Procedure

Conditional Analysis

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logistic regression - FIP: ADJUSTED

The LOGISTIC Procedure

Conditional Analysis

Model Information

Model Information

Data Set	WORK.OUTCOMES
Response Variable	FIPpost
Number of Response Levels	2
Number of Strata	1117
Number of Uninformative Strata	999
Frequency Uninformative	3996
Model	binary logit
Optimization Technique	Newton-Raphson ridge

Observations Summary

Number of Observations Read	4468
Number of Observations Used	4468

Response Profile

Response Profile

Ordered Value	FIPpost	Total Frequency
1	0	4311
2	1	157

Probability modeled is FIPpost=1.

Class Level Information

Class Level Information

Class	Value	Design Variables			
Type	Control	0			
	Intervention	1			
agecat	20-34	1	0	0	0
	35-44	0	1	0	0
	45-54	0	0	1	0
	55-64	0	0	0	1
	<20	-1	-1	-1	-1

Class Level Information

Class	Value	Design Variables				
female	0	1				
	1	-1				
hospital1	BWH	1	0			
	MGH	0	1			
	NSMC	-1	-1			
escort	Other	1				
	family	-1				
mood_disorder1	0	1				
	1	-1				
Night	0	1				
	1	-1				
acuityboth	1	1	0	0	0	0
	2	0	1	0	0	0
	4	0	0	1	0	0
	6	0	0	0	1	0
	7	0	0	0	0	1
	8	-1	-1	-1	-1	-1

Strata Summary

Strata Summary

Response Pattern	FIPpost		Number of Strata	Frequency
	0	1		
1	0	4	2	8
2	1	3	4	16
3	2	2	23	92
4	3	1	91	364
5	4	0	997	3988

Newton-Raphson Ridge Optimization

Without Parameter Scaling

Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Fit Statistics

Model Fit Statistics

Criterion	Without Covariates	With Covariates
AIC	345.817	333.353
SC	345.817	442.233
-2 Log L	345.817	299.353

Global Tests

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	46.4638	17	0.0001
Score	44.2396	17	0.0003
Wald	37.5189	17	0.0029

Type 3 Tests

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
Type	1	1.0553	0.3043
agecat	4	8.5528	0.0733
FIPpre6m	1	3.2828	0.0700
female	1	4.8674	0.0274
hospital1	2	3.9512	0.1387
escort	1	6.0889	0.0136
mood_disorder1	1	11.0228	0.0009
Night	1	0.4481	0.5032
acuityboth	5	6.5613	0.2554

Parameter Estimates

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Type	Intervention	1	-0.2626	0.2556	1.0553	0.3043
agecat	20-34	1	0.1617	0.1963	0.6786	0.4101
agecat	35-44	1	0.3619	0.2483	2.1245	0.1450
agecat	45-54	1	-0.0932	0.2659	0.1229	0.7259
agecat	55-64	1	0.4251	0.2521	2.8420	0.0918
FIPpre6m		1	0.2313	0.1276	3.2828	0.0700
female	0	1	0.2772	0.1256	4.8674	0.0274
hospital1	BWH	1	-0.5493	0.3497	2.4672	0.1162
hospital1	MGH	1	0.4267	0.6026	0.5015	0.4789
escort	Other	1	-0.3485	0.1412	6.0889	0.0136
mood_disorder1	0	1	-0.4095	0.1233	11.0228	0.0009
Night	0	1	0.0971	0.1451	0.4481	0.5032
acuityboth	1	1	1.9938	181.5	0.0001	0.9912
acuityboth	2	1	-9.4845	907.7	0.0001	0.9917
acuityboth	4	1	1.0201	181.5	0.0000	0.9955
acuityboth	6	1	2.1767	181.5	0.0001	0.9904

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
acuityboth	7	1	2.2973	181.5	0.0002	0.9899

Odds Ratios

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Type Intervention vs Control	0.769	0.466	1.269
agecat 20-34 vs <20	2.765	1.228	6.229
agecat 35-44 vs <20	3.378	1.318	8.657
agecat 45-54 vs <20	2.143	0.834	5.504
agecat 55-64 vs <20	3.598	1.394	9.288
FIPpre6m	1.260	0.981	1.618
female 0 vs 1	1.741	1.064	2.849
hospital1 BWH vs NSMC	0.511	0.250	1.042
hospital1 MGH vs NSMC	1.355	0.221	8.299
escort Other vs family	0.498	0.286	0.866
mood_disorder1 0 vs 1	0.441	0.272	0.715
Night 0 vs 1	1.214	0.688	2.145

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
acuityboth 1 vs 8	0.997	0.196	5.076
acuityboth 2 vs 8	<0.001	<0.001	>999.999
acuityboth 4 vs 8	0.377	0.166	0.855
acuityboth 6 vs 8	1.197	0.466	3.077
acuityboth 7 vs 8	1.351	0.232	7.853

The LOGISTIC Procedure

Conditional Analysis

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logistic regression - PCP: ADJUSTED

The LOGISTIC Procedure

Conditional Analysis

Model Information

Model Information	
Data Set	WORK.OUTCOMES
Response Variable	PCPpost
Number of Response Levels	2
Number of Strata	1117
Number of Uninformative Strata	255

Model Information	
Frequency Uninformative	1020
Model	binary logit
Optimization Technique	Newton-Raphson ridge

Observations Summary

Number of Observations Read	4468
Number of Observations Used	4468

Response Profile

Response Profile		
Ordered Value	PCPpost	Total Frequency
1	0	2991
2	1	1477

Probability modeled is PCPpost=1.

Class Level Information

Class Level Information		
Class	Value	Design Variables
Type	Control	0
	Intervention	1

Class Level Information

Class	Value	Design Variables			
agecat	20-34	1	0	0	0
	35-44	0	1	0	0
	45-54	0	0	1	0
	55-64	0	0	0	1
	<20	-1	-1	-1	-1
female	0	1			
	1	-1			
racecat	Black	1	0	0	
	Hispanic	0	1	0	
	Other	0	0	1	
	White	-1	-1	-1	
MaritalStatus1	0	1			
	1	-1			
emp	Fulltime	1	0	0	
	Other	0	1	0	
	Parttime	0	0	1	
	Student	-1	-1	-1	

Class Level Information

Class	Value	Design Variables	
hospital1	BWH	1	0
	MGH	0	1
	NSMC	-1	-1
escort	Other	1	
	family	-1	
amb	0	1	
	1	-1	
sud	0	1	
	1	-1	
ses1	0	1	
	1	-1	
ped	0	1	
	1	-1	
Support_system1	0	1	
	1	-1	
suboptimal_housing1	0	1	
	1	-1	

Class Level Information

Class	Value	Design Variables				
anxiety1	0	1				
	1	-1				
mood_disorder1	0	1				
	1	-1				
nicotine1	0	1				
	1	-1				
dv1	0	1				
	1	-1				
Night	0	1				
	1	-1				
acuityboth	1	1	0	0	0	0
	2	0	1	0	0	0
	4	0	0	1	0	0
	6	0	0	0	1	0
	7	0	0	0	0	1
	8	-1	-1	-1	-1	-1

Strata Summary

Strata Summary

Response Pattern	PCPpost 0	PCPpost 1	Number of Strata	Frequency
1	0	4	15	60
2	1	3	105	420
3	2	2	345	1380
4	3	1	412	1648
5	4	0	240	960

Note:The following parameters have been set to 0, since the variables are a linear combination of other variables as shown.

Linear

ped0 =	0.6 + 0.4 * agecat20-34 + 0.4 * agecat35-44 + 0.4 * agecat45-54 + 0.4 * agecat55-64

Newton-Raphson Ridge Optimization

Without Parameter Scaling

Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Fit Statistics

Model Fit Statistics

Criterion	Without Covariates	With Covariates
AIC	2669.742	2607.231

Model Fit Statistics

Criterion	Without Covariates	With Covariates
SC	2669.742	2818.586
-2 Log L	2669.742	2541.231

Global Tests

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	128.5114	33	<.0001
Score	125.1145	33	<.0001
Wald	117.6009	33	<.0001

Type 3 Tests

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
Type	1	25.8973	<.0001
PCPpre6m	1	18.2351	<.0001
agecat	4	7.7854	0.0998
female	1	0.5013	0.4789
racecat	3	0.5274	0.9128

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
MaritalStatus1	1	3.4302	0.0640
Lang	1	1.5958	0.2065
emp	3	5.3568	0.1475
hospital1	2	9.2981	0.0096
escort	1	1.0533	0.3047
amb	1	0.0001	0.9933
sud	1	0.3084	0.5787
ses1	1	0.0033	0.9542
ped	0	.	.
Support_system1	1	1.6635	0.1971
suboptimal_housing1	1	0.0405	0.8404
anxiety1	1	1.1466	0.2843
mood_disorder1	1	1.4789	0.2239
nicotine1	1	3.8907	0.0486
dv1	1	1.7801	0.1821
Night	1	0.2941	0.5876

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
acuityboth	5	13.4791	0.0193

Parameter Estimates

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Type	Intervention	1	0.4132	0.0812	25.8973	<.0001
PCPpre6m		1	0.1609	0.0377	18.2351	<.0001
agecat	20-34	1	-0.1908	0.0772	6.1104	0.0134
agecat	35-44	1	0.0970	0.0899	1.1646	0.2805
agecat	45-54	1	0.0736	0.0933	0.6216	0.4304
agecat	55-64	1	0.0854	0.0973	0.7715	0.3798
female	0	1	-0.0305	0.0431	0.5013	0.4789
racecat	Black	1	-0.0439	0.0844	0.2705	0.6030
racecat	Hispanic	1	0.0167	0.0665	0.0630	0.8018
racecat	Other	1	0.0535	0.1004	0.2837	0.5943
MaritalStatus1	0	1	0.0978	0.0528	3.4302	0.0640
Lang		1	-0.1240	0.0982	1.5958	0.2065

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
emp	Fulltime	1	-0.0849	0.0896	0.8971	0.3436
emp	Other	1	0.1112	0.0596	3.4786	0.0622
emp	Parttime	1	0.0783	0.0954	0.6736	0.4118
hospital1	BWH	1	-0.1892	0.1392	1.8472	0.1741
hospital1	MGH	1	0.00365	0.2475	0.0002	0.9882
escort	Other	1	-0.0507	0.0494	1.0533	0.3047
amb	0	1	-0.00049	0.0576	0.0001	0.9933
sud	0	1	0.0914	0.1645	0.3084	0.5787
ses1	0	1	0.00931	0.1621	0.0033	0.9542
ped	0	0	0	.	.	.
Support_system1	0	1	-0.1300	0.1008	1.6635	0.1971
suboptimal_housing1	0	1	-0.0138	0.0686	0.0405	0.8404
anxiety1	0	1	-0.0503	0.0469	1.1466	0.2843
mood_disorder1	0	1	-0.0615	0.0506	1.4789	0.2239
nicotine1	0	1	0.1123	0.0570	3.8907	0.0486
dv1	0	1	-0.0847	0.0635	1.7801	0.1821

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Night	0	1	0.0249	0.0460	0.2941	0.5876
acuityboth	1	1	0.3615	0.4784	0.5710	0.4499
acuityboth	2	1	0.5694	1.2472	0.2084	0.6480
acuityboth	4	1	-0.6878	0.2989	5.2962	0.0214
acuityboth	6	1	0.1233	0.3454	0.1275	0.7211
acuityboth	7	1	-0.1108	0.4006	0.0765	0.7821

Odds Ratios

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Type Intervention vs Control	1.512	1.289	1.772
PCPpre6m	1.175	1.091	1.265
agecat 20-34 vs <20	0.882	0.645	1.206
agecat 35-44 vs <20	1.176	0.836	1.655
agecat 45-54 vs <20	1.149	0.812	1.626
agecat 55-64 vs <20	1.163	0.817	1.654
female 0 vs 1	0.941	0.795	1.114

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
racecat Black vs White	0.982	0.770	1.254
racecat Hispanic vs White	1.044	0.850	1.282
racecat Other vs White	1.083	0.812	1.445
MaritalStatus1 0 vs 1	1.216	0.989	1.496
Lang	0.883	0.729	1.071
emp Fulltime vs Student	1.020	0.740	1.406
emp Other vs Student	1.241	0.972	1.584
emp Parttime vs Student	1.201	0.859	1.679
hospital1 BWH vs NSMC	0.688	0.540	0.875
hospital1 MGH vs NSMC	0.834	0.400	1.739
escort Other vs family	0.903	0.744	1.097
amb 0 vs 1	0.999	0.797	1.252
sud 0 vs 1	1.200	0.630	2.288
ses1 0 vs 1	1.019	0.540	1.924
Support_system1 0 vs 1	0.771	0.519	1.145
suboptimal_housing1 0 vs 1	0.973	0.743	1.273

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
anxiety1 0 vs 1	0.904	0.752	1.087
mood_disorder1 0 vs 1	0.884	0.725	1.078
nicotine1 0 vs 1	1.252	1.001	1.565
dv1 0 vs 1	0.844	0.658	1.083
Night 0 vs 1	1.051	0.878	1.259
acuityboth 1 vs 8	1.853	0.717	4.790
acuityboth 2 vs 8	2.282	0.123	42.310
acuityboth 4 vs 8	0.649	0.476	0.885
acuityboth 6 vs 8	1.461	0.868	2.459
acuityboth 7 vs 8	1.156	0.566	2.361

eAppendix D.

SAS Output

The LOGISTIC Procedure

Conditional Analysis

logistic regression - ED: ADJUSTED: baseline ED=0

The LOGISTIC Procedure

Conditional Analysis

Model Information

Model Information	
Data Set	WORK.OUTCOMES
Response Variable	EDpost
Number of Response Levels	2
Number of Strata	608
Number of Uninformative Strata	297
Frequency Uninformative	1188
Model	binary logit
Optimization Technique	Newton-Raphson ridge

Observations Summary

Number of Observations Read	2432
Number of Observations Used	2432

Response Profile

Response Profile

Ordered Value	EDpost	Total Frequency
1	0	2034
2	1	398

Probability modeled is EDpost=1.

Class Level Information

Class Level Information

Class	Value	Design Variables		
Type	Control	0		
	Intervention	1		
female	0	1		
	1	-1		
racecat	Black	1	0	0
	Hispanic	0	1	0
	Other	0	0	1
	White	-1	-1	-1
MaritalStatus1	0	1		
	1	-1		
emp	Fulltime	1	0	0

Class Level Information

Class	Value	Design Variables		
	Other	0	1	0
	Parttime	0	0	1
	Student	-1	-1	-1
hospital1	BWH	1	0	
	MGH	0	1	
	NSMC	-1	-1	
escort	Other	1		
	family	-1		
amb	0	1		
	1	-1		
sud	0	1		
	1	-1		
ses1	0	1		
	1	-1		
ped	0	1		
	1	-1		
Support_system1	0	1		

Class Level Information

Class	Value	Design Variables				
	1	-1				
suboptimal_housing1	0	1				
	1	-1				
anxiety1	0	1				
	1	-1				
mood_disorder1	0	1				
	1	-1				
nicotine1	0	1				
	1	-1				
dv1	0	1				
	1	-1				
Night	0	1				
	1	-1				
acuityboth	1	1	0	0	0	0
	2	0	1	0	0	0
	4	0	0	1	0	0
	6	0	0	0	1	0

Class Level Information						
Class	Value	Design Variables				
	7	0	0	0	0	1
	8	-1	-1	-1	-1	-1

Strata Summary

Strata Summary				
Response Pattern	EDpost		Number of Strata	Frequency
	0	1		
1	0	4	1	4
2	1	3	10	40
3	2	2	63	252
4	3	1	238	952
5	4	0	296	1184

Note:The following parameters have been set to 0, since the variables are a linear combination of other variables as shown.

Linear

EDpre6m =	0

Newton-Raphson Ridge Optimization

Without Parameter Scaling

Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Fit Statistics

Model Fit Statistics

Criterion	Without Covariates	With Covariates
AIC	913.364	863.605
SC	913.364	1037.499
-2 Log L	913.364	803.605

Global Tests

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	109.7584	30	<.0001
Score	106.5726	30	<.0001
Wald	93.7964	30	<.0001

Type 3 Tests

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
Type	1	5.0433	0.0247
Age_Visit	1	0.9791	0.3224

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
EDpre6m	0	.	.
female	1	0.9508	0.3295
racecat	3	5.8957	0.1168
MaritalStatus1	1	0.0016	0.9679
Lang	1	0.1498	0.6987
emp	3	0.6889	0.8758
hospital1	2	0.2231	0.8944
escort	1	1.0097	0.3150
amb	1	0.0249	0.8745
sud	1	0.4288	0.5126
ses1	1	1.1011	0.2940
ped	1	0.5099	0.4752
Support_system1	1	2.3943	0.1218
suboptimal_housing1	1	1.9809	0.1593
anxiety1	1	1.4320	0.2314
mood_disorder1	1	1.2568	0.2622

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
nicotine1	1	0.0792	0.7784
dv1	1	2.4393	0.1183
Night	1	41.5063	<.0001
acuityboth	5	9.0771	0.1060

Parameter Estimates

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Type	Intervention	1	-0.3806	0.1695	5.0433	0.0247
Age_Visit		1	0.00690	0.00697	0.9791	0.3224
EDpre6m		0	0	.	.	.
female	0	1	-0.0772	0.0792	0.9508	0.3295
racecat	Black	1	0.1721	0.1526	1.2710	0.2596
racecat	Hispanic	1	0.1675	0.1248	1.8012	0.1796
racecat	Other	1	-0.4601	0.1919	5.7481	0.0165
MaritalStatus1	0	1	0.00378	0.0941	0.0016	0.9679
Lang		1	0.0699	0.1805	0.1498	0.6987

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
emp	Fulltime	1	0.1045	0.1544	0.4576	0.4988
emp	Other	1	0.0107	0.1046	0.0105	0.9182
emp	Parttime	1	-0.1130	0.1756	0.4140	0.5200
hospital1	BWH	1	-0.0464	0.3110	0.0222	0.8814
hospital1	MGH	1	-0.0155	0.5640	0.0008	0.9781
escort	Other	1	0.0886	0.0882	1.0097	0.3150
amb	0	1	-0.0168	0.1067	0.0249	0.8745
sud	0	1	-0.1879	0.2870	0.4288	0.5126
ses1	0	1	0.4420	0.4212	1.1011	0.2940
ped	0	1	0.1246	0.1745	0.5099	0.4752
Support_system1	0	1	-0.2765	0.1787	2.3943	0.1218
suboptimal_housing1	0	1	-0.2031	0.1443	1.9809	0.1593
anxiety1	0	1	-0.1018	0.0851	1.4320	0.2314
mood_disorder1	0	1	-0.1051	0.0938	1.2568	0.2622
nicotine1	0	1	0.0317	0.1125	0.0792	0.7784
dv1	0	1	-0.1901	0.1217	2.4393	0.1183

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Night	0	1	-0.4940	0.0767	41.5063	<.0001
acuityboth	1	1	2.8845	93.0339	0.0010	0.9753
acuityboth	2	1	-9.7856	465.2	0.0004	0.9832
acuityboth	4	1	1.1989	93.0321	0.0002	0.9897
acuityboth	6	1	2.3846	93.0332	0.0007	0.9796
acuityboth	7	1	1.5060	93.0342	0.0003	0.9871

Odds Ratios

Odds Ratio Estimates

Effect	Point Estimate	90% Wald Confidence Limits	
Type Intervention vs Control	0.683	0.517	0.903
Age_Visit	1.007	0.995	1.019
female 0 vs 1	0.857	0.660	1.112
racecat Black vs White	1.053	0.728	1.523
racecat Hispanic vs White	1.048	0.762	1.442
racecat Other vs White	0.560	0.353	0.886
MaritalStatus1 0 vs 1	1.008	0.739	1.373

Odds Ratio Estimates

Effect	Point Estimate	90% Wald Confidence Limits	
Lang	1.072	0.797	1.443
emp Fulltime vs Student	1.113	0.686	1.804
emp Other vs Student	1.013	0.701	1.463
emp Parttime vs Student	0.895	0.532	1.506
hospital1 BWH vs NSMC	0.897	0.614	1.312
hospital1 MGH vs NSMC	0.926	0.230	3.727
escort Other vs family	1.194	0.893	1.596
amb 0 vs 1	0.967	0.681	1.373
sud 0 vs 1	0.687	0.267	1.765
ses1 0 vs 1	2.420	0.606	9.675
ped 0 vs 1	1.283	0.723	2.278
Support_system1 0 vs 1	0.575	0.320	1.035
suboptimal_housing1 0 vs 1	0.666	0.414	1.071
anxiety1 0 vs 1	0.816	0.617	1.079
mood_disorder1 0 vs 1	0.810	0.595	1.103
nicotine1 0 vs 1	1.065	0.736	1.543

Odds Ratio Estimates			
Effect	Point Estimate	90% Wald Confidence Limits	
dv1 0 vs 1	0.684	0.458	1.020
Night 0 vs 1	0.372	0.289	0.479
acuityboth 1 vs 8	2.924	0.836	10.233
acuityboth 2 vs 8	<0.001	<0.001	>999.999
acuityboth 4 vs 8	0.542	0.343	0.855
acuityboth 6 vs 8	1.774	0.644	4.882
acuityboth 7 vs 8	0.737	0.188	2.893

The LOGISTIC Procedure

Conditional Analysis

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logistic regression - ED: ADJUSTED: baseline ED=1

The LOGISTIC Procedure

Conditional Analysis

Model Information

Model Information	
Data Set	WORK.OUTCOMES
Response Variable	EDpost
Number of Response Levels	2

Model Information	
Number of Strata	237
Number of Uninformative Strata	94
Frequency Uninformative	376
Model	binary logit
Optimization Technique	Newton-Raphson ridge

Observations Summary

Number of Observations Read	948
Number of Observations Used	948

Response Profile

Response Profile		
Ordered Value	EDpost	Total Frequency
1	0	755
2	1	193

Probability modeled is EDpost=1.

Class Level Information

Class Level Information		
Class	Value	Design Variables
Type	Control	0

Class Level Information

Class	Value	Design Variables		
	Intervention	1		
female	0	1		
	1	-1		
racecat	Black	1	0	0
	Hispanic	0	1	0
	Other	0	0	1
	White	-1	-1	-1
MaritalStatus1	0	1		
	1	-1		
emp	Fulltime	1	0	0
	Other	0	1	0
	Parttime	0	0	1
	Student	-1	-1	-1
hospital1	BWH	1	0	
	MGH	0	1	
	NSMC	-1	-1	
escort	Other	1		

Class Level Information

Class	Value	Design Variables
	family	-1
amb	0	1
	1	-1
sud	0	1
	1	-1
ses1	0	1
	1	-1
ped	0	1
	1	-1
Support_system1	0	1
	1	-1
suboptimal_housing1	0	1
	1	-1
anxiety1	0	1
	1	-1
mood_disorder1	0	1
	1	-1

Class Level Information

Class	Value	Design Variables			
nicotine1	0	1			
	1	-1			
dv1	0	1			
	1	-1			
Night	0	1			
	1	-1			
acuityboth	1	1	0	0	0
	4	0	1	0	0
	6	0	0	1	0
	7	0	0	0	1
	8	-1	-1	-1	-1

Strata Summary

Strata Summary

Response Pattern	EDpost		Number of Strata	Frequency
	0	1		
1	1	3	5	20
2	2	2	40	160

Strata Summary

Response Pattern	EDpost		Number of Strata	Frequency
	0	1		
3	3	1	98	392
4	4	0	94	376

Newton-Raphson Ridge Optimization

Without Parameter Scaling

Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Fit Statistics

Model Fit Statistics

Criterion	Without Covariates	With Covariates
AIC	428.917	440.638
SC	428.917	586.269
-2 Log L	428.917	380.638

Global Tests

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	48.2793	30	0.0186

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Score	47.5738	30	0.0219
Wald	40.2195	30	0.1007

Type 3 Tests

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
Type	1	0.0047	0.9455
Age_Visit	1	0.0616	0.8040
EDpre6m	1	0.4012	0.5265
female	1	0.0091	0.9240
racecat	3	0.6656	0.8813
MaritalStatus1	1	0.0666	0.7964
Lang	1	0.6531	0.4190
emp	3	1.7783	0.6197
hospital1	2	0.8280	0.6610
escort	1	1.0047	0.3162
amb	1	1.0493	0.3057

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
sud	1	1.6146	0.2038
ses1	1	2.5948	0.1072
ped	1	0.7390	0.3900
Support_system1	1	0.4028	0.5256
suboptimal_housing1	1	0.6231	0.4299
anxiety1	1	0.0236	0.8778
mood_disorder1	1	11.7880	0.0006
nicotine1	1	0.4079	0.5230
dv1	1	0.3855	0.5347
Night	1	7.6940	0.0055
acuityboth	4	5.0262	0.2846

Parameter Estimates

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Type	Intervention	1	-0.0151	0.2210	0.0047	0.9455
Age_Visit		1	0.00249	0.0100	0.0616	0.8040

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
EDpre6m		1	0.4820	0.7609	0.4012	0.5265
female	0	1	0.0111	0.1165	0.0091	0.9240
racecat	Black	1	-0.1599	0.2326	0.4726	0.4918
racecat	Hispanic	1	-0.0396	0.1753	0.0511	0.8211
racecat	Other	1	0.1300	0.3025	0.1848	0.6673
MaritalStatus1	0	1	0.0373	0.1446	0.0666	0.7964
Lang		1	-0.2090	0.2586	0.6531	0.4190
emp	Fulltime	1	0.2721	0.2267	1.4405	0.2301
emp	Other	1	-0.0413	0.1529	0.0728	0.7873
emp	Parttime	1	-0.2265	0.2523	0.8055	0.3694
hospital1	BWH	1	-0.1086	0.4405	0.0608	0.8052
hospital1	MGH	1	0.4494	0.8015	0.3144	0.5750
escort	Other	1	-0.1365	0.1362	1.0047	0.3162
amb	0	1	0.1670	0.1630	1.0493	0.3057
sud	0	1	-0.9429	0.7421	1.6146	0.2038
ses1	0	1	0.6956	0.4318	2.5948	0.1072

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
ped	0	1	0.2067	0.2404	0.7390	0.3900
Support_system1	0	1	-0.1655	0.2607	0.4028	0.5256
suboptimal_housing1	0	1	-0.1372	0.1739	0.6231	0.4299
anxiety1	0	1	0.0187	0.1213	0.0236	0.8778
mood_disorder1	0	1	-0.4560	0.1328	11.7880	0.0006
nicotine1	0	1	-0.0883	0.1383	0.4079	0.5230
dv1	0	1	-0.1002	0.1614	0.3855	0.5347
Night	0	1	-0.3216	0.1159	7.6940	0.0055
acuityboth	1	1	-0.9678	1.0179	0.9040	0.3417
acuityboth	4	1	-0.5264	0.4674	1.2681	0.2601
acuityboth	6	1	0.9650	0.6556	2.1665	0.1410
acuityboth	7	1	0.4718	0.9926	0.2260	0.6345

Odds Ratios

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Type Intervention vs Control	0.985	0.639	1.519

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Age_Visit	1.002	0.983	1.022
EDpre6m	1.619	0.364	7.194
female 0 vs 1	1.022	0.648	1.614
racecat Black vs White	0.795	0.411	1.537
racecat Hispanic vs White	0.897	0.533	1.509
racecat Other vs White	1.062	0.444	2.544
MaritalStatus1 0 vs 1	1.077	0.611	1.899
Lang	0.811	0.489	1.347
emp Fulltime vs Student	1.318	0.598	2.905
emp Other vs Student	0.964	0.531	1.748
emp Parttime vs Student	0.801	0.338	1.898
hospital1 BWH vs NSMC	1.261	0.654	2.431
hospital1 MGH vs NSMC	2.204	0.207	23.479
escort Other vs family	0.761	0.446	1.298
amb 0 vs 1	1.397	0.737	2.646
sud 0 vs 1	0.152	0.008	2.782

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
ses1 0 vs 1	4.019	0.740	21.840
ped 0 vs 1	1.512	0.589	3.880
Support_system1 0 vs 1	0.718	0.258	1.996
suboptimal_housing1 0 vs 1	0.760	0.384	1.502
anxiety1 0 vs 1	1.038	0.645	1.670
mood_disorder1 0 vs 1	0.402	0.239	0.676
nicotine1 0 vs 1	0.838	0.487	1.441
dv1 0 vs 1	0.818	0.435	1.541
Night 0 vs 1	0.526	0.334	0.828
acuityboth 1 vs 8	0.359	0.032	3.994
acuityboth 4 vs 8	0.558	0.249	1.249
acuityboth 6 vs 8	2.478	0.636	9.661
acuityboth 7 vs 8	1.514	0.146	15.675

The LOGISTIC Procedure

Conditional Analysis

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logistic regression - ED: ADJUSTED: baseline ED=2

The LOGISTIC Procedure

Conditional Analysis

Model Information

Model Information	
Data Set	WORK.OUTCOMES
Response Variable	EDpost
Number of Response Levels	2
Number of Strata	184
Number of Uninformative Strata	54
Frequency Uninformative	216
Model	binary logit
Optimization Technique	Newton-Raphson ridge

Observations Summary

Number of Observations Read	736
Number of Observations Used	736

Response Profile

Response Profile		
Ordered Value	**EDpost**	**Total Frequency**
1	0	531

Response Profile

Ordered Value	EDpost	Total Frequency
2	1	205

Probability modeled is EDpost=1.

Class Level Information

Class Level Information

Class	Value	Design Variables		
Type	Control	0		
	Intervention	1		
female	0	1		
	1	-1		
racecat	Black	1	0	0
	Hispanic	0	1	0
	Other	0	0	1
	White	-1	-1	-1
MaritalStatus1	0	1		
	1	-1		
emp	Fulltime	1	0	0
	Other	0	1	0

Class Level Information

Class	Value	Design Variables		
	Parttime	0	0	1
	Student	-1	-1	-1
hospital1	BWH	1	0	
	MGH	0	1	
	NSMC	-1	-1	
escort	Other	1		
	family	-1		
amb	0	1		
	1	-1		
sud	0	1		
	1	-1		
ses1	0	1		
	1	-1		
ped	0	1		
	1	-1		
Support_system1	0	1		
	1	-1		

Class Level Information

Class	Value	Design Variables			
suboptimal_housing1	0	1			
	1	-1			
anxiety1	0	1			
	1	-1			
mood_disorder1	0	1			
	1	-1			
nicotine1	0	1			
	1	-1			
dv1	0	1			
	1	-1			
Night	0	1			
	1	-1			
acuityboth	1	1	0	0	0
	4	0	1	0	0
	6	0	0	1	0
	7	0	0	0	1
	8	-1	-1	-1	-1

Strata Summary

Strata Summary

Response Pattern	EDpost		Number of Strata	Frequency
	0	1		
1	0	4	1	4
2	1	3	12	48
3	2	2	47	188
4	3	1	71	284
5	4	0	53	212

Newton-Raphson Ridge Optimization

Without Parameter Scaling

Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Fit Statistics

Model Fit Statistics

Criterion	Without Covariates	With Covariates
AIC	398.550	390.117
SC	398.550	528.154
-2 Log L	398.550	330.117

Global Tests

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	68.4333	30	<.0001
Score	63.0499	30	0.0004
Wald	52.0842	30	0.0075

Type 3 Tests

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
Type	1	0.3410	0.5593
Age_Visit	1	0.8517	0.3561
EDpre6m	1	0.2280	0.6330
female	1	0.4838	0.4867
racecat	3	0.2626	0.9669
MaritalStatus1	1	1.3900	0.2384
Lang	1	0.0174	0.8950
emp	3	4.7924	0.1876
hospital1	2	3.4217	0.1807
escort	1	0.0215	0.8835

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
amb	1	3.0363	0.0814
sud	1	0.4411	0.5066
ses1	1	1.0828	0.2981
ped	1	1.0600	0.3032
Support_system1	1	4.6377	0.0313
suboptimal_housing1	1	1.2382	0.2658
anxiety1	1	0.2504	0.6168
mood_disorder1	1	1.2974	0.2547
nicotine1	1	3.1994	0.0737
dv1	1	0.1497	0.6988
Night	1	18.2301	<.0001
acuityboth	4	12.3805	0.0147

Parameter Estimates

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Type	Intervention	1	0.1374	0.2352	0.3410	0.5593

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Age_Visit		1	0.00946	0.0102	0.8517	0.3561
EDpre6m		1	0.0927	0.1942	0.2280	0.6330
female	0	1	0.0857	0.1232	0.4838	0.4867
racecat	Black	1	-0.1155	0.2340	0.2438	0.6215
racecat	Hispanic	1	-0.0121	0.1966	0.0038	0.9509
racecat	Other	1	0.1334	0.3336	0.1599	0.6892
MaritalStatus1	0	1	0.1787	0.1516	1.3900	0.2384
Lang		1	0.0405	0.3074	0.0174	0.8950
emp	Fulltime	1	-0.3020	0.2392	1.5949	0.2066
emp	Other	1	-0.1109	0.1759	0.3975	0.5284
emp	Parttime	1	-0.1941	0.2604	0.5554	0.4561
hospital1	BWH	1	-0.8240	0.4772	2.9819	0.0842
hospital1	MGH	1	1.6322	0.8825	3.4211	0.0644
escort	Other	1	0.0198	0.1351	0.0215	0.8835
amb	0	1	-0.2854	0.1638	3.0363	0.0814
sud	0	1	0.2701	0.4067	0.4411	0.5066

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
ses1	0	1	0.4588	0.4409	1.0828	0.2981
ped	0	1	0.2550	0.2476	1.0600	0.3032
Support_system1	0	1	0.7413	0.3442	4.6377	0.0313
suboptimal_housing1	0	1	-0.1809	0.1625	1.2382	0.2658
anxiety1	0	1	-0.0699	0.1398	0.2504	0.6168
mood_disorder1	0	1	-0.1567	0.1376	1.2974	0.2547
nicotine1	0	1	-0.2477	0.1385	3.1994	0.0737
dv1	0	1	-0.0635	0.1641	0.1497	0.6988
Night	0	1	-0.5871	0.1375	18.2301	<.0001
acuityboth	1	1	-0.1345	0.8630	0.0243	0.8762
acuityboth	4	1	-1.4879	0.4540	10.7408	0.0010
acuityboth	6	1	0.3781	0.6474	0.3411	0.5592
acuityboth	7	1	1.6770	1.0815	2.4042	0.1210

Odds Ratios

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Type Intervention vs Control	1.147	0.723	1.819
Age_Visit	1.010	0.989	1.030
EDpre6m	1.097	0.750	1.605
female 0 vs 1	1.187	0.732	1.924
racecat Black vs White	0.896	0.474	1.694
racecat Hispanic vs White	0.994	0.559	1.765
racecat Other vs White	1.149	0.458	2.883
MaritalStatus1 0 vs 1	1.430	0.789	2.590
Lang	1.041	0.570	1.902
emp Fulltime vs Student	0.403	0.169	0.963
emp Other vs Student	0.488	0.237	1.003
emp Parttime vs Student	0.449	0.180	1.120
hospital1 BWH vs NSMC	0.984	0.515	1.881
hospital1 MGH vs NSMC	11.479	0.851	154.842
escort Other vs family	1.040	0.613	1.767
amb 0 vs 1	0.565	0.297	1.074

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
sud 0 vs 1	1.716	0.349	8.453
ses1 0 vs 1	2.503	0.444	14.100
ped 0 vs 1	1.665	0.631	4.396
Support_system1 0 vs 1	4.404	1.143	16.978
suboptimal_housing1 0 vs 1	0.696	0.368	1.317
anxiety1 0 vs 1	0.869	0.503	1.504
mood_disorder1 0 vs 1	0.731	0.426	1.253
nicotine1 0 vs 1	0.609	0.354	1.049
dv1 0 vs 1	0.881	0.463	1.676
Night 0 vs 1	0.309	0.180	0.530
acuityboth 1 vs 8	1.347	0.177	10.273
acuityboth 4 vs 8	0.348	0.154	0.785
acuityboth 6 vs 8	2.250	0.539	9.398
acuityboth 7 vs 8	8.246	0.625	108.849

The LOGISTIC Procedure

Conditional Analysis

logistic regression - ED: ADJUSTED: baseline ED=4

The LOGISTIC Procedure

Conditional Analysis

Model Information

Model Information	
Data Set	WORK.OUTCOMES
Response Variable	EDpost
Number of Response Levels	2
Number of Strata	88
Number of Uninformative Strata	21
Frequency Uninformative	84
Model	binary logit
Optimization Technique	Newton-Raphson ridge

Observations Summary

Number of Observations Read	352
Number of Observations Used	352

Response Profile

Response Profile

Ordered Value	EDpost	Total Frequency
1	0	163
2	1	189

Probability modeled is EDpost=1.

Class Level Information

Class Level Information

Class	Value	Design Variables		
Type	Control	0		
	Intervention	1		
female	0	1		
	1	-1		
racecat	Black	1	0	0
	Hispanic	0	1	0
	Other	0	0	1
	White	-1	-1	-1
MaritalStatus1	0	1		
	1	-1		
emp	Fulltime	1	0	0

Class Level Information

Class	Value	Design Variables		
	Other	0	1	0
	Parttime	0	0	1
	Student	-1	-1	-1
hospital1	BWH	1	0	
	MGH	0	1	
	NSMC	-1	-1	
escort	Other	1		
	family	-1		
amb	0	1		
	1	-1		
sud	0	1		
	1	-1		
ses1	0	1		
	1	-1		
ped	0	1		
	1	-1		
Support_system1	0	1		

Class Level Information

Class	Value	Design Variables			
	1	-1			
suboptimal_housing1	0	1			
	1	-1			
anxiety1	0	1			
	1	-1			
mood_disorder1	0	1			
	1	-1			
nicotine1	0	1			
	1	-1			
dv1	0	1			
	1	-1			
Night	0	1			
	1	-1			
acuityboth	1	1	0	0	0
	4	0	1	0	0
	6	0	0	1	0
	7	0	0	0	1

Class Level Information					
Class	Value	Design Variables			
	8	-1	-1	-1	-1

Strata Summary

Strata Summary				
Response Pattern	EDpost		Number of Strata	Frequency
	0	1		
1	0	4	13	52
2	1	3	20	80
3	2	2	30	120
4	3	1	17	68
5	4	0	8	32

Newton-Raphson Ridge Optimization

Without Parameter Scaling

Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Newton-Raphson Ridge Optimization

Without Parameter Scaling

Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Fit Statistics

Model Fit Statistics

Criterion	Without Covariates	With Covariates
AIC	210.091	217.636
SC	210.091	329.681
-2 Log L	210.091	159.636

Global Tests

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	50.4554	29	0.0081
Score	40.6693	29	0.0736
Wald	31.1841	29	0.3568

Type 3 Tests

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
Type	1	0.2621	0.6087
Age_Visit	1	0.0911	0.7627
EDpre6m	1	6.8445	0.0089

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
female	1	0.4433	0.5056
racecat	3	1.3660	0.7135
MaritalStatus1	1	0.4470	0.5037
Lang	1	1.1351	0.2867
emp	3	2.7435	0.4329
hospital1	2	1.2758	0.5284
escort	1	0.1259	0.7227
amb	1	1.9264	0.1652
sud	1	0.3728	0.5415
ses1	1	0.0001	0.9924
ped	1	0.1931	0.6603
Support_system1	1	1.3515	0.2450
suboptimal_housing1	1	12.2098	0.0005
anxiety1	1	0.3576	0.5499
mood_disorder1	1	0.1194	0.7297
nicotine1	1	0.3574	0.5500

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
dv1	1	0.1598	0.6893
Night	1	1.9579	0.1617
acuityboth	3	1.8996	0.5935

Parameter Estimates

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Type	Intervention	1	0.1935	0.3779	0.2621	0.6087
Age_Visit		1	0.00440	0.0146	0.0911	0.7627
EDpre6m		1	0.1597	0.0610	6.8445	0.0089
female	0	1	-0.1218	0.1829	0.4433	0.5056
racecat	Black	1	-0.4045	0.4102	0.9724	0.3241
racecat	Hispanic	1	0.2103	0.3472	0.3670	0.5447
racecat	Other	1	0.0258	0.6460	0.0016	0.9681
MaritalStatus1	0	1	0.1349	0.2018	0.4470	0.5037
Lang		1	0.5419	0.5086	1.1351	0.2867
emp	Fulltime	1	-0.6962	0.4288	2.6359	0.1045

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
emp	Other	1	0.0937	0.2835	0.1092	0.7410
emp	Parttime	1	0.0921	0.4719	0.0381	0.8453
hospital1	BWH	1	0.9604	158.5	0.0000	0.9952
hospital1	MGH	1	-2.5398	316.9	0.0001	0.9936
escort	Other	1	-0.0798	0.2249	0.1259	0.7227
amb	0	1	0.3081	0.2219	1.9264	0.1652
sud	0	1	-0.2852	0.4671	0.3728	0.5415
ses1	0	1	9.0538	950.8	0.0001	0.9924
ped	0	1	0.1839	0.4186	0.1931	0.6603
Support_system1	0	1	-0.4933	0.4243	1.3515	0.2450
suboptimal_housing1	0	1	-0.7435	0.2128	12.2098	0.0005
anxiety1	0	1	0.1170	0.1957	0.3576	0.5499
mood_disorder1	0	1	-0.0662	0.1917	0.1194	0.7297
nicotine1	0	1	-0.1215	0.2033	0.3574	0.5500
dv1	0	1	-0.0982	0.2457	0.1598	0.6893
Night	0	1	-0.2876	0.2055	1.9579	0.1617

Analysis of Conditional Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
acuityboth	1	1	-11.7787	1426.2	0.0001	0.9934
acuityboth	4	1	3.3467	475.4	0.0000	0.9944
acuityboth	6	1	4.4349	475.4	0.0001	0.9926
acuityboth	7	0	0	.	.	.

Odds Ratios

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Type Intervention vs Control	1.213	0.579	2.545
Age_Visit	1.004	0.976	1.034
EDpre6m	1.173	1.041	1.322
female 0 vs 1	0.784	0.383	1.606
racecat Black vs White	0.564	0.198	1.605
racecat Hispanic vs White	1.043	0.457	2.379
racecat Other vs White	0.867	0.150	5.002
MaritalStatus1 0 vs 1	1.310	0.594	2.889
Lang	1.719	0.634	4.659

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
emp Fulltime vs Student	0.299	0.061	1.465
emp Other vs Student	0.659	0.178	2.444
emp Parttime vs Student	0.658	0.112	3.850
hospital1 BWH vs NSMC	0.539	0.184	1.576
hospital1 MGH vs NSMC	0.016	<0.001	>999.999
escort Other vs family	0.852	0.353	2.059
amb 0 vs 1	1.852	0.776	4.420
sud 0 vs 1	0.565	0.091	3.527
ses1 0 vs 1	>999.999	<0.001	>999.999
ped 0 vs 1	1.445	0.280	7.453
Support_system1 0 vs 1	0.373	0.071	1.967
suboptimal_housing1 0 vs 1	0.226	0.098	0.521
anxiety1 0 vs 1	1.264	0.587	2.721
mood_disorder1 0 vs 1	0.876	0.413	1.857
nicotine1 0 vs 1	0.784	0.353	1.740
dv1 0 vs 1	0.822	0.314	2.152

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Night 0 vs 1	0.563	0.251	1.259
acuityboth 1 vs 8	<0.001	<0.001	>999.999
acuityboth 4 vs 8	0.522	0.171	1.591
acuityboth 6 vs 8	1.549	0.341	7.046