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Gender as risk factor for 30 days post-discharge hospital utilisation: a secondary data analysis

Shaula Woz,¹ Suzanne Mitchell,¹ Caroline Hesko,¹ Michael Paasche-Orlow,² Jeffrey Greenwald,² V K Chetty,¹ Julie O'Donnell,¹ Brian Jack¹

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SM is a consultant and speaker for the non-product health topics series on relationship centred care for Merck & Co.

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¹Department of Family Medicine, Boston University School of Medicine, Boston, Massachusetts, USA

²Section of General Internal Medicine, Department of Medicine, Boston University School of Medicine, Boston, Massachusetts, USA

Correspondence to

Dr Suzanne Mitchell;
suzanne.mitchell@bmc.org

ABSTRACT

Objective: In the 30 days after hospital discharge, hospital utilisation is common and costly. This study evaluated the association between gender and hospital utilisation within 30 days of discharge.

Design: Secondary data analysis using Poisson regression stratified by gender.

Participants: 737 English-speaking hospitalised adults from general medical service in urban, academic safety-net medical centre who participated in the Project Re-Engineered clinical trial (clinicaltrials.gov identifier: NCT00252057).

Main outcome measure: The primary end point was hospital utilisation, defined as total emergency department visits and hospital readmissions within 30 days after index discharge.

Results: Female subjects had a rate of 29 events for every 100 people and male subjects had a rate of 47 events for every 100 people (incident rate ratio (IRR) 1.62, 95% CI 1.28 to 2.06). Among men, risk factors included hospital utilisation in the 6 months prior to the index hospitalisation (IRR 3.55, 95% CI 2.38 to 5.29), being unmarried (IRR 1.72, 95% CI 1.12 to 2.64), having a positive depression screen (IRR 1.53, 95% CI 1.09 to 2.13) and no PCP visit within 30 days (IRR 1.64, 95% CI 1.08 to 2.50). Among women, the only risk factor was hospital utilisation in the 6 months prior to the index hospitalisation (IRR 3.08, 95% CI 1.86 to 5.10).

Conclusions: In our data, male subjects had a higher rate of hospital utilisation within 30 days of discharge than female subjects. For men—but not for women—risk factors were being retired, unmarried, having depressive symptoms and having no PCP visit within 30 days. Interventions addressing these factors might lower hospital utilisation rates observed among men.

INTRODUCTION

Hospital utilisation in the 30 days after discharge is costly and may be a marker of poor quality of care. In 2004, the cost for hospital readmissions among Medicare recipients was estimated to be \$17.4 billion.¹ Accordingly, the Affordable Care Act

ARTICLE SUMMARY

Article focus

- Early hospital readmission is a common and costly occurrence in the USA. Men often use hospital emergency departments for usual source of medical care.
- We aimed to study whether men are therefore more likely to be readmitted to the hospital within 30 days of an index discharge.

Key messages

- Men have higher rates of 30-day readmission to hospital than women in this study group. Men also were less likely to complete a follow-up appointment with their primary care physician after discharge.
- Interventions that promote connecting men to primary care, address social isolation and screen for depressive symptoms may reduce the risk for early readmission among men.

Strengths and limitations of this study

- This analysis was conducted with the Project RED data set, which included, and allowed controlling for certain clinical and social confounders in our analysis such as subjects' comorbidity burden, depression symptoms, homelessness, substance abuse and other similar risk factors, in our analysis.
- This study is limited in that it was conducted at an urban safety-net hospital and may not be generalisable to other types of hospital systems.
- We also relied on subject self-report of any rehospitalisation events outside of the study site, however, were able to confirm 91% of all events using our hospital electronic medical record system.

includes multiple provisions designed to improve care transitions. The act includes both funding to stimulate hospitals and community-based providers to coordinate post-discharge services and a programme to withhold payments, of progressively increasing amounts, to hospitals that demonstrate higher rates of readmission within 30 days after discharge.² The extent to

which readmissions are preventable is debated.^{3 4} However, given the magnitude of the problem, even a moderate reduction in unnecessary readmissions could have a large economic impact. In fact, we have shown that hospital readmissions can be moderately reduced.⁵

With prospective identification of patients at high risk of being readmitted, providers could potentially direct resources to prevent the readmission. In order to fulfil this goal in an efficient and effective manner, providers will need to be able to identify the patients with high risk and may need to understand how to adapt services according to the risk factors identified.

Several factors associated with 30-day rehospitalisation have been well characterised. These include older age,^{6 7} comorbidity,⁷ income level,⁸ history of prior hospitalisation,^{6 7} increased length of stay in the index hospitalisation,⁹ minority ethnicity,^{7 10} depressive symptoms,^{11 12} alcohol and drug use¹⁰ and specific clinical conditions (eg, congestive heart failure).^{6 7} The role of male gender as a risk factor for post-discharge hospital utilisation has been noted in several disease-specific contexts; yet, to our knowledge, no study of post-discharge hospital utilisation has focused on gender. While gender is not typically considered a modifiable factor, established patterns of health service utilisation that are associated with gender (ie, lower rates of preventive care and fewer visits to primary care among men) may put men at higher risk for poor outcomes after hospital discharge.¹³

Therefore, we conducted a secondary analysis of the Re-engineered Discharge (RED) clinical trial data set to assess the association between gender and the rate of post-discharge hospital utilisation among a cohort of adult patients hospitalised in an urban safety-net hospital. In addition, we sought to identify potential factors contributing to gender-based differences.

METHODS

A full description of the methods for the Project RED trial has been described previously.⁵ Briefly, the Project RED trial was a two-armed randomised controlled trial of English-speaking adult patients, 18 years or older, admitted to the teaching service of Boston Medical Center. Seven hundred and forty-nine subjects were enrolled and randomised: 376 in the usual care arm and 373 in the intervention arm. Patients had to have a telephone, be able to comprehend study details and the consent process in English and have plans to be discharged to a US community. Patients were not enrolled if they were admitted from a skilled nursing facility or other hospital, transferred to a different hospital service, admitted for a planned hospitalisation, on hospital precautions, on suicide watch, deaf or blind. A total of 3873 were assessed for eligibility. Due to a lack of available research staff, 1616 patients were not assessed. Of those assessed for eligibility, 1049 did not meet eligibility criteria, 120 were previously enrolled, 527 refused to participate, 474 were unavailable in their hospital room at the time of enrolment and 954 were not

approached because the maximum enrolled subject number was reached that day. Seven hundred and forty-nine subjects were enrolled and randomised: 376 in the usual care arm and 373 in the intervention arm. The Institutional Review Board of Boston University approved all study activities. Baseline demographic and clinical characteristics were similar across the study arms.

Primary outcome

The primary outcome was the rate of post-discharge hospital utilisation, defined as the total number of emergency department (ED) visits and readmissions per subject, within 30 days of their index discharge. Any ED visit in which a subject was subsequently admitted to the hospital was only counted as a readmission.

Primary independent variable and covariates

The primary independent variable, gender (male or female), was defined by the hospital electronic medical record (EMR). Potential confounders were identified a priori from the literature on factors associated with post-discharge hospital utilisation and gender including age, marital status, health literacy score,¹⁴ Charlson score,¹⁵ insurance type, employment status, income level, homeless status, hospital utilisation within the 6 months prior to the index hospitalisation, educational attainment, length of hospital stay, race/ethnicity, depressive symptoms and Project RED study group assignment.

Data collection

Outcome data were collected by Project RED research staff, blinded to group assignment, by review of the hospital's EMRs and by contacting subjects by telephone 30 days post-discharge. Dates of subsequent ED visits and readmissions at Boston Medical Center were obtained from the EMRs, while those at other hospitals were collected through subject report. Those subjects who could not be reached within 60 days post-discharge were assumed alive and hospital EMRs were relied upon for primary outcomes. Randomisation provided a balanced study sample, with an equal proportion of male and female participants assigned to each arm of the original trial. Of 749 subjects who had participated in a randomised clinical trial (Project RED), 737 participants were included in this secondary analysis and 12 subjects were removed due to death prior to index discharge,⁶ requested removal,¹³ previously enrolled¹ and missing data.¹ Data for selected covariates were collected by self-report (age, race, income, marital status, education attainment, employment status, insurance type, homelessness) or using validated tools (health literacy, depressive symptoms) or EMR (length of stay, prior utilisation, Charlson score).

Statistical analysis

Socio-demographic and clinical characteristics of the subjects were compared by gender. Bivariate analyses were conducted to identify gender differences and

potential confounders between gender and post-discharge hospital utilisation within 30 days of index discharge. χ^2 Tests were utilised for categorical variables and t tests for continuous variables. A Poisson regression was conducted using relevant potential confounders to construct the final best-fit model determining the strength of association between gender and hospital utilisation. Several interaction terms in our initial Poisson regression were significant. We therefore decided to evaluate potential interactions between gender and hospital utilisation using a stratified Poisson regression analysis.

Age, length of stay and Charlson score were used as continuous variables. Gender (male or female), marital status (married, not married) and homelessness (homeless within the last 3 months) were treated as dichotomous variables. Categorical variables were created for prior hospital utilisation (no prior visits, one to two prior visits or three or more prior visits in the previous 6 months), educational attainment (less than high school graduate, high school graduate or GED or any college), insurance type (Medicare, Medicaid, private insurance or Massachusetts State Subsidised Free Care), income level (no income, <\$10 000/year, \$10 000–20 000, \$20 000 or more or declined to answer), level of health literacy (grade 3 and below, grades 4–6, grades 7–8 or grade 9 and above) according to the Rapid Estimate of Adult Literacy in Medicine and employment status (employed, not employed, disabled, retired or other).

Hospital utilisation is defined as the sum of emergency room visits and hospitalisations (an emergency room visit that leads to a hospitalisation is counted only as a hospitalisation). Hospital utilisation incidence rates were calculated as the number of hospital utilisation events within 30 days of discharge per subject. Person-time was measured in months. The unadjusted incident rate ratio (IRR) was calculated as the ratio of the rate of hospital utilisation among male patients versus female patients using Poisson regression. p Values and CIs were corrected for over dispersion if necessary.

Poisson models were used to test for statistically significant differences in the number of post-discharge hospital utilisation events at 30 days. Two-sided significance tests were used. p Values of <0.05 were considered to indicate statistical significance. A Kaplan–Meier survival curve was generated for the time to multiple hospital utilisation events for the 30-day period following the index discharge and compared using a log-rank test. All data were analysed with S-Plus 8.0.

RESULTS

The analytic cohort included 367 male subjects and 370 female subjects. Socio-demographic, healthcare utilisation and health status indicator variables, stratified by gender, are shown in [table 1](#). Gender differences existed among a number of variables. For example, male subjects were approximately 4 years younger and were more likely to be white non-Hispanic or Hispanic and

less likely black non-Hispanic than female subjects. Men reported a relatively higher income, with almost 10% more men reporting an annual personal income of \$20 000 or more compared with women. Male subjects were more likely to have private insurance, while female subjects were more likely to have Medicaid. Women reported having a PCP at baseline at a significantly higher rate than men (88% vs 74%, $p<0.001$). Women also had higher levels of depressive symptoms (Patient Health Questionnaire-9, 2.5 vs 1.9), were more likely to report a history of having been diagnosed as having depression (46% vs 26%) and were more likely to report currently taking medicine for depression (26% vs 13%).

Hospital utilisation

Female subjects had a rate of 29 events per 100 people per month and male subjects had a rate of 47 events per 100 people per month (IRR 1.62, 95% CI 1.28 to 2.06) ([table 2](#)). This difference is largely attributable to a higher rate of ED visits among male subjects (IRR 2.04, 95% CI 1.45 to 2.86). Furthermore, Kaplan–Meier survival curves for the time to multiple hospital utilisation events in the 30 days following index discharge showed that men were more likely to return to the hospital ($p=0.04$) ([figure 1](#)). At the 30-day follow-up telephone call, fewer men reported understanding their appointments after leaving the hospital compared with women (78% and 87%, $p=0.005$, respectively) ([table 2](#)). In addition, at 30 days post-discharge, women reported visiting their PCPs at a higher rate within the 30 days after their hospital discharge (57% and 49%, $p=0.04$, respectively).

Risk factors for hospital reutilisation by gender

A Poisson regression that is stratified by gender is shown in [table 3](#). The model is controlled for age, previous hospital visits, employment, marital status, depression, study group, having a PCP at baseline and attending a PCP appointment. Among women, the only predictive factor was hospital utilisation in the 6 months prior to the index hospitalisation. Prior hospitalisation was also a risk factor for returning to the hospital within 30 days among men; however, additional significant factors were (1) being retired, (2) not married, (3) having a positive depression screen, (4) reporting no PCP visit within 30 days and (5) not being reached for the follow-up call at 30 days.

DISCUSSION

Among our subjects, we found that men have a higher rate of hospital utilisation within 30 days of hospital discharge than women. ED visits accounted for most of this difference. Among both men and women, prior hospital utilisation is predictive of future utilisation; however, risk factors including being retired, unmarried and having a positive depression screen were identified as risk factors exclusively in men. Additionally, men fared more poorly at understanding and attending their follow-up appointments, which also appeared to be an

Table 1 Baseline characteristics of subjects by gender

Characteristics	Male (n=367)	Female (n=370)	p Value
Socio-demographics			
Study arm, intervention	195 (53)	174 (47)	0.10
Age, mean (SD), years	47.9 (14.5)	51.6 (15.5)	<0.01
Race, n (%)			
White non-Hispanic	113 (34)	92 (27)	0.02
Black non-Hispanic	171 (51)	215 (62)	
Hispanic	44 (13)	30 (9)	
Other race or mixed race	7 (2)	9 (3)	
Annual personal income, n (%)			
No income	54 (15)	45 (12)	<0.01
<\$10 000	53 (15)	83 (22)	
\$10 000–\$19 999	59 (16)	71 (19)	
\$20 000 or more	102 (28)	72 (19)	
Declined to answer	97 (27)	99 (27)	
Health insurance, n (%)			
Private	66 (18)	53 (14)	<0.01
Medicaid	157 (43)	199 (54)	
Medicare	46 (13)	52 (14)	
Free care†	93 (26)	64 (17)	
Highest educational level, n (%)			
Some high school	97 (26)	91 (25)	0.75
High school graduate or GED	136 (37)	146 (40)	
Any college	134 (37)	131 (36)	
REALM health literacy score, mean (SD)	48.1 (21.4)	49.5 (21.1)	0.35
Health literacy level‡, n (%)			
Grade 3 and below	55 (15)	52 (15)	0.31
Grades 4–6	45 (13)	31 (9)	
Grades 7–8	107 (30)	121 (34)	
Grade 9 and above	149 (42)	154 (43)	
Current marital status, n (%)			
Married	112 (31)	116 (31)	0.83
Not married	253 (69)	253 (69)	
Current employment status, n (%)			
Employed	149 (41)	116 (31)	<0.01
Unemployed	72 (20)	70 (19)	
Disabled	78 (21)	86 (23)	
Retired	58 (16)	73 (20)	
Other (student, homemaker, other)	8 (2)	24 (7)	
Homeless in last 3 months, n (%)	40 (11)	35 (10)	0.52
Healthcare utilisation			
Hospital utilisation (hospital utilisations in 6 months prior to index admission)			
0	165 (45)	143 (39)	0.23
1–2	125 (34)	143 (39)	
≥3	77 (21)	82 (22)	
Prior hospital admissions, mean (SD)§			
Prior ED visits, mean (SD)§	0.66 (1.4)	0.66 (1.1)	0.97
Length of stay, mean (SD), days	0.9 (1.8)	1.0 (1.6)	0.40
Had PCP at enrolment, n (%)	2.7 (3.6)	2.6 (2.5)	0.51
	271 (74)	324 (88)	<0.01
Health status indicators			
Charlson comorbidity score,¶ mean (SD)	1.1 (1.9)	1.4 (1.9)	0.05
SF-12,** mean (SD)			
PCS	40.7 (7.0)	40.2 (7.6)	0.30
MCS	46.6 (9.2)	46.3 (9.9)	0.67
PHQ-9 depression screen, †† mean (SD)	1.9 (2.2)	2.5 (2.3)	<0.01
PHQ-9 depression screen, †† n (%)			
Major depressive disorder, n (%)	48 (13)	72 (19)	0.02
Other depressive disorder, n (%)	56 (15)	60 (16)	0.76
Any depressive disorder, n (%)	104 (29)	132 (36)	0.04

Continued

Table 1 Continued

Characteristics	Male (n=367)	Female (n=370)	p Value
Patient reported depression questions			
Ever given clinical depression diagnosis	95 (26)	169 (46)	<0.01
Ever prescribed meds for depression	82 (22)	153 (41)	<0.01
Currently taking meds for depression	46 (13)	98 (26)	<0.01
Completed treatment for depression	1 (<0.1)	0	0.32
Treatment for depression successful	12 (3)	19 (5)	0.21
Ever stopped taking depression meds without telling clinician	21 (6)	37 (10)	0.03

*Not all column percentages sum to 100% due to missing values.

†Free care refers to a Massachusetts state programme for uninsured patients.

‡REALM health literacy categories correspond to total REALM scores of grade 3 and below (0–18), grades 4–6 (19–44), grades 7–8 (45–60), grade 9 and above (61–66).

§Prior hospital admissions and ED visits include those that occurred within 6 months prior to index admission.

¶Charlson comorbidity index reflects the cumulative increased likelihood of 1-year mortality; the higher the score, the more severe the burden of comorbidity; a 35% increase in risk of dying is reflected in a one-point increase in weights. Minimum score equals 0, no maximum score.

**Short Form-12 Health Survey (SF-12)—Physical Component Summary (PCS): range 0–100, mean score for US population=50 (SD=10), higher scores suggest greater physical functional status. Mental Component Summary (MCS): range 0–100, mean score for US population=50 (SD=10), higher scores suggest greater mental functional status.

††Patient Health Questionnaire (PHQ-9): 9-item 4-point Likert scale, standard scoring algorithm to diagnose major and minor depression and anxiety disorders.

ED, emergency department; REALM, Rapid Estimate of Adult Literacy in Medicine.

independent risk factor for returning to the hospital for men in this study.

Identifying and addressing risk factors associated with early post-discharge hospital utilisation is useful so that resources can be efficiently tailored to each individual patient's risk profile. Ideally, methods to ameliorate important risk factors are available. Some risk factors, like gender, however, may seem inherently immutable.

Yet, as we demonstrated in this study, male gender is associated with other parameters that could potentially be effectively targeted.

Our findings raise the possibility that social isolation—as illustrated by the positive association with being retired, unmarried and symptoms of depression—may be important factors to target for intervention. Supporting these findings are studies examining

Table 2 Primary and secondary outcomes, by gender

	Men	Women	p Value
Primary outcomes ≤30 days after index hospitalisation			
Patients, n	367	370	
Hospital utilisations, n (visits/patient/mo)*	174 (0.474)	108 (0.292)	<0.01
IRR (95% CI)	1.62 (1.28 to 2.06)	REF	
Emergency department visits, n (visits/patient/mo)	101 (0.275)	50 (0.135)	<0.01
IRR (95% CI)	2.04 (1.45 to 2.86)	REF	
Readmissions, n (visits/patient/mo)	73 (0.199)	58 (0.157)	0.09
IRR (95% CI)	1.27 (0.90 to 1.79)	REF	
Secondary outcomes†			
Patients reached for 30-day follow-up call, n (%)	292 (80)	322 (87)	<0.01
Able to identify PCP name, n (%)	224 (77)	284 (88)	<0.01
PCP appt scheduled prior to discharge, n (%)	223 (60)	230 (63)	0.41
Visited PCP, n (%)	142 (49)	183 (57)	0.04
Visited specialist, n (%)	81 (28)	105 (33)	0.19
Able to identify discharge diagnosis, n (%)	212 (73)	247 (77)	0.24
How well did you understand your appointments after you left the hospital?‡ (those reporting understood well or very well)	210 (78%)	263 (87%)	<0.01
How well did you understand how to take your medications after leaving the hospital? (those reporting understood well or very well)	227 (84%)	270 (88%)	0.12
How well did you understand your main problem or diagnosis when you left the hospital? (those reporting understood well or very well)	175 (62%)	190 (61%)	0.65
How prepared were you to leave the hospital? (those reporting well prepared or very well)	175 (62%)	185 (59%)	0.40

*Defined as sum of emergency department (ED) visits plus rehospitalisations. Note: An ED visit that leads to a rehospitalisation is counted only as a rehospitalisation.

†Denominators reflect those subjects reached at 30-day follow-up phone call and those that answered question.

‡Questions asked on a 5-point Likert scale; Per cent reflects subjects who responded with either of the top two categories on the scale (ie, 'very prepared' or 'prepared').

IRR, incidence rate ratios.

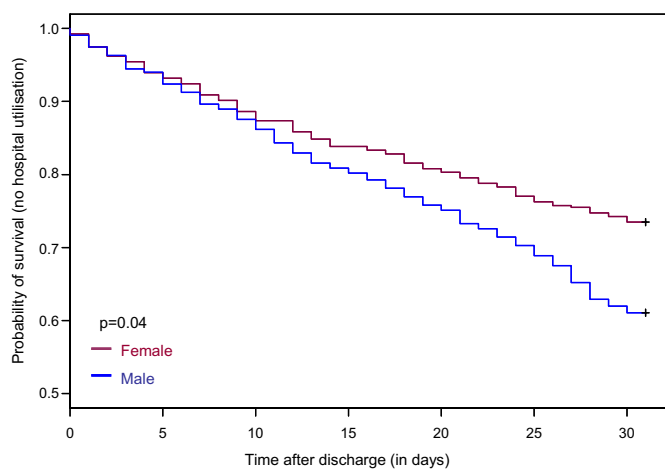


Figure 1 Kaplan–Meier curve: time to multiple hospitalisation events by gender.

the impact of social support and social networks. These studies have found that, in general, men are more socially isolated than women and that this contributes to worse health outcomes among men.^{13 16} Men who were socially isolated were found to be less likely to undergo screening for blood pressure, cholesterol and cancer.¹⁶

Other studies suggest that men report less help-seeking behaviours, use primary care less¹⁰ and are less likely to have a primary care physician when compared with women.¹³ Overall, women use more health services

than men due to pregnancy and cervical and breast cancer screening programmes.⁶ However, lower rate of connectedness to primary care among men may also contribute to their excess use of hospital services and the finding that they may delay accessing care when it is needed.¹⁷ Perhaps paradoxically, one study showed that increased access to primary care actually increased subsequent hospital utilisation; however, this study was conducted in the VA with almost exclusively male subjects and may have reflected appropriate use of hospital services among those who had been previously underserved.¹⁸ Evidence suggests other factors that may impact a man’s health-seeking behaviour including (1) men may have an overly optimistic perception of their health status, (2) the role women play in care-seeking decisions of men, (3) the influence of social networks and mood disorders and (4) the relatively lower value men appear to place on preventive care.^{13 17}

Mood disorders can exacerbate the impact of social isolation on health. Men are far less likely than women to seek help for depression or anxiety.¹⁹ Even when they do present for care, depression is often misdiagnosed or overlooked by providers.²⁰ These differences may be due to the differences in perceptions of distress experienced by men and women but may contribute to the low help-seeking behaviours exhibited by men. Still, given the effective treatment available for depression and anxiety disorders, depression represents a targetable risk for reducing unwarranted hospital utilisation by men.

Table 3 Adjusted incidence rate ratios (IRRs) and 95% CIs for socio-demographic characteristics on hospital utilisation in 30 days after index discharge

Variable	Total (n=737), IRR* (95% CI)	Male (n=367), IRR* (95% CI)	Female (n=370), IRR* (95% CI)
Age	0.99 (0.98 to 1.00)	0.98 (0.97 to 0.99)	1.00 (0.99 to 1.02)
Gender			
Female	Ref	–	–
Male	1.55 (1.20 to 2.00)	–	–
Previous hospital visits (6 months)			
None	Ref	Ref	Ref
1–2	1.32 (0.95 to 1.83)	1.38 (0.89 to 2.13)	1.31 (0.78 to 2.21)
≥3	3.20 (2.35 to 4.35)	3.55 (2.38 to 5.29)	3.08 (1.86 to 5.10)
Employment status			
Employed	Ref	Ref	Ref
Not employed	1.13 (0.79 to 1.63)	1.31 (0.81 to 2.11)	0.97 (0.54 to 1.73)
Retired	2.29 (1.46 to 3.61)	3.27 (1.83 to 5.86)	1.10 (0.53 to 2.30)
Disabled	1.23 (0.86 to 1.75)	1.40 (0.88 to 2.23)	0.91 (0.53 to 1.59)
Other	1.53 (0.84 to 2.80)	0.86 (0.26 to 2.80)	1.70 (0.81 to 3.58)
Marital status			
Married	Ref	Ref	Ref
Not married	1.51 (1.10 to 2.06)	1.72 (1.12 to 2.64)	1.33 (0.83 to 2.15)
Positive depression screen	1.55 (1.20 to 2.00)	1.53 (1.09 to 2.13)	1.44 (0.96 to 2.15)
Study group, intervention	0.78 (0.61 to 1.00)	0.89 (0.65 to 1.23)	0.76 (0.50 to 1.13)
Visited PCP			
Yes	Ref	Ref	Ref
No	1.43 (1.07 to 1.93)	1.64 (1.08 to 2.50)	1.40 (0.92 to 2.14)
Not reached for follow-up call	2.16 (1.56 to 2.97)	2.19 (1.91 to 4.43)	1.07 (0.58 to 1.99)
Report PCP at baseline	0.96 (0.70 to 1.31)	1.22 (0.83 to 1.80)	0.57 (0.33 to 0.99)

This analysis suggests that approaches to mitigate the risk of post-discharge rehospitalisations or ED visits among men may be to develop interventions that promote a connection to primary care, address social isolation and diagnose and treat depressive symptoms. Addressing these risks will require a creative and innovative approach including methods like routine screening for depressive symptoms, more aggressive empowerment of patients to engage the healthcare system proactively rather than reactively and establishing group visits within primary care to foster a social environment paired with the provision of primary care services and health education, as has been used in diabetes care and other chronic illnesses.²¹

This study has several limitations. Data on hospital utilisation outside Boston Medical Center were determined using patient self-report and not confirmed by EMR review at other hospitals. We were, however, able to confirm 91% of all events by consulting our own EMR. Second, our results may not be generalisable to populations other than those served by urban safety-net hospitals or other populations excluded from the RED trial (eg, non-English-speaking patients and patients admitted from nursing homes). Third, not all patients were reached at 30 days for the follow-up phone call, which is how the information regarding PCP follow-up was gathered. Finally, having done our project in Massachusetts, our population may have had an uncommonly high level of access to primary care.

In summary, our findings suggest that male gender is an important risk factor for early unplanned hospital utilisation within 30 days of discharge. This association may be linked to social behavioural patterns commonly associated with male gender, such as delayed help-seeking behaviours, often resulting in sporadic and episodic use of health services by men. Interventions targeting factors at the root of this phenomenon—such as social isolation, low rates of primary and preventive healthcare use and treatment of depressive symptoms—may help mitigate this gender effect. As health insurance reform and workforce development in primary care evolve, special efforts may be needed to acculturate men to the use of outpatient services.

Contributors SW was responsible for conception, design, acquisition of data, analysis and interpretation of results. She also made significant contributions to the drafting of the manuscript and revising for intellectual content and final approval of published version. SM was responsible for the analysis and interpretation of the results and made significant contributions to the drafting of the manuscript, its intellectual content and final approval of published version. CH was responsible for conception, design and acquisition of data and analysis and interpretation of the data. She contributed to the intellectual content of the manuscript and was responsible for approval of the final version of the article. MP was responsible for conception and design and analysis and interpretation of data. He also contributed significantly to the critical revisions of the manuscript and final approval of the submitted version. JG was responsible for conception and design and analysis and interpretation of data. He also contributed significantly to the critical revisions of the manuscript and final approval of the submitted version. VKC was responsible for conception and design, data analysis and interpretation, drafting of the manuscript and approval of the final version. JO was responsible for design, data collection, analysis and interpretation, drafting of the manuscript and final approval of

published version. BJ was responsible for conception and design and analysis and interpretation of data. He also contributed significantly to the critical revisions of the manuscript and final approval of the submitted version.

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Competing interests None.

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REFERENCES

- Jencks SF, Williams MV, Coleman EA. Rehospitalizations among patients in the Medicare Fee-for-service program. *N Engl J Med* 2009;360:1418–28.
- Obama B. *Patient Protection and Affordable Care Act*. 2010:3025.
- Oddone EZ, Weinberger M, Horner M, et al. Classifying general medicine readmissions. Are they preventable? Veterans affairs cooperative studies in health services group on primary care and hospital readmissions. *J Gen Intern Med* 1996;11:597–607.
- Ashton CM, Wray NP. A conceptual framework for the study of early readmission as an indicator of quality of care. *Soc Sci Med* 1996;43:1533–41.
- Jack BW, Chetty VK, Anthony D, et al. A Reengineered hospital discharge program to decrease rehospitalization. *Ann Intern Med* 2009;150:178–87.
- Billings J, Dixon J, Mijanovich T, et al. Case finding for patients at risk of readmission to hospital: development of algorithm to identify high risk patients. *BMJ* 2006;333:327.
- Bottle A, Aylin P, Majeed A. Identifying patients at high risk of emergency hospital admissions: a logistic regression analysis. *J R Soc Med* 2006;99:406–14.
- Weissman JS, Stern RS, Epstein AM. The impact of patient socioeconomic status and other social factors on readmission: a prospective study in four Massachusetts hospitals. *Inquiry* 1994;31:163–72.
- Krumholz HM, Parent EM, Tu N, et al. Readmission after hospitalization for congestive heart Failure among medicare beneficiaries. *Arch Intern Med* 1997;157:99–104.
- Cherpitel CJ. Emergency room and primary care services utilization and associated alcohol and drug use in the United States general population. *Alcohol Alcohol* 1999;34:581–9.
- Mitchell SE, Paasche-Orlow MK, Forsythe SR, et al. Post-discharge hospital utilization among adult medical inpatients with depressive symptoms. *J Hosp Med* 2010;5:378–84.
- Kartha A, Anthony D, Manasseh CS, et al. Depression is a risk factor for rehospitalization in medical inpatients. *Prim Care Companion J Clin Psychiatry* 2007;9:256–62.
- Mackenzie CS, Gekoski WL, Knox VJ. Age, gender, and the underutilization of mental health services: the influence of help-seeking attitudes. *Aging Ment Health* 2006;10:574–82.
- Davis TC, Long SW, Jackson RH, et al. Rapid estimate of adult literacy in medicine: a shortened screening instrument. *Fam Med* 1993;25:391–5.
- Charlson ME, Pompei P, Ales KL, et al. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis* 1987;40:373–83.
- Molloy GJ, Perkins-Porras L, Strike PC, et al. Social networks and partner stress as predictors of adherence to medication, rehabilitation attendance, and quality of life following acute coronary syndrome. *Health Psychol* 2008;27:52–8.
- Courtenay WH. Constructions of masculinity and their influence on men's well-being: a theory of gender and health. *Soc Sci Med* 2000;50:1385–401.
- Weinberger M, Oddone EZ, Henderson WG. Does increased access to primary care Reduce hospital readmissions? *N Engl J Med* 1996;334:1441–7.
- World Health Organization. *Gender and Mental Health*. 2002. <http://whqlibdoc.who.int/gender/2002/a85573.pdf> (accessed Jun 2011).
- Kuehn BM. Men face barriers to mental health care. *JAMA* 2006;296:2303–4.
- Davis AM, Sawyer DR, Vinci LM. The potential of group visits in diabetes care. *Clin Diabetes* 2008;26:58–62.