Characteristics of Veterans with non-VA encounters enrolled in a trial of standards-based, interoperable event notification and care coordination

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INTRODUCTION

Coordinating the delivery of patient care across settings and providers remains a challenge for health systems across the globe (1). This is true even for Veterans in the U.S. who, although enrolled in an integrated network managed by the Veteran’s Health Administration (VHA), often receive care from providers inside and out of the VHA network.

Veterans older than 65 years of age have historically had the option of using healthcare services from the VHA, community providers via Medicare, or both (2). Among 2.6 million VHA-Medicare dually eligible Veterans, nearly 1 million receive care in both the VA health care system and in systems outside VA (3). Furthermore, this proportion is expected to increase given recent legislation and policies impacting the US Department of Veterans Affairs (VA). Specifically, the Veterans Access, Choice, and Accountability Act of 2014 (“Choice Act”) allows Veterans to receive care from community providers if the expected wait time for a VHA appointment is greater than 30 days or if the nearest provider is greater than 40 miles away (4). The VA Mission Act of 2018 expanded efforts at the VA to provide timely and accessible care to Veterans through community providers with an emphasis on the coordination of VA and community care (5).

In this era of increasing community care options, understanding how Veterans dually utilize VHA for primary care and non-VA acute care can help policy makers predict future use of VA and non-VA healthcare resources. Prior studies have shown that dual use of VA and non-VA healthcare services is common (6–9). However, these prior examinations largely focused on utilization of non-VA specialty care, non-VA primary care, or VA inpatient care. Two prior studies examined inpatient utilization both in and out of the VA, although these studies focused on specific disease cohorts (e.g., Veterans with diabetes, Veterans with rheumatoid arthritis) (10, 11). There are no published examinations of non-VA acute care
among a general population of VHA patients who receive the majority of their primary care in the VA.

The aim of this study was to identify patient characteristics associated with non-VA acute care encounters in a cohort of older Veterans at the Bronx and Indianapolis VA Medical Centers. This study is part of a larger trial that examines the impact of VA provider notification and care coordination when older veterans utilize non-VA inpatient or ED services, described in detail elsewhere (12).

METHODS

Setting

The Veterans Health Administration (VHA) is the largest integrated health care system in the United States. The VHA provides care at 1,243 health care facilities, including 170 medical centers and over 1,000 outpatient clinics, serving 9 million enrolled veterans each year.

Two medical centers within the VHA participated in this study. The first is the James J. Peters VA Medical Center (JJP VAMC) located in the Bronx, New York. The JJP VAMC provides care for more than 26,000 patients annually at a tertiary care facility providing comprehensive inpatient and outpatient services in addition to four outpatient clinics. The second medical center is the Richard L. Roudebush VA Medical Center (RLR VAMC) located in Indianapolis, Indiana. The RLR VAMC serves more than 62,000 patients annually via a tertiary care facility that provides comprehensive inpatient care and three outpatient clinics. Both medical centers also serve as teaching hospitals and regional referral sites.

Population

A veteran was eligible for the larger study if he or she 1) was followed in the geriatric or primary care clinics at either the Bronx or Indianapolis VA Medical Centers; 2) was 65 years or older; 3) agreed to consent to standards-based, interoperable health information exchange (HIE) between VHA and non-VHA providers; 4) utilized any non-VHA services (including lab, physician, nursing, pharmacy, and/or hospital services) within two years prior to enrollment in the study according to records in the external HIE network or self-report; and 5) enrolled in the parent study between February 1, 2016 and February 1, 2019.

Eligibility for the larger trial was determined based on the fact that veterans 65 years and older are eligible for Medicare which expands their access to non-VA care, enabling comparison of findings with prior studies on dual use. The number of participants enrolled was 565 out of the total number eligible of 951, resulting in a rate of agreement to enroll among participants to be 59.4%. Most who did not enroll refused without any specific reasons. Those who did give a reason most commonly stated 1) they had no time that day or; 2) were not interested in research or; 3) had too many health concerns.

Patients were followed from enrollment until October 1, 2019 or until death, whichever came first.
Data Collection

Baseline data were collected from the veteran or caregiver using a questionnaire administered by a trained Research Assistant. The questions pertained to a veteran’s demographics, use of high-risk medications, functional status, and cognitive function.

Measures

The primary outcome was use of non-VA acute care, defined as non-VA hospital admission or non-VA emergency visit as alerted by the HIE. The following measures were considered possible predictors of the primary outcome:

- Age
- Sex (dichotomous, as recorded in the medical record)
- Race/ethnicity
- Annual income (self-reported, individual)
- Service connectedness (health conditions related to military service)
- Site of receipt of majority of care (self-reported VA or non-VA)
- Has a regular non-VA provider (self-reported yes or no)
- VA ED or hospital admission in the past year
- Insurance type (private, Medicare, Medicaid)
- Chronic disease burden (Charlson Comorbidity Index)
- Self-reported health (poor, fair, good, very good, excellent)
- Travel time to the VA (in minutes)
- Geographic location (Rural-Urban Commuting Area (RUCA) codes)

Data Analysis

Statistical analysis included descriptive characteristics of all subjects, stratified by whether they experienced a non-VA acute care encounter. Histograms of each variable were examined to ascertain the distribution of data. Bivariate analyses were used to identify significant differences between those who did and did not experience a non-VA acute care encounter. A chi-square test was used for discrete variables and a two-sided t-test for continuous variables. Among those with a non-VA acute care encounter, we also describe non-VA acute care encounter characteristics (e.g., reason for visit, duration), stratified by site (Bronx or Indianapolis).

To examine factors associated with use of non-VA acute care (non-VA hospital admission or non-VA emergency visit), we fit multivariable models with a logit link and binomial distribution using robust standard errors clustered by enrollment site. This approach was employed to take into account within-site cluster correlations. Statistical models included the following potential predictor variables: age, gender, race/ethnicity, annual income, insurance type, service connectedness, perceived health status, chronic condition burden, prior VA use,
site of receipt of majority of care (VA or non-VA), regular non-VA provider, travel time to VA, enrollment site, RUCA codes, as well as duration of follow-up to control for time at risk. Two observations were omitted from the analysis due to missing values for the predictor variables. We conducted all analyses using SAS version 9.4 (SAS Institute, Cary, NC).

**Ethics**

This study, along with its informed consent documents, questionnaires and data collection templates, was reviewed and approved by the Institutional Review Board (IRB) of Indiana University as well as the VA Research & Development Committee at both the Indianapolis VA Medical Center and the Bronx VA Medical Center.

**RESULTS**

**Characteristics of the cohort**

Descriptive statistics of the study cohort are summarized in Table 1, stratified by those with and without non-VA acute care encounter alerts. Most of the study population was white (60.8%), male (98.3%), had an average travel time to the VA of 39.5 minutes, and resided in urban environments.

**Non-VA alerts**—Out of a total of 565 patients enrolled in the trial, 197 (34.9%) had a non-VA acute care encounter alert during the study period (Table 1). The Bronx had 39 ED visits and 51 hospital admissions for a total of 90 non-VA encounters. Indianapolis had 66 ED visits and 41 hospital admissions for a total of 107 non-VA encounters. The average length of stay (LOS) for a hospital admission was 5.3 days (SD 5.5) ((Bronx mean LOS: 6.7 days (SD 6.4); Indianapolis mean LOS: 3.4 days (SD 3.1)). Overall, the most common diagnosis groups reported for non-VA encounters were cardiovascular other than chest pain, trauma, gastrointestinal, musculoskeletal pain, and infection (Table 2).

**Comparison of those with and without an alert**

In unadjusted analyses, participants with and without non-VA alerts were similar in terms of gender and chronic disease burden. In unadjusted analyses, Veterans who experienced a non-VA alert were older on average (77.1 vs. 75.2 years; p=.019), more likely white race (68.0% vs. 57.1%; p=.026); and more likely to have private insurance (58.9% vs. 48.6%; p=.020) and an income >$100,000 (7.6% vs. 2.2%; p=.009) (Table 1). Veterans who experienced a non-VA alert were also more likely to have a regular non-VA provider (60.4% vs. 49.2%; p=.011) and endorse that they receive the majority of their care outside the VA (23.4% vs. 13.0%; p=.006). Veterans who experienced a non-VA alert were less likely to live in a metropolitan area (77.2% vs. 87.8%; p=.002) and spent more time traveling to the VA on average (43.0 vs. 37.6 min; p=.019) (Table 1).

**Regression model**

Results of a regression model for predicting non-VA alerts are shown in Table 3. Patient characteristics significantly associated with a greater odds of a non-VA alert included: older age (OR per additional year = 1.05; 95% CI,1.04–1.05); endorsing that majority of care
received is non-VA (OR = 1.83; 95% CI, 1.06–3.15); private insurance (OR = 1.39; 95% CI, 1.19–1.62); and higher income (OR = 4.01; 95% CI, 2.68–5.98). An increased number of VA ED visits in the year prior to baseline was associated with greater odds of an alert (OR = 1.13; 95% CI, 1.12–1.13), whereas, conversely, VA admission in the year prior to baseline was associated with lower odds of an alert (OR = 0.63; 95% CI, 0.57–0.69). Living in an isolated rural (OR = 2.67, 95% CI, 2.06–3.47), small rural (OR = 1.60; 95% CI, 1.35–1.89), or large rural city (OR = 1.93; 95% CI, 1.89–1.97) was associated with higher odds of an alert. The odds of an alert were higher for those who had a self-perceived state of health as either fair or poor (OR = 2.21; 95% CI, 1.24–3.94; and OR = 2.01; 95% CI, 0.91–4.46, respectively).

DISCUSSION

We characterized patient-level factors that are associated with non-VA acute care utilization in a cohort of older Veterans at two VA medical centers. Approximately one-third of the Veterans experienced a non-VA acute care episode during the three-year study period. To our knowledge, this is the first study to identify patient characteristics associated with non-VA acute care encounters among a general population of VHA patients who receive regular care in the VA.

Higher income, access to private insurance, poorer self-perceived health, and the use of a non-VA provider were associated with a greater likelihood of generating an alert. Decreased reliance on the VA by this population could be related to cost, convenience, preferences, quality of care, or referral by other providers (13). Both Veteran and non-Veteran populations are at greater risk for experiencing negative health impacts of fragmented care; thus, this decreased reliance on VA care may substantially impact chronic disease management and continuity of care for Veterans (13, 14).

This study also found that older Veterans and those living in a rural area were more likely to generate an alert. As the risk of an acute care event increases with age, these patients may seek care at a non-VA hospital that provides needed or preferred resources. This is particularly true in rural areas, given that non-VA hospitals greatly outnumber VA hospitals, and a non-VA hospital is usually closer to an individual seeking care than a VA hospital (15). Risk did not change based on travel time, although individuals with an alert did have a mean travel time higher than those without an alert.

Importantly, we found that an increased number of VA ED visits in the year prior was associated with an increased risk of a non-VA alert. This could be explained by those who have greater real or perceived acute care needs have increased use of both VA and non-VA acute care settings. Alternatively, patients who repeatedly visit a VA ED but do not feel that their needs are being met may seek care at a non-VA hospital, perhaps because of availability of different services. In addition, we found that a VA hospital admission in the year prior was associated with a decreased risk of a non-VA alert. This could be explained by these patients being more engaged with and remaining in the VA system as a result of care needs after the VA hospitalization.
Not all non-VA acute care events were serious (e.g., urinary tract infection, wrist sprain, gout), suggesting that improving accessibility to VA primary care may be another strategy to reduce non-VA acute care utilization. In addition, coordination and follow-up of non-VA acute care should be a key component of primary care in the VHA. Moreover, recent legislation including the CHOICE Act of 2014 and MISSION Act of 2018, directs the VHA to expand out-of-network care to veterans (16, 17). Since it is anticipated that non-VA care visits will increase, it is incumbent upon the VHA to strengthen care coordination processes in order to control quality of care as well as costs (12).

This study has several limitations. First, this cohort consisted of Veterans who volunteered for a prospective trial aimed at improving care coordination. They may represent Veterans more likely to use non-VA resources or be at-risk for non-VA acute care encounters; however, their demographics are representative of the VA population as a group. Next, we did not include measures of other types of non-VA care (e.g., outpatient). This could provide insights into patterns of utilization about how Veterans use VA and non-VA providers differently and provide a more precise picture of the types of care sought by Veterans going outside the VA for care. A potential limitation is that the HIE catchment area covers 90–95% of potential non-VA hospitals, leaving the opportunity for some missed acute care events. Those few patients who might have sought care outside the HIE catchment area may have characteristics that could potentially impact our results, yet any effect would be minimal. If anything, the impact would likely strengthen the relationship between rurality and non-VA utilization. A final limitation is that the characteristics of those who chose not to enroll in the study may be different from those who chose to participate, but the effect this may have on our findings cannot be determined.

Our findings have several implications for VA policymakers. First, these findings provide a clear picture of the various subpopulations of Veterans who are going outside the VA for care and describe who is at risk of negative health implications due to lack of care coordination. This should drive future work and research to further VA’s efforts to help coordinate care. Additionally, chronic condition burden was not a good predictor of experience of a non-VA alert in this study, indicating that there might be a need to examine other ways to measure disease burden relative to the utilization of non-VA care. Next, our study suggests that multiple VA ED visits were more likely to generate a non-VA alert indicating an opportunity for VA planners to develop an intervention to more closely follow Veterans who come through the VA ED.

**FUTURE WORK**

This study is the first to examine patient characteristics associated with non-VA acute care encounters. Patient characteristics of high income, access to private insurance and non-VA providers, older age, rural living, and prior VA ED use were identified as predictors of generating a non-VA alert. Veterans who seek outside care are at risk for negative health implications due to fragmented care. Unfortunately, communication and coordination of care among VHA and non-VHA providers is often absent or delayed, resulting in missed opportunities to improve Veterans’ outcomes. Health information exchange holds promise to improve the quality of care for patients who see non-VA providers, and to
improve outcomes following transitions between VA and non-VA health care providers, by facilitating communication and coordination of care through surveillance of acute events.

REFERENCES

1. Hynes DM, Koelling K, Stroupe K, Arnold N, Mallin K, Sohn MW, Weaver FM, Manheim L, Kok L. Veterans’ access to and use of Medicare and Veterans Affairs health care. Med Care 2007; 45(3), 214–23. [PubMed: 17304078]

2. Liu C, Batten A, Wong ES, Fihn SD, Hebert PL. Fee-for-service Medicare-enrolled elderly patients are increasingly voting with their feet to use more VA and less Medicare, 2003–2014. Health Serv Res. 2018; 53 suppl 3: 5140–5158. doi:10.1111/1475-6773.13029 [PubMed: 30151827]

3. Veterans Affairs Information Resource Center (VIReC). Veterans’ Enrollment, Access, and Use of Medicare and VA Health Services: Report to the Under Secretary for Health, Department of Veterans Affairs. 2003. (Abstract accessed April 25, 2020 at https://www.hsrd.research.va.gov/research/abstracts/SDR_02-237.htm).

4. Veterans Access, Choice, and Accountability Act of 2014. Pub.L.No.113–146, 128 Stat. 1754 (Aug. 7, 2014).

5. Isakson J 2018. The VA Mission Act of 2018: The VA Maintaining Internal Systems and Strengthening Integrated Outside Networks (MISSION) Act. Washington, DC: U.S. Senate.

6. Carey K, Montez-Rath ME, Rosen AK, Christiansen CL, Loveland S, Ettner SL. Use of VA and Medicare services by dually eligible veterans with psychiatric problems. Health Serv Res. 2008;43(4):1164–83. [PubMed: 18355256]

7. Humensky J, Carretta H, de Groot K, Brown MM, Tarlov E, Hynes DM. Service utilization of veterans dually eligible for VA and Medicare fee-for-service: 1999–2004. Medicare Medicaid Res Rev. 2012;2(3):mmrr.002.03.a06. Published 2012 Oct 19. doi:10.5600/mmrr.002.03.a06

8. Petersen LA, Byrne MM, Dow CN, Hasche J, Reis B, Pietz K. Relationship between clinical conditions and use of Veterans Affairs health care among Medicare-enrolled veterans. Health Serv Res. 2010;45(3):762–91. [PubMed: 20403056]

9. Radomski TR, Zhao X, Thorpe CT, et al. VA and Medicare Utilization Among Dually Enrolled Veterans with Type 2 Diabetes: A Latent Class Analysis. J Gen Intern Med. 2016;31(5):524–31. [PubMed: 26902242]

10. Schwab P, Sayles H, Bergman D, Cannon GW, Michaud K, Mikuls TR, Barton J. Utilization of care outside the Veterans Affairs health care system by US veterans with rheumatoid arthritis. Arthritis Care Res (Hoboken). 2017; 69(6):776–782. doi:10.1002acr.23088 [PubMed: 27696766]

11. Rose DE, Rowneki M, Sambamoorthi U, Fried D, Dwibedi N, Tseng CL, Jani N, Yano EM, Helmer DA. Variations in VA and Medicare use among veterans with diabetes: Impacts on ambulatory care sensitive conditions hospitalizations for 2008, 2009, and 2010. Med Care. 2019; 57(6): 425–436. [PubMed: 31045693]

12. Dixon AX, Schwartzkopf AL, Guerrero VM, May J, Koufocas NS, Bean AM et al. Regional data exchange to improve care for veterans after non-VA hospitalization: a randomized controlled trial. BMC Medical Informatics and Decision Making. 2019;19(1):125. doi:10.1186/s12911-019-0849-1. [PubMed: 31272427]

13. Liu C, Manning WG, Burgess JF, Hebert PL, Bryson CL, Fortney J, Perkins M, Sharp ND, Maciejewski ML. Reliance on Veterans Affairs outpatient care by Medicare-eligible veterans, Med Care. 2011; 49(10): 911–917. [PubMed: 21685810]

14. Kim H, Hung WW, Myunghye CP, Ross JS, Zhao Z, Gi-Soo K, Boocvkar K. Predictors and outcomes of unplanned admission to a different hospital. Int J Qual Health Care. 2015;27(6): 513–519. [PubMed: 26472739]

15. Weeks WB, West AN, Wallace AE, Fisher ES. Comparing the characteristics, utilization, efficiency, and outcomes of VA and non-VA inpatient care provided to VA enrollees. Med Care. 2008; 46(8): 863–871. [PubMed: 18665066]

16. Veterans Access, Choice, and Accountability of 2014. In., 113th edn; 2014.

17. VA MISSION Act of 2018. 115th congress edn. USA: U.S. Congress; 2018.
Table 1.
Baseline Characteristics of Veterans Enrolled between 2016 and 2019 Stratified by Non-VA Alert Status

| Variable                        | Alert (n =197) | No Alert (n =368) | Overall (n =565) |
|---------------------------------|----------------|------------------|-----------------|
|                                 | No. (%) or Mean ±SD | No. (%) or Mean ±SD | No. (%) or Mean ±SD |
| Male sex                        | 194 (98.5) 77.1 ±8.0 | 361 (98.1) 75.2 ±7.5 | 555 (98.3) 75.8 ±7.7 |
| Age, years*                     |                |                  |                 |
| Race/ethnicity                  |                |                  |                 |
| White                           | 134 (68.0) 10 (5.1) | 210 (57.1) 19 (5.2) | 344 (60.9) 29 (5.1) |
| Black                           | 36 (18.3)     | 79 (21.5)       | 115 (20.4)      |
| Hispanic                        | 18 (9.1)      | 52 (14.1)       | 70 (12.4)       |
| Asian                           | 1 (0.5)       | 1 (0.3)         | 2 (0.4)         |
| Multiracial                     | 3 (1.5)       | 9 (2.5)         | 12 (2.1)        |
| Other                           | 5 (2.5)       | 17 (4.6)        | 22 (3.9)        |
| Total annual individual income, $|                |                  |                 |
| 0–10 000                        | 10 (5.1)      | 19 (5.2)        | 29 (5.1)        |
| 10 001–25 000                   | 62 (31.5)     | 119 (32.3)      | 181 (32.0)      |
| 25 001–50 000                   | 54 (27.4)     | 116 (31.5)      | 170 (30.1)      |
| 50 001–100 000                  | 38 (19.5)     | 78 (21.2)       | 116 (20.5)      |
| 100 001–250 000                 | 13 (6.6)      | 8 (2.2)         | 21 (3.7)        |
| > 250 000                       | 2 (1.0)       | 0               | 2 (0.4)         |
| Unknown/refused                 | 18 (9.1)      | 28 (7.6)        | 46 (8.1)        |
| Insurance type                  |                |                  |                 |
| Medicare                        | 174 (88.3)    | 321 (87.2)      | 495 (87.6)      |
| Medicaid                        | 19 (9.6)      | 41 (11.1)       | 60 (10.6)       |
| Private*                        | 116 (58.9)    | 179 (48.6)      | 295 (52.2)      |
| Perceived health status         |                |                  |                 |
| Excellent                       | 14 (7.1)      | 32 (8.7)        | 46 (8.2)        |
| Very good                       | 37 (18.9)     | 88 (23.9)       | 125 (22.2)      |
| Good                            | 67 (34.2)     | 145 (39.4)      | 212 (37.6)      |
| Fair                            | 65 (33.2)     | 84 (22.8)       | 149 (26.4)      |
| Poor                            | 13 (6.6)      | 19 (5.2)        | 32 (5.7)        |
| Any service connectedness       | 103 (52.3)    | 184 (50.0)      | 287 (50.8)      |
| Chronic conditions              |                |                  |                 |
| Charlson Comorbidity Index      | 1.4 ±1.6      | 1.4 ±1.9        | 1.4 ±1.8        |
| Chronic pulmonary disease       | 35 (17.8)     | 66 (17.9)       | 101 (17.9)      |
| Congestive heart failure        | 20 (10.2)     | 35 (9.5)        | 55 (9.7)        |
| Diabetes                        | 86 (43.7)     | 160 (43.5)      | 246 (43.5)      |
| Enrollment site                 |                |                  |                 |
| Bronx, NY                       | 90 (45.7)     | 190 (51.6)      | 280 (49.6)      |
| Indianapolis, IN                | 107 (54.3)    | 178 (48.4)      | 285 (50.4)      |
| Travel time to VA, minutes*     | 43.0 ±28.6    | 37.6 ±24.6      | 39.5 ±26.2      |
| Variable                        | Alert (n =197) | No Alert (n =368) | Overall (n =565) |
|--------------------------------|---------------|-------------------|------------------|
| RUCA †                         |               |                   |                  |
| Metropolitan                   | 152 (77.2)    | 323 (87.8)        | 475 (84.1)       |
| Micropolitan                   | 25 (12.7)     | 29 (7.9)          | 54 (9.6)         |
| Small town                     | 6 (3.1)       | 6 (1.6)           | 12 (2.1)         |
| Rural                          | 9 (4.6)       | 7 (1.9)           | 16 (2.8)         |
| Unknown                        | 5 (2.5)       | 3 (0.8)           | 8 (1.4)          |
| VA use in year prior to enrollment |          |                   |                  |
| Total # VA ED visits          | 0.7 ±1.7      | 0.7 ±1.4          | 0.7 ±1.5         |
| VA hospitalization             | 22 (11.2)     | 54 (14.7)         | 76 (13.5)        |
| Receives majority of care *    |               |                   |                  |
| VA                             | 146 (74.1)    | 313 (85.1)        | 459 (81.2)       |
| Non-VA                         | 46 (23.4)     | 48 (13.0)         | 94 (16.6)        |
| Unknown/refused                | 5 (2.5)       | 7 (1.9)           | 12 (2.1)         |
| Has a regular non-VA provider *| 119 (60.4)    | 181 (49.2)        | 300 (53.1)       |
| (Yes, No)                      |               |                   |                  |

* Bivariate analysis for Alert and No Alert comparisons was statistically significant at p < 0.05.

† Rural-Urban Commuting Area Codes:
Metropolitan: population > 50,000
Micropolitan: population 10,000 – 49,999
Small town: population 2500 – 9,999
Rural: population < 2500
Table 2.
Characteristics of Hospitalizations and ED Visits among Veterans who Experienced a Non-VA Alert between 2016 and 2019 Stratified by Enrollment Site *

| Variable                                      | Overall     | Bronx       | Indianapolis |
|-----------------------------------------------|-------------|-------------|--------------|
| Alert type                                    |             |             |              |
| Hospital admission                            | 92 (46.7)   | 51 (56.7)   | 41 (38.3)    |
| Emergency department                          | 105 (53.3)  | 39 (43.3)   | 66 (61.7)    |
| Hospitalization length of stay, days          | 5.3 ±5.5    | 6.7 ±6.4    | 3.4 ±3.1     |
| Diagnosis group                               |             |             |              |
| Cardiovascular–other than chest pain          | 24 (13.9)   | 13 (16.3)   | 11 (11.8)    |
| Trauma                                        | 21 (12.1)   | 10 (12.5)   | 11 (11.8)    |
| Gastrointestinal                              | 18 (10.4)   | 11 (13.8)   | 7 (7.5)      |
| Musculoskeletal pain                          | 15 (8.7)    | 3 (3.8)     | 12 (12.9)    |
| Infection                                     | 14 (8.1)    | 7 (8.8)     | 7 (7.5)      |
| Neurologic                                    | 11 (6.4)    | 5 (6.3)     | 6 (6.5)      |
| Respiratory–other than pneumonia              | 11 (6.4)    | 6 (7.5)     | 5 (5.4)      |
| Genitourinary–other than hematuria or infection| 6 (3.5)    | 3 (3.8)     | 3 (3.2)      |
| Chest pain                                    | 5 (2.9)     | 2 (2.5)     | 3 (3.2)      |
| Pneumonia                                     | 5 (2.9)     | 3 (3.8)     | 2 (2.2)      |
| Hematuria                                     | 4 (2.3)     | 1 (1.3)     | 3 (3.2)      |
| Inflammation                                  | 1 (0.6)     | —           | 1 (1.1)      |
| Musculoskeletal–other than pain or trauma     | 1 (0.6)     | —           | 1 (1.1)      |
| Unknown                                       | 25 (14.5)   | 8 (10.0)    | 17 (18.3)    |
| Other                                         | 12 (6.9)    | 8 (10.0)    | 4 (4.3)      |

* Alert type n = 197; Hospitalization length of stay n = 87, this variable was missing 5 values; Diagnosis group n = 173, this variable was missing 24 values.
### Table 3.
Multivariable Logistic Regression Results for Odds of a Non-VA Alert, Spring 2016–Winter 2019 (N = 563)

| Variable                              | OR (95% CI)  |
|---------------------------------------|--------------|
| Male sex (ref = Female)               | 1.15 (0.55, 2.43) |
| Age, years                            | 1.05 (1.04, 1.05) |
| Race/ethnicity (ref = White)          |              |
| Black                                 | 0.84 (0.55, 1.27) |
| Other                                 | 0.66 (0.42, 1.03) |
| Total annual individual income, $ (ref = ≤ 100 000) |          |
| > 100 000                             | 4.01 (2.68, 5.98) |
| Unknown/refused                       | 1.22 (0.88, 1.68) |
| Insurance type                        |              |
| Medicare (ref = No Medicare)          | 0.97 (0.57, 1.64) |
| Medicaid (ref = No Medicaid)          | 1.19 (1.17, 1.21) |
| Private (ref = No Private)            | 1.39 (1.19, 1.62) |
| Perceived health status (ref = Excellent) |         |
| Very good                             | 0.96 (0.51, 1.80) |
| Good                                  | 1.10 (0.71, 1.70) |
| Fair                                  | 2.21 (1.24, 3.94) |
| Poor                                  | 2.01 (0.91, 4.46) |
| Any service connectedness (ref = No)  | 0.97 (0.75, 1.26) |
| Chronic conditions                    |              |
| Charlson Comorbidity Index            | 0.96 (0.89, 1.03) |
| Chronic pulmonary disease (ref = No)  | 1.06 (0.55, 2.05) |
| Congestive heart failure (ref = No)   | 1.44 (1.06, 1.95) |
| Diabetes (ref = No)                   | 1.02 (0.93, 1.12) |
| Follow-up time, days                  | 1.00 (1.00, 1.00) |
| Enrollment site (ref = Bronx, NY)     |              |
| Indianapolis, IN                      | 1.24 (0.80, 1.92) |
| Travel time to VA, minutes            | 1.00 (1.00, 1.01) |
| RUCA (ref = Metropolitan)             |              |
| Micropolitan                          | 1.93 (1.89, 1.97) |
| Small town                            | 1.60 (1.35, 1.89) |
| Rural                                 | 2.67 (2.06, 3.47) |
| Unknown                               | 4.63 (4.48, 4.80) |
| VA use in year prior to enrollment    |              |
| Total # VA ED visits                  | 1.13 (1.12, 1.13) |
| VA hospitalization (ref = No)         | 0.63 (0.57, 0.69) |
| Has a regular non-VA provider (ref = No) | 1.21 (0.82, 1.78) |
| Receives majority of care (ref = VA)  |              |
| Non-VA                                | 1.83 (1.06, 3.15) |
| Variable       | OR (95% CI) * |
|----------------|-------------|
| Unknown/refused| 0.84 (0.83, 0.85) |

* Adjusted for other variables in the column.

† Rural-Urban Commuting Area Codes:
- Metropolitan: population > 50,000
- Micropolitan: population 10,000 – 49,999
- Small town: population 2,500 – 9,999
- Rural: population < 2,500