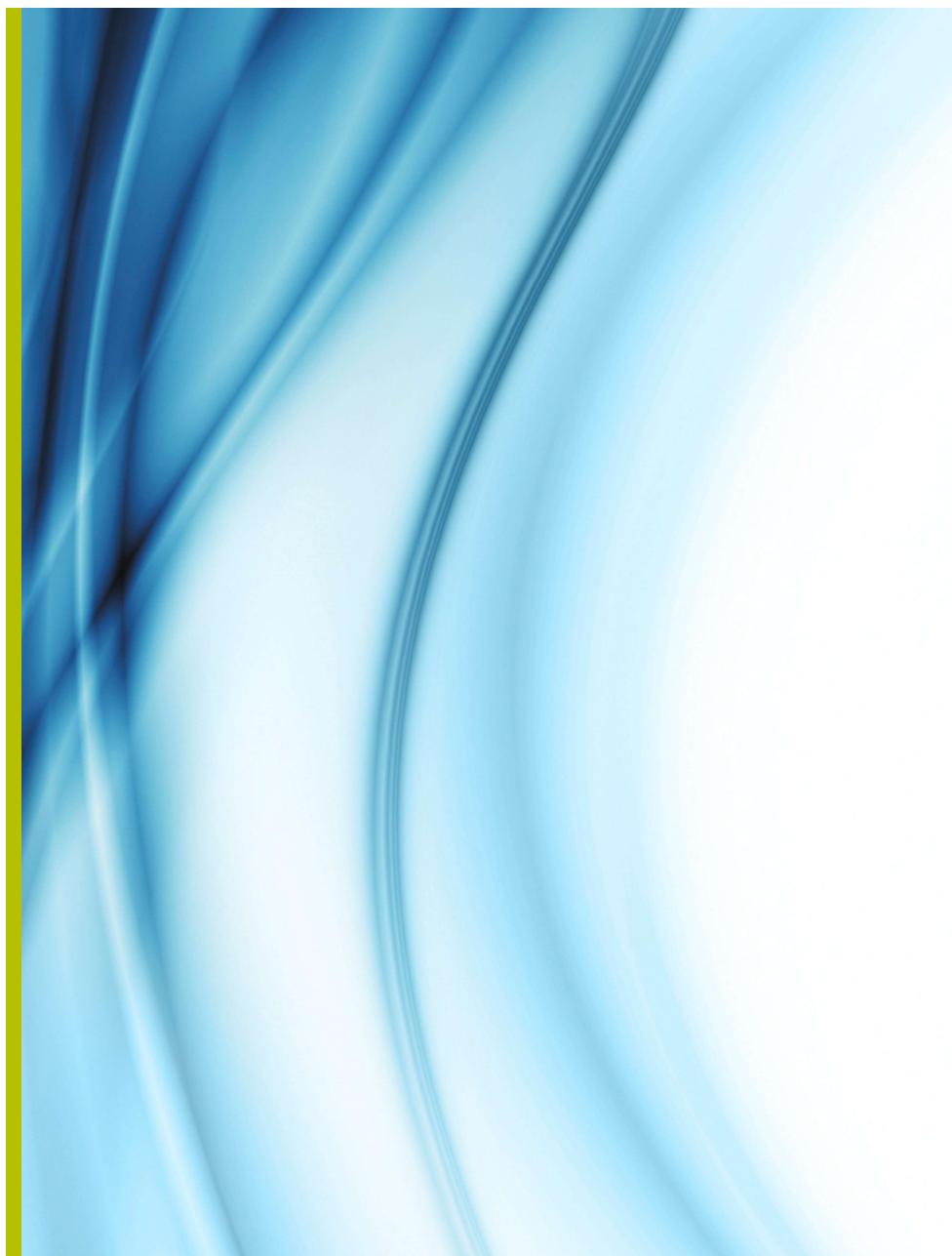


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Assessing the Benefits of Transportation Services to Veterans

Health Benefits and Cost Savings Provided by the Veterans Transportation Service

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Executive Summary

Numerous studies have illustrated the cost and health benefits of increasing accessibility to transportation. Healthcare organizations are expanding transportation services they offer due to evidence that demonstrates cost savings and positive impacts on patient health.

The Veterans Transportation Service (VTS), under the Veterans Transportation Program, facilitates the travel of Veterans to Department of Veterans Affairs (VA) and authorized non-VA healthcare facilities. Unlike many VA medical services, patients are not required to meet eligibility requirements, which allows VTS to provide transportation to all patients with valid medical appointments.

VTS is a voluntary program. The decision to participate is at the VISN and VA Medical Center (VAMC) level. In FY17, 97 out of the total 172 VAMCs participated in VTS.

Cost benefits realized from this service can be attributed to the savings that provide services directly (i.e., Beneficiary Travel reimbursements to eligible patients and payments to Special Mode Transportation vendors) in addition to the costs associated with patient encounters (i.e., manpower, technology, and overhead costs for the medical service provided). Analysis of available data for fiscal year (FY) 2017 estimates cost avoidances of approximately \$110,840,000 due to VTS services. This amount includes the annual cost avoidances of Beneficiary Travel (\$1.94 million) and Special Mode Transportation (\$15.2 million), reductions in unnecessary inpatient stay days (\$13.2 million) and canceled appointments (\$74.4 million), and avoided Emergency Department (ED) encounters (\$6.1 million).

The data also shows potential correlations between a lack of transportation and negative health outcomes. Patients who lack transportation are not only more likely to visit the ED, when they do, they tend to exhibit with more urgent clinical presentations and are more frequently admitted to inpatient status. These patients also exhibit higher readmission rates and pain scores than the general patient population and have lower 5-year survival rates for lung and prostate cancer.

Lacking transportation also appears to correlate with negative mental health outcomes. In 2016, a total of 4,099 Veterans with an inpatient diagnosis of Intentional Self-Harm, Attempted Suicide, or Suicidal Ideations canceled at least one appointment due to lack of transportation. Patients lacking transportation were 3.75 times more likely to be diagnosed with Suicidal Ideations and 4.04 times more likely to be diagnosed with Attempted Suicide or Intentional Self-Harm than patients who did not lack transportation. These patients are also diagnosed with Substance Use & Disorders and Mental Diseases & Disorders in the ED at higher frequencies. In addition, three of the top 10 outpatient visit diagnoses for these patients are associated with mental health: Substance Use & Disorders; Injury, Poisoning & Drug Toxicity, and Mental Diseases & Disorders.

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There also appears to be correlations between positive post-traumatic stress disorder (PTSD) and depression survey results and lack of transportation. A greater percentage of patients who lack transportation are more likely to display scores that identify probable PTSD. These patients are also more likely to submit concurring answers to questions regarding death, self-harm, and resiliency.

VTS is effective in improving missed appointment rates: the decrease in canceled appointments at VTS-participating VAMCs is three times greater than the decrease in nonparticipating VAMCs. Additionally, patients who have used VTS services cancel three fewer appointments on average per year and account for a greater decrease in ED encounters than those who do not use VTS services. Regarding mental health, the data shows that patients diagnosed with Intentional Self-Harm, Attempted Suicide, or Suicidal Ideations who have at least one occurrence of using VTS services reduced their appointment cancellation rates by 20%, compared to the 2.66% decrease in cancellation rates of those who did not use VTS services.

Although the current state of VTS allows for positive outcomes, there are still opportunities for improvement, as evidenced by the 250,000 patients who canceled an appointment in 2017 due to lack of transportation. While VTS tracks unmet demand in the form of denied trips (1,743 requests for transportation were denied in March 2017 alone), the actual need for transportation services is likely much greater. Multiple factors hinder comprehensive assessment of transportation needs, including a dependence on reliable data and a lack of transportation coordination across VAMC services and available transportation resources.

Introduction

The VA has taken great efforts to provide Veteran patients with easy access to care. Public exposure of the VA's extended waiting times for patients to be seen for clinical consults resulted in the Veterans Access, Choice and Accountability Act, signed into law on April 7, 2014. This Act included the Veterans Choice Program (VCP), which addresses issues regarding healthcare access, including transportation, by allowing authorized Veterans to seek care from more easily accessible community providers within the VA's VCP network.

This is not the first or only initiative the VA has taken to address issues with transportation faced by Veteran patients. The Veterans Transportation Program (VTP) consists of the VTS, which aims to facilitate the travel of eligible Veterans to VA and authorized non-VA healthcare facilities, the Beneficiary Travel (BT) program, which works to provide eligible beneficiaries mileage reimbursement, common carrier or Special Mode transportation (SMT, i.e., ambulance, wheelchair van) for travel to and from VA healthcare or VA-authorized non-VA healthcare, and the Highly Rural Transportation Grant (HRTG) program, which assists Veterans in rural areas with travel to VA or VA-authorized healthcare facilities by providing grant funding to Veteran Service Organizations (VSOS) and State Veterans Service Agencies to be used for transportation services.

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Because the BT benefit is mandated by law, most VAMCs provide transportation services in some form. However, the organization of BT and transportation services under the national VTP Program Management Office (PMO) is optional for each facility. For VAMCs that choose to participate in VTP, the PMO provides the salary for a Mobility Manager as well as the costs to acquire and maintain two vehicles for the initial three years. The PMO may provide additional VTS vehicles if the facility can state a business need within this initial period.

BT reimbursements are only available to patients who meet certain administrative, income and medical prerequisites. However, because VTS services are not bound by eligibility requirements, VTS is able to provide transportation to all patients with valid medical appointments. Accordingly, patients who have no means of transportation for medical services are given an option for accessing medical services.

Because VTS also transports patients who do not meet eligibility requirements for transportation benefits, factors other than direct cost avoidances for mandated BT and SMT payments must be considered when analyzing the monetary value of its services. For example, cost assessments of VTS should include trips to support inpatient discharges, regardless of the patients' eligibility statuses. Because each inpatient stay day costs VAMCs an average of \$1,847.79 per day (the actual figure may be higher or lower, depending on the medical unit and the facility's location), costs associated with transporting a patient from a medical facility are likely minimal in comparison.

Associations between transportation services and actual health outcomes are less obvious. While it would be logical to assume that missed appointments can be directly attributed to a decrease in quality of health, using data to support this statement is difficult.

MITRE performed two studies for the VTP. The first was to demonstrate the impact of transportation on healthcare outcomes, and the second was an attempt to decrease bed days of care by including the Mobility Manager in the discharge planning process. Veterans who are deemed medically ready for discharge may remain in the hospital unnecessarily if they do not have appropriate transportation to their residence. Including the Mobility Manager in the discharge planning process will facilitate transportation planning for discharges.

Topic areas

- Access to care
- Transportation
- Health Outcomes
- Utilization Optimization
- Cost Benefit Analysis
- Quality Measures

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Research questions

1. What are the cost savings that can be attributed to transportation services:
 - a. Due to realized health benefits?
 - b. Due to access to medical services?
 - c. Due to timely discharges?
2. What correlations are found between transportation access and health?

Significance to knowledge

This report attempts to make associations between the availability of transportation for patients to medical facilities for healthcare and resulting outcomes.

While previous studies have attempted to address patients' health outcomes by using metrics obtained from self-reported surveys, few have used patient healthcare information captured by clinicians and medical staff.

This study can also be scaled to address benefits of other services that address access to healthcare, as well as to demonstrate the benefits of incorporating ancillary services into clinical processes (i.e., transportation services into discharge planning).

Previous research and existing metrics

Literature review

There has been an increased focus on healthcare access in recent years. Healthcare organizations have realized the need to assess the effects of transportation on access to healthcare. In 2015, an internal assessment by MedStar Health found that the major obstacle preventing patients from arriving to appointments on time, if at all, was the cost, accessibility, and speed of transportation (Pullin 2016).

Numerous studies have demonstrated the cost and health benefits of increasing accessibility to transportation (Syed, Gerber, and Sharp 2013). A systematic review of 108 different studies found that 77% of the studies identified evidence of a distance decay association in which patients who lived farther from facilities tended to present poorer health outcomes, including mortality and hospital lengths of stay (Kelly, et al. 2016). This correlates to several studies that indicate distance and other geographic factors are barriers for patients undergoing cardiac heart rehabilitation (Sangster, et al. 2013; Paquet, et al. 2005; Tod, Lacey and McNeill 2002) and treatments for diabetes (Kibbey, et al. 2013) and cancer (Smillie, et al. 2014; Moore, et al. 2013, Wan, et al. 2012).

Studies have also associated increased healthcare access with desired health-related behaviors in demographic groups that may be relevant to the VA's patient population. For

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example, there is a need to increase the availability and awareness of transportation options for the socioeconomically disadvantaged elderly in rural areas, a demographic that faces increased barriers in accessing healthcare (Ford, et al. 2016). Additionally, Medicaid beneficiaries with chronic conditions who use non-emergency medical transportation (NEMT) increase their likelihood of meeting the recommended number of medical visits (Thomas and Wedel 2014).

More directly addressing the effects of transportation on the VA patient population are studies that correlate PTSD with logistic barriers to healthcare, including travel-related obstacles to treatment. Surveys of Veterans with PTSD identify distance and travel time to be deterrents in their decision to obtain treatment (Tan, et al. 2013; Sayer, et al. 2009). These surveys correspond with studies that show a continuing (though decreasing) gap in psychotherapy use between urban and rural Veteran patient populations, which may be a result of the VA's efforts to engage rural Veterans in psychotherapy care (Mott, et al. 2015). The surveys also correlate with the methods of treatment provided to these patients; patients living greater than 30 miles from the nearest mental health facility are less likely to receive psychotherapy and more likely to receive antidepressant treatment than patients living within 30 miles (Pfeiffer, et al. 2011).

Discrepancies in the definition of a transportation-disadvantaged population may have contributed to the lack of research in this area (Wallace, et al. 2005). Existing studies lack information on either health or transportation availability, and thus a direct cause-and-effect association does not exist. Accordingly, different studies have provided varying estimates of the health- and transportation-disadvantaged population. In its *2002 National Transportation and Availability and Use Survey*, the Bureau of Transportation Statistics estimates that at least 528,000 homebound disabled people missed at least one medical trip per year due to transportation barriers.

The current version of the National Health Interview Survey (NHIS) includes the following question: "There are many reasons people delay getting medical care. Have you delayed getting care for any of the following reasons in the PAST 12 MONTHS... [because] You didn't have transportation?" Results for the 2016 NHIS indicates that 4.6% (more than 1.1 million) of adults aged 19-64 with family incomes less than or equal to 138% of the federal poverty level experienced a delay in healthcare in the previous 12 months because of a lack of transportation (Cohen and Zammitti 2016). In 2002, NHIS disregarded income boundaries when identifying its survey population, which allowed for the isolation of transportation as a variable in assessing healthcare access. The survey found that approximately 1.33% of all adults and 1.31% of all children for a total of 3.7 million people experienced a delay in healthcare services due to issues with transportation (Wallace, et al. 2005). This estimate closely follows the 2001 study conducted by the Medical Expenditure Panel, which indicated that 1.21% of the U.S. population (3.5 million people) attribute to transportation their difficulty in obtaining care.

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In 2005, the Transportation Research Board of the National Academies examined the relative costs and benefits of providing NEMT to those who lack access to it (Hughes-Cromwick, et al. 2005). The study identified a target population and their associated characteristics (including rurality and medical conditions), the costs associated with providing transportation to this target population, and the healthcare costs and benefits that can be associated with encounters made possible by providing transportation (i.e., improved quality of life, better managed care, and decreased emergency room visits). For all 12 medical conditions analyzed, the researchers determined that providing NEMT is at least cost-effective (provides sufficient improvement in quality of life, life expectancy, or both when using a valuation of \$50,000 per quality adjusted life-year) and concluded that transportation is relatively inexpensive in comparison to the rapidly increasing costs of healthcare. A summary of the 12 medical conditions and their associated cost-effectiveness analysis results are as follows:

Table 1: Summary of Condition-Specific Cost-Effectiveness

Condition	Type	Cost-Effectiveness of Providing NEMT
Influenza Vaccinations	Preventive	Highly Cost-Effective
Prenatal Care	Preventive	Cost Saving
Breast Cancer Screening	Preventive	Moderately Cost-Effective
Colorectal Cancer Screening	Preventive	Moderately Cost-Effective
Dental Care	Preventive	Highly Cost-Effective
Asthma	Chronic	Cost Saving
Heart Disease (Congestive Heart Failure)	Chronic	Cost Saving
Chronic Obstructive Pulmonary Disease	Chronic	Highly Cost-Effective
Hypertension	Chronic	Highly Cost-Effective
Diabetes	Chronic	Cost Saving
Depression/Mental Health	Chronic	Highly Cost-Effective
End-Stage Renal Disease	Chronic	Highly Cost-Effective

Current VTS transportation measures

Transportation programs are required by both PMO and facility leadership to provide metrics and analysis to demonstrate business need and to support financial requests. The VetRide scheduling software is able to produce reports that capture the number of Veterans serviced and the number of trips completed by VTS. VetRide is also able to calculate and report costs paid by the facility to vendors providing wheelchair, ALS/BLS, and ambulance transportation services.

In addition to reporting these metrics, the Portland VA Health Care System (HCS) Mobility Manager compares claims processing output with that of other similar facilities to support a request to hire additional staff. Transportation supervisors at the Portland VA HCS also

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assess VTS usage by geographic location. This information is used to present a need for additional VTS routes or a need for additional vehicles to service other VA healthcare facilities, such as Community-Based Outpatient Clinics (CBOCs).

The Lexington and White River Junction (WRJ) VAMCs have performed extensive analyses on the effects of transports to support inpatient discharges. The WRJ VAMC, in particular, has effectively demonstrated the benefits of incorporating transportation into discharge planning processes. Historically, the WRJ VAMC experienced difficulties in meeting InterQual criteria for hospital stays,¹ contributing to a longer length of stay (LOS), compared to other VAMCs and industry standards. In 2017, the WRJ VAMC established an Interdisciplinary Rounds (IDR) process in which all stakeholders² met each morning to review and discuss resources needed to provide appropriate clinical care for each admitted Veteran, as well as to establish the patients' discharge plans. After the initial implementation of the IDR, a need to include the Mobility Manager into the IDR process was realized.

Outcomes of the WRJ VAMC IDR initiative included an increase in the number of inpatient cases meeting InterQual criteria and a decrease in the average adjusted LOS. Including transportation in the IDR process resulted in a drastic increase in VTS trips to support inpatient discharges (with associated cost savings).³ This has also been a factor in decreasing the Average Daily Census, which allowed for a decrease in nursing staff, and an increase in available beds (which negated the need to refer Veterans to seek care in community hospitals). In addition, the Mobility Manager states that "Reducing the amount of time that Veterans spend in the acute care setting, when that level of care is no longer required, allows care teams to focus resources and efforts on those Veterans that require that level of care thus improving clinical outcomes while simultaneously improving the patient experience."

Interlocking findings and unanswered questions

While the need and importance of standardizing health outcomes has been acknowledged for quite some time, only recently has the formulation of actual measures taken place (Porter, Larsson, and Lee 2016). The International Consortium for Health Outcomes Measurement (ICHOM), a nonprofit organization, strives to "transform healthcare systems worldwide by measuring and reporting patient outcomes in a standardized way."⁴ To

¹ InterQual® is an evidence-based decision support solution for guiding organizations in making clinically appropriate medical decisions. The VA's Utilization Management application uses InterQual standardized clinical appropriateness criteria and algorithms to determine whether patient admissions and hospital days meet clinical appropriateness criteria for acute care hospital care.

² Daily attendees for IDR include: Physical Therapy, Occupational Therapy, Nurse Case Management, Utilization Review, Inpatient Social Work, Chief of Medicine, Recreation Therapy, Telehealth, Pharmacy, Ward Managers, Assistant Chief Nurse, Nutrition, SAT/Psychiatry, HBPC, and a member of the Quadrad.

³ Marsh, Jason (2017). VTS Role in Inter-Disciplinary Rounds Process, White River Junction, VT VAMC. Unpublished manuscript.

⁴ <http://www.ichom.org/>

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identify health outcomes measures, ICHOM uses a “Patient-Physician Partnership” approach measure in which international teams of clinicians, outcomes researchers and patient advocates define sets of outcomes per medical condition. To identify the most important outcomes, the ICHOM team facilitates discussions between patient representatives who have been treated for the condition being evaluated and physicians who specialize in performing different treatment options for the conditions. At the time of this report, the development of outcomes for a number of medical conditions remains to be completed.

While existing studies demonstrate the cost benefits associated with increasing accessibility to health services, they do not address the unique requirements exhibited by the VA or the patient population it serves. A scan of numerous articles indicates that the nature of active duty experiences often results in the prevalent occurrence of selected physical and mental manifestations that are less common in civilian patients. This may require unique considerations regarding transportation.

Studies performed by individual transportation services at VAMCs tend to focus on realized cost avoidances and the volume of trips provided without drawing correlations to health outcomes.

Additionally, many studies that attempt to address health outcomes use metrics obtained from patient-reported surveys instead of patient medical and encounter data that clinical staff capture in medical health records and clinical and business information systems.

Methodology

Preliminary work

A comprehensive scan was performed for sources of applicable data. When possible, the VA’s existing reporting products were leveraged, including the VHA Support Service Center (VSSC), data analysis cubes, and the Pyramid data manipulation program.

The applicability of available data in the VA Corporate Data Warehouse (CDW) was determined through an extensive review of documents, including, but not limited to, data dictionaries, handbooks, user manuals, technical manuals, and data architecture diagrams. Also instrumental in this process were discussions with VTP PMO, VHA data architects, and transportation and clinical field staff.

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Approach

Selection of study populations

Many of the individual assessments included in this research used a study population of patients who lack transportation, as identified by patient-canceled appointments due to issues with transportation in 2017.⁵ The appointment module in VistA allows VAMC staff to capture the reason given for canceling the appointment in the “Cancelation reason” and “Cancelation remarks” fields.⁶ Appointments canceled due to issues with transportation are given a cancelation reason of “TRAVEL DIFFICULTY,” “TRANSPORTATION PROBLEMS” or “NO TRANSPORTATION.” Additionally, the free-text “Cancelation remarks” field was examined to find words and phrases that would indicate issues with transportation as the reason for canceling the appointment. Individual patients were then determined using unique patient identifiers. (See Appendix B for the criteria and codes used to determine the study populations.)

To assess data quality and determine the comprehensiveness of the selected study population in regard to the universe of patients with transportation issues, the level of completeness for each of the following fields was analyzed: ReasonSID, AppStatus, CancelReason, and CancelRemark. Considering each field, or a combination of them, leaves 30,556 canceled appointments that cannot be positively attributed to any particular reason. This accounts for only 0.13% of all canceled appointments in 2017.

Table 2: Percentages of Missing Values in Key Data Fields for All Canceled Appointments in 2017

Categories	N of records with missing values	% of records with missing values	N and % of Undetermined Canceled Appts	N and % of Undetermined Canceled Appts by entities	N and % of Undetermined Canceled Appts Due to Transportation	N and % of Undetermined Canceled Appts By Patients	N and % of Undetermined Canceled Apps By Patients Due to Transportation
ReasonSID	2,359,126	9.91%	✓			✓	✓
AppStatus	252	0.00%	✓	✓		✓	✓
CancelReason	2,359,126	9.91%		✓	✓	✓	✓
CancelRemark	3,004,175	12.62%			✓		✓
Total Count			-	-	30,556	-	30,556
%			0.00%	0.00%	0.13%	0.00%	0.13%

It should be noted that this data depends on the accuracy in which the information is shared and captured. First, the clinic must be notified of the need to cancel the appointment and the reason for the cancelation. VAMC staff then has the opportunity to accurately

⁵ Study populations for previous years were identified when appropriate, such as when analyzing survival rates over time.

⁶ VistA—Veterans Health Information and Technology Architecture—is the VA’s information system and Electronic Health Record, supporting clinical, administrative, and financial operations of the VHA.

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capture the reason given by the patient for canceling the appointment in the “Cancelation reason” field. However, appointment data shows that cancelation reasons of “Other” or “Unable to keep appointment” were selected for 96.6% of patient-canceled appointments in 2017.

The research team also attempted to evaluate the effectiveness of VTS programs at participating facilities by identifying a population subset of patients at VTS-participating facilities. The VTS National Coordinator provided information on facility participation in the VTS program. The implementation schedule and status reports that the PMO captured were considered when performing interfacility and pre- and post-VTS implementation comparative analysis. Additionally, a population subset of patients who use VTS services was obtained from a VetRide data extract that the PMO provided. This allowed for the identification of individuals for more specified analysis.

Cost benefit analysis

Completed appointments

To assess the cost benefits provided by VTS, the team considered cost avoidance computations from the VetRide scheduling software. Patients who are eligible for BT or SMT benefits are flagged as such in VetRide. VetRide captures VTS-provided trips for these patients and compares the costs associated with trips to the amount the facility would otherwise have had to pay for reimbursement (BT) or to third-party transportation providers (SMT).⁷

VetRide also captures the number of trips attributed to individual VAMC clinics, which are identified by both name and stop code.⁸ However, a review of the clinics listed in VetRide revealed additional clinics that were not included in the agency-approved list. When deemed appropriate by formally trained and licensed clinicians, trips attributed to these added clinics were included in the analysis. Added clinics that could not be clearly equated to an agency-approved clinic were not included in analysis.

Cost associations for patient transports provided by VTS were performed by using cost reports from the Managerial Cost Accounting Office (MCAO) Outpatient Cube. Calculated average costs for each outpatient service is available from the MCAO Outpatient Cost Report: Cost and Workload for Selected DSS Clinic Stop/Credit Stop.

⁷ VetRide calculates cost avoidance using an estimated distance (based on pick up and drop off points) and specific costs for transporting different mobility types (i.e., ALS or BLS, based on contracted third party rates).

⁸ Stop Codes are the VHA’s Decision Support System Identifiers, used to characterize VHA Outpatient Clinics by a six-character descriptor.

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Discharge planning

The Discharge clinic (although not technically a clinic) was added to VetRide to identify trips supporting patients who are discharged from inpatient status. Preliminary analysis of Discharge clinic utilization in VetRide allowed the project team to identify facilities that frequently used VTS to support inpatient discharges. Details regarding the extent of VTP's involvement in discharge planning and their experiences in integrating discharge planning processes were captured through interviews with transportation staff at these facilities. This information was considered when identifying potential participants in the discharge planning study.

Metrics captured by the National Utilization Management Integration (NUMI) application were also used to obtain Continued Stay (CS) data. The NUMI web-based application is used by clinicians to collect inpatient review assessments and outcomes. Currently, the VHA's Utilization Management (UM) program requires the review of CS for patients in acute care services (including Medicine, Surgery, Neurology, Psychiatry, and Observation status in a dedicated unit, the ED or on beds in existing units).⁹ Data captured in NUMI is available for analysis and review through VSSC.

A list of potential sites to participate in the discharge planning study was determined using a combination of inappropriate CS days, as recorded in NUMI, and input by VTS PMO. The VTS PMO (including the National and Regional Coordinators) then obtained permission from the selected facilities' Mobility Managers and VAMC Directors to proceed with the study. Upon approval, the research team scheduled meetings with facility executives, discharge leaders, and transportation staff. The briefing included study goals (i.e., decrease LOS, improve efficiencies), a summary of the White River Junction initiative, an extract of the site's data (including missed appointments, inappropriate admissions and CS days, and VTS trip data), and the dependencies required from facility leadership and other services.

Touch-base sessions were scheduled for facilities that decided to support incorporating transportation staff into discharge planning processes. These conversations with Mobility Managers and/or Transportation Coordinators provided opportunities to discuss and capture new decisions, executed processes changes, realized outcomes, and strengths, gaps and lessons learned.

Additionally, selected sites would have an elevated number of inappropriate CS days attributed to transportation prior to participation in the study. This would allow for the quantitative measurement of at least one variable resulting from incorporating

⁹ VHA Directive 1171(1): Utilization Management Program. Amended January 18, 2018. Extracted from https://www.va.gov/vhapublications/ViewPublication.asp?pub_ID=3018

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transportation into discharge planning processes. These metrics were also compared to the number of discharges supported by VTS, as captured by VetRide.¹⁰

Cost associations for any observed changes in inappropriate CS days after VTS staff began participating in discharge planning were calculated using the average cost per inpatient day per service, as documented in the MCAO Inpatient Cost Report: Cost by Diagnostic Related Groups by Major Components.

Health outcomes

In selecting which health outcomes to include in its analysis, the research team considered health areas that the agency identified as priorities, including mental health, opioid treatment and pain management, and specialty rehabilitation (Department of Veterans Affairs 2018).

In its assessment of the impact of VTS services, the team considered the treatments provided at the clinics for which VTS transports a large number of Veteran patients, as well as information shared with VTP PMO by program staff and clinical subject matter experts at participating sites.

Health outcomes that were included in previous research efforts were also considered in this study (i.e., mortality, cancer, emergency care utilization). The literature review showed that previous attempts at correlating access with health outcomes often included metrics pertaining to the same medical services, including psychiatry and dialysis.

Some areas of study and associated findings were also the result of unstructured analysis. Discoveries from the exploratory analysis performed at the onset of the study were often used to indicate areas for additional focus. The initial analysis distinguished differences in medical services provided for patients who were identified as those who lacked transportation. This allowed for a detailed assessment of clinic usage by this patient population, as well as the identification of major diagnostic categories under which their conditions fall.

Health measures identified and tracked by other government agencies and healthcare organizations were also taken into consideration. For example, there is a growing acceptance for using readmissions as a performance metric for evaluating medical facilities. The Hospital Readmission Reduction Program requires that Medicare reduce payments to hospitals with high rates of Medicare readmissions (Centers for Medicare and Medicaid Services 2018). This study considers readmissions, as defined by Medicare, as occurrences

¹⁰ At the time of the study, VetRide had not been implemented in all facilities. Accordingly, alternate ways of capturing discharge trip information were formulated for participating facilities that had not yet adopted VetRide.

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when a patient is admitted within 30 days of discharge from an earlier hospital stay, regardless of the reason for the readmission.

Data Sources

- CDW
- VSSC
- Shared environment
- VetRide patient list (provided by VTP PMO)
- VetRide Scheduling application

Analytic tools

- SQL Server
- SAS
- R-Studio
- Pyramid
- MS Access
- MS Excel

Analytic techniques

- Trending
- Pattern analysis
- Comparative analysis
- Descriptive statistics
- Cluster analysis
- Discriminant analysis
- Exploratory analysis
- Frequency distribution
- Multivariate analysis

Results

Cost Savings/Cost Avoidance

Beneficiary Travel reimbursement and Special Mode Transportation

Veterans who meet eligibility requirements based on service-connected disability or income are entitled to VA-provided transportation.¹¹ The BT benefit reimburses eligible Veterans for mileage and other out-of-pocket costs that are incurred for qualified medical

¹¹ Beneficiary Travel regulations are codified in 38 U.S. Code § 111 - Payments or allowances for beneficiary travel.

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visits. Veterans who meet eligibility requirements and demonstrate a medical need for SMT are provided with appropriate transportation accommodations. Accordingly, one source of cost-avoidance that the program has been able to track is the difference between the costs of providing transportation services directly and the costs of having the services outsourced to third-party vendors.

VTS uses the VetRide scheduling software system to document and plan trips. The application maximizes resource utilization by calculating the most effective routes for VTS vehicles to transport groups of patients to and from medical appointments, accounting for the vehicles' rider capacity and patients' transportation needs, points of origin, and appointment times. VetRide also calculates cost avoidance for trips that the VTS provides for benefit-eligible Veterans.

For the first half of FY18, VetRide calculated a cost avoidance of more than \$970,000 in BT payments for 85 facilities and more than \$7.6 million in SMT payments for 67 facilities.¹²

The following table shows the average cost avoidance for facilities of the same complexity rating in FY17.¹³ The 6-month cost avoidance totals include the average cost avoidance as calculated by VetRide for the first 6 months of FY18. The 1-year cost avoidance projection is the 6-month cost avoidance total multiplied by two and the Projected Yearly Cost Avoidance is the sum of the calculated 1-year projections for BT and SMT. Reporting sites included in the analysis for BT and SMT were selected based on the availability of data in VetRide at the time of this report.¹⁴

Table 3: Projected Yearly Cost Avoidance per Facility by Complexity

Facility Complexity	BT Cost Avoidance			SMT Cost Avoidance			Projected Yearly Cost Avoidance
	# of Sites	6 months	1-year projection	# of Sites	6 months	1-year projection	
1a	26	\$ 13,024.38	\$26,048.76	19	\$ 60,479.91	\$ 120,959.83	\$147,008.58
1b	14	\$ 8,945.41	\$17,890.81	13	\$ 160,584.85	\$ 321,169.71	\$339,060.52
1c	15	\$ 7,273.21	\$14,546.43	12	\$ 144,636.10	\$289,272.21	\$303,818.63
2	13	\$ 12,371.73	\$24,743.45	10	\$68,380.38	\$136,760.76	\$161,504.21
3	17	\$ 14,389.42	\$28,778.84	13	\$ 152,226.07	\$ 304,452.14	\$333,230.98

Canceled appointments

Missed appointments and no-show rates as high as 30% cost healthcare providers in the United States \$150 billion each year (Zimmerman 2015, Morse 2018). In 2017, a total of

¹² It should be noted that 46 facilities went live with VetRide in the second half of FY17.

¹³ FY17 Facility Complexity levels listed as recorded in the VHA Office of Productivity Efficiency and Staffing.

¹⁴ The difference in the number of sites included in the BT and SMT cost avoidance for each complexity level is due to the staggered rollout of VetRide that was undergoing at the time of this study.

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20,315,237 appointments were either canceled (13.7 million) or no-shows (6.5 million) by VA patients. Using the average cost of \$218.21 per VAMC outpatient encounter in FY 2017, this number of unfilled appointments amounts to more than \$4.4 billion in healthcare costs to the agency.¹⁵

The services offered by VTS are not constrained by the eligibility rules specified in 38 USC 111. As such, VTS is able to transport Veterans who may not meet the Service-Connected disability or income criteria but are presented with transportation-related barriers preventing them from keeping medical appointments. Accordingly, an assessment of the cost savings attributed to VTS should include costs associated with appointments that might have been missed if not for the services the program provided.

As previously stated, the VistA scheduling package allows VAMC staff to document the reason for canceling an appointment using predetermined options and free text. Available data in the appointment module identifies more than 250,000 patients who canceled at least one appointment citing issues with transportation as the reason for being unable to keep the appointment in 2017. These patients accounted for more than 1.8 million patient-canceled appointments in the same timeframe. Accordingly, patients who attributed issues with transportation to at least one appointment cancellation in 2017 exhibited a cancellation rate of 19.78%, compared to the average patient cancellation rate of 12.93%.

Table 4: Appointment Cancellations in 2017

Metric	By All Patients	By Patients with Documented Lack of Transportation
Total Patients with Booked Appointments	6,860,562	256,708
Total Appointments	106,286,139	9,404,346
Appointments per Patient	15	37
Appointments Canceled by Patient	13,737,589	1,860,330
Appointments Canceled by Patient Rate	12.93%	19.78%
Appointment No-Shows	6,577,648	737,468
Appointment No-Show Rate	6.19%	7.84%
Same-Day Cancelations	4,663,960	813,270
Percent Same-Day Cancelations	4.39%	8.65%
Total "Wasted" Appointments	11,241,608	1,550,738
Total Percent "Wasted" Appointments	10.58%	16.49%

A comparison of two populations of patients who canceled appointments, with the differentiating variable being the identification of transportation as the cause for at least

¹⁵ The average cost of \$218.21 per outpatient encounter in FY 2017 was extracted from the MCAO Outpatient Cube.

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one cancellation, shows that patients with documented transportation issues were more likely to cancel appointments and exhibit higher no-show and same-day cancellation rates. No-show and same-day cancellations can be considered “wasted” opportunities, in that the cancellation notification occurs without enough advance notice to fill the appointment timeslot with another patient. Although patients who canceled at least one appointment attributed to a lack of transportation comprise only 3.74% of the total patient population, they are responsible for 13.79% of “wasted” opportunities.

From 2013 to 2017, the number of appointments that were canceled by patients who cited transportation as the reason for their cancellations increased by 18% (Figure 1).

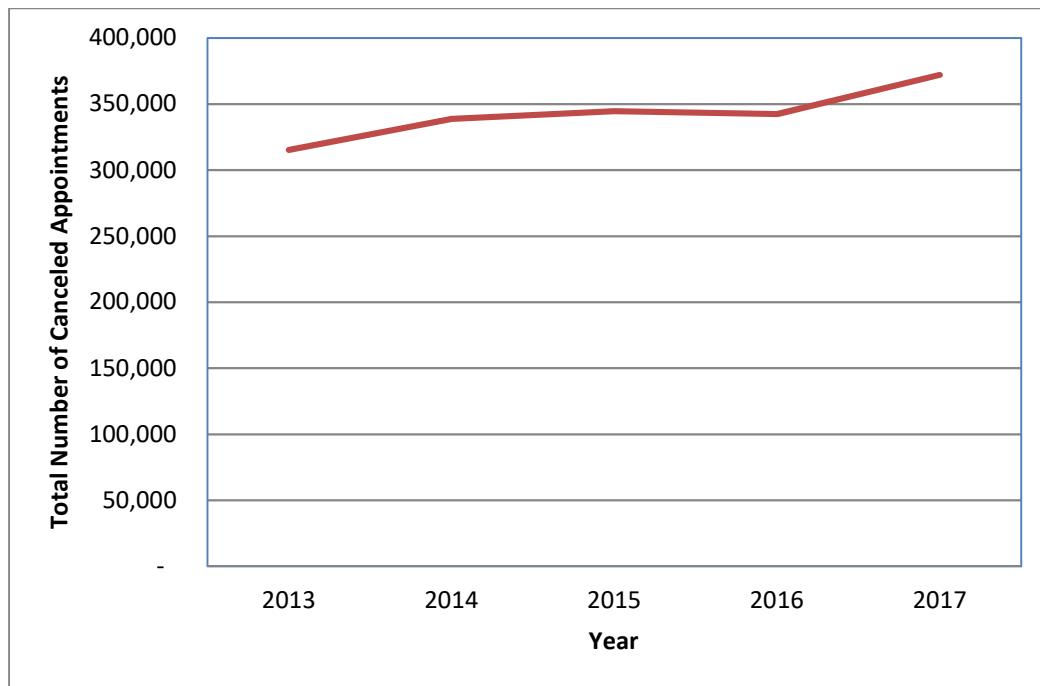


Figure 1: Total Canceled VA Appointments Due to Transportation from 2013 to 2017

Figure 2 presents the average change in canceled appointments the years before and after facilities begin operating VTS. For comparison purposes, 2012 was used as the go-live year for facilities that have not implemented VTS, as the program became operational in a significant number of VAMCs (34 facilities) in 2012. The decrease in the percentage of canceled appointments was 3.5 times greater in VAMCs that implemented VTS than in sites that did not have the program. This correlates with VTS utilization and the appointments canceled by patients with transportation issues in 2017, which shows that patients who did not use VTS canceled three more appointments (on average) than patients who used VTS (7.88 compared to 4.52 canceled appointments per patient).

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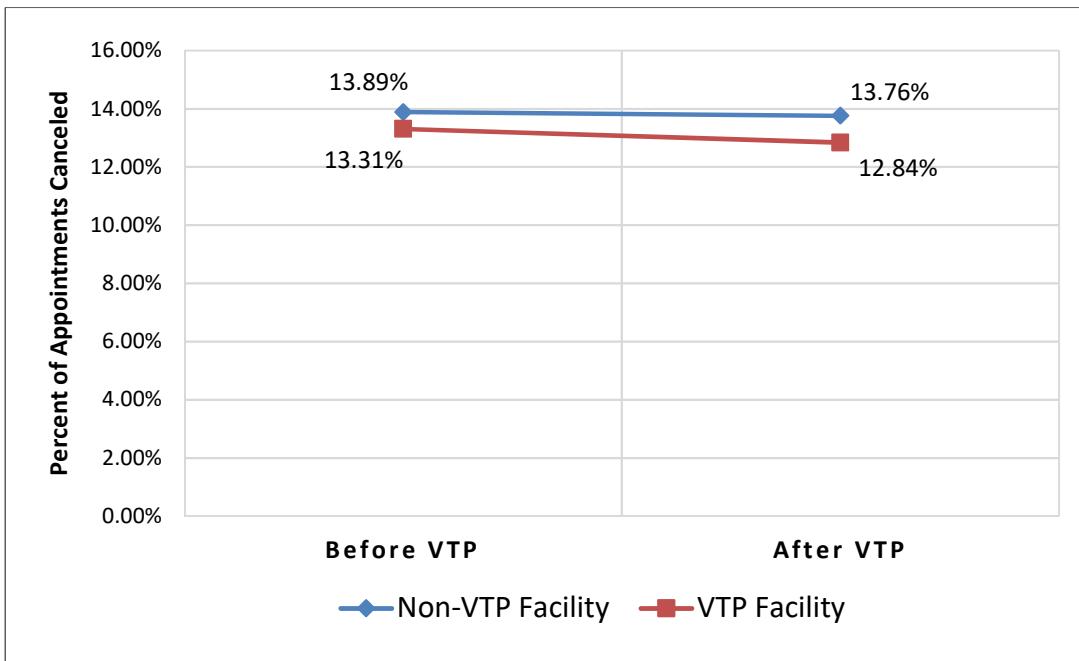


Figure 2: Comparison of Canceled Appointment Rates by VTS Participation

Facilities that participate in VTS experience an average decrease of 3,896 patient-canceled appointments the year after the program's implementation, when adjusted for the change in appointment volume.

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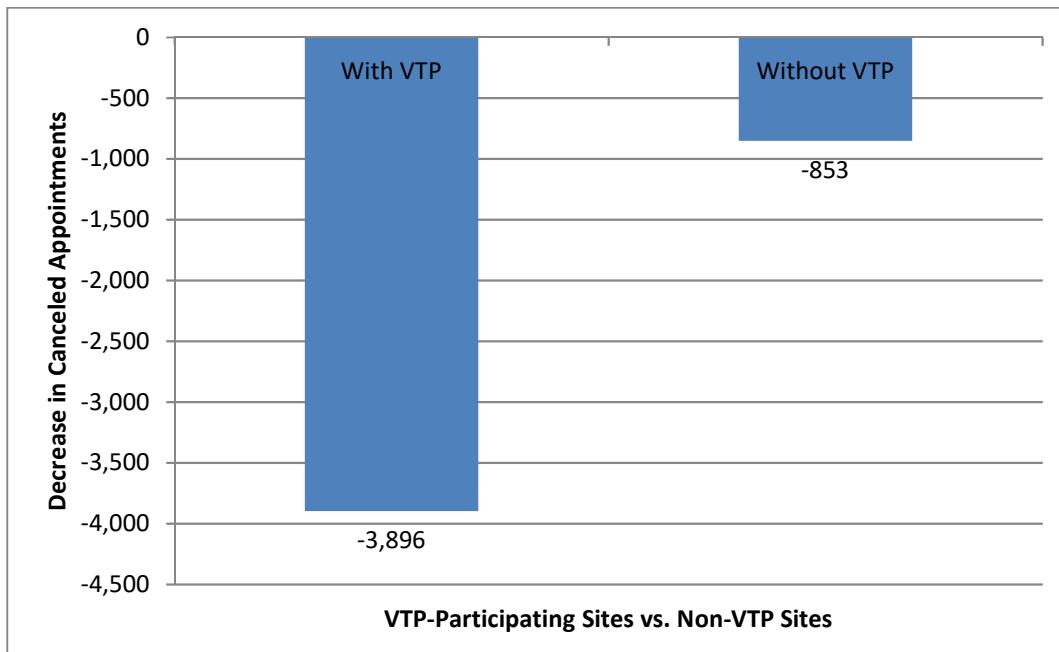


Figure 3: Average Decrease in Canceled Appointments by VTS Participation

Trending the average reduction in patient-canceled appointments over time (Figure 4) shows that facilities exhibit a decrease in patient-canceled appointments, when adjusted for the change in appointment volume.

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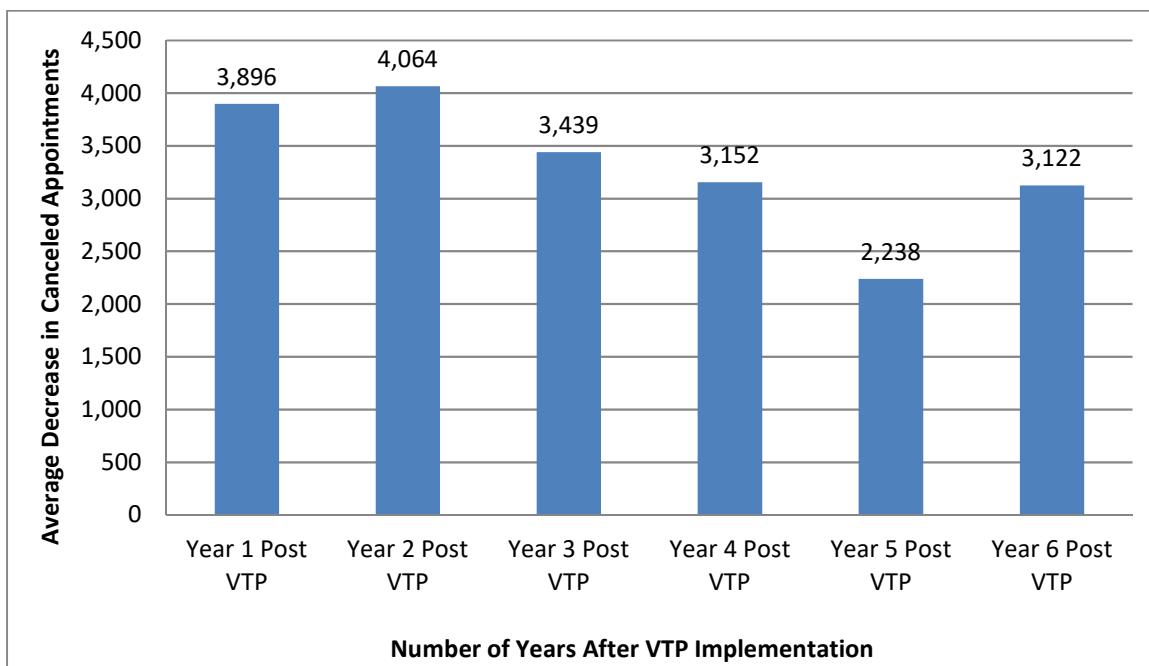


Figure 4: Average Reduction in Patient Canceled Appointments

Perhaps even more indicative of the impact of VTS are the cancelation rates of each participating VAMC two years after the start of VTS operations. Applying the difference in cancelation rates before participating in VTS (13.31%) and two years after participating in VTS (12.84%) computes to 341,360 kept appointments across all participating facilities.¹⁶ Using the average outpatient encounter cost of \$218.21, this amounts to \$74,488,165 in cost avoidances from appointments that were not canceled.

The continued rollout and adoption of VetRide for scheduling has enabled the increased capture of trip details, such as the specific specialty clinics to which patients were transported. For the first two quarters of FY18, VetRide captured 60,020 VTS trips made to transport Veterans for medical appointments. Associating the number of patient trips provided to each medical clinic with the national average encounter cost for each stop code as computed by the VA MCAO indicates that VTS transported Veterans to approximately \$22 million dollars' worth of clinical care in the first two quarters of FY18.

VetRide data also shows that VTS transports patients to clinics that generally have higher encounter costs. While the average cost for an outpatient encounter at a VA healthcare facility is \$218.21, the costs for care at the clinics to which VTS provides patient transports average \$628.55.

¹⁶ Kept appointments calculated using the following formula: [(Pre-VTP Cancelation Patient Rate) - (Year 2 Post-VTS Patient Cancelation Rate)] times (Year 2 Post-VTS Total Appointments) = (13.31% - 12.84%) x 72,796,054 = 341,360

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Timely discharges

VTS is able to transport patients who are discharged from inpatient status but have no means to travel from the medical center. In FY17, the average inpatient cost per day across all VAMCs was \$1,847.79.¹⁷ A breakdown of average inpatient costs for some of the medical units from which patients are likely to be discharged is listed in Table 5. Accordingly, comparing VTS expenses for a trip to support an inpatient discharge with the price of an unjustified CS day suggests a probable opportunity for cost savings.

Table 5: Average Cost per Bed Day for Selected Treating Specialties, FY17¹⁸

Treating Specialty Name	Average Cost per Bed Day FY17
Medical observation	\$4,571
Medical step down	\$4,272
General acute medicine	\$3,217
Hospice - acute care	\$2,578
Surgical observation	\$1,796

VAMCs use the NUMI application to automate review assessment and outcomes. One element of care they review is CS, which determines whether a patient's continued admission in an acute care setting meets clinical criteria. The application allows reviewers to identify reasons for inappropriate CS events. One option available for reviewers to document inappropriate CS events is "Transportation," which is defined as: "Lack of transportation to home or the next level of care."¹⁹

Selected VAMCs have implemented initiatives to improve discharge planning processes. As previously stated, systemic deficiencies led the WRJ VAMC to establish an IDR process to review each admitted Veteran and discuss resources needed to provide appropriate clinical care. After the initial implementation of the IDR, a need was realized to include the Mobility Manager into the IDR process. One outcome of the Mobility Manager's inclusion was a jump from three to 164 VTS-provided discharge trips per quarter. The facility also calculated that VTS-supported discharges represented a cost savings of \$492,405 in six months.²⁰

¹⁷ The Average Cost per Inpatient Stay Day was extracted from the MCAO Inpatient Cost Report: Total Cost by Diagnostic Related Groups by Major Components.

¹⁸ TREATING SPECIALTY (TRT): The numeric code for an inpatient service or special care area (such as general medicine, orthopedics, or psychiatry) on which patients are treated. This system of coding is managed by VHA Office of Information, Health Information Management. In the Decision Support System, each day of inpatient stay has an assigned treating specialty, based on the Treating Specialty field.

¹⁹ This definition of Transportation as a reason for CS is as defined in the User Guide for National Utilization Management Integration (NUMI) v. 15.5, last updated 07/13/2018.

²⁰ Marsh, Jason (2017). VTS Role in Inter-Disciplinary Rounds Process, White River Junction, VT VAMC. Unpublished manuscript.

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Other facilities that have incorporated transportation services into their discharge planning processes have also observed similar decreases in inappropriate CS days attributed to transportation issues. For example, the Memphis VAMC reduced its inappropriate CS days due to transportation from an average of 16 to six CS days per quarter after participating in the IDR. The FY17 average cost of \$2,837.72 per inpatient bed day at the Memphis VAMC calculates to an average cost avoidance of \$28,337.20 per quarter, or \$113,508.80 per year.²¹

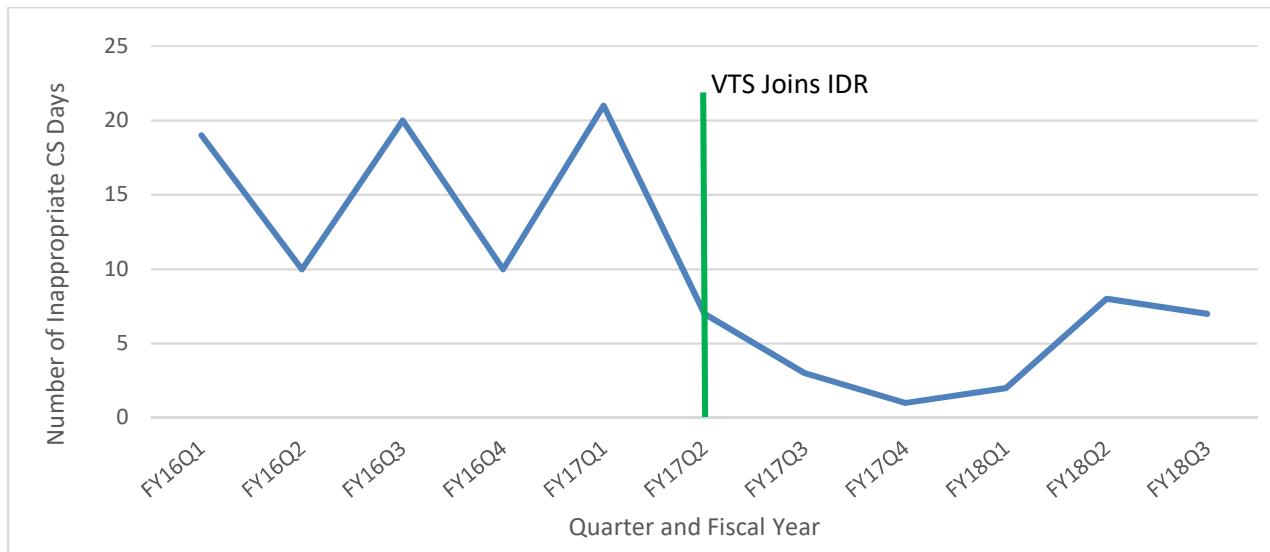


Figure 5: Memphis VAMC Inappropriate CS Days Due to Transportation per Quarter

The Memphis VAMC's experiences in implementing an IDR process were captured through interviews with facility leadership, including the Transportation Coordinator, Mobility Manager, Associate Director, and Chief Medical Officer. The facility constructed an IDR process in which every morning, the UM team facilitates a discussion among key patient care services (i.e., medicine, floor nurses, social work, physical therapy, respiratory) regarding each inpatient's care plan, including discharge arrangements. Another key contributor in streamlining the IDR discussion was the construction of a system used to document information relevant to the IDR. For this, Memphis VAMC elected to use Microsoft OneNote with which they grouped patients by medical team and updated in real-time each patient's assessments and treatments.

The research team, in collaboration with the VTP PMO, conducted a study involving six VTP-participating VAMCs with a history of elevated inappropriate CS days due to

²¹ The average FY17 cost of \$2,837.72 for a bed day of care at the Memphis VAMC was obtained from the VA's Managerial Accounting Program's Inpatient Cost Report: Total Cost by Diagnostic Related Groups by Major Components. The average number of inappropriate CS days per quarter pre-IDR reflects data from Q1 FY16 to Q1 FY17. Average number of inappropriate CS days per quarter post-IDR reflects data beginning in Q2 FY17, when VTP joined IDRs according to Memphis VAMC staff, to Q3 FY18.

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transportation. The Memphis VAMC was included in the study for the research team to observe and gather information from a facility with an operating IDR process. The study involved the participation of facility executives, clinical leadership, and transportation management, and required that the facility evaluate current discharge planning processes and determine where opportunities for collaboration exist. Table 6 displays the facilities that were ultimately chosen to perform in the Discharge Planning study.

Table 6: Sites Participating in the Discharge Planning Study

Facility	Facility complexity	Visit Date
New Jersey HCS	1c	1/25/18
Tennessee Valley HCS	1a	1/30/18
Mountain Home, TN HCS	1c	2/1/18
Memphis, TN VAMC	1a	2/6/18
San Francisco, CA HCS	1a	2/15/18
New Mexico HCS	1b	2/21/18

Following the Discharge Planning presentation, the San Francisco HCS (SFHCS) Associate Director initiated an A3 effort to assess current rounding processes.²² The effort is being led by the facility's Mobility Manager and Patient Flow Nursing Manager. Preliminary findings indicate several opportunities for facility-wide improvements that have the potential to impact transportation. Some uncovered issues occurred before the scheduled medical visit. For example, some providers were found to be unaware of the rules and regulations regarding transportation. Others failed to discuss transportation plans with patients before surgery, or when they did, failed to discuss how the patient's circumstances might change after the procedure. Additionally, the team found that transportation was discussed in only half of all admission interviews observed, and that there was great potential to expand and enhance the medical center's admission processes.

At the time of this report, the A3 committee had begun taking steps to improve methods of determining eligibility for transportation services. The committee was also in the process of forming a presentation to SFHCS executive leadership for approval to continue pursuing plans to improve discharge processes, including the creation of an Admission department.

Although the A3 effort had not been completed and no formal steps had been taken to improve discharge planning processes, the SFHCS Mobility Manager has already observed some realized outcomes, including better collaboration with other services, increased

²² The Quality Improvement term "A3" is indicative of the size of a large sheet of paper, on which the important points of an improvement project, including goals, current status, participants and roles, performance measures, conclusions and insights, is captured on a single page. The A3 may be posted in a public area as a way to organize the tasks to be done, as well as a way to keep everyone impacted by the project informed.

https://www.queri.research.va.gov/implementation/quality_improvement/methods.cfm?method=1

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awareness of the program and its services throughout the facility, and approval to fill vacant VTS driver positions.

While not all participating facilities determined IDRs to be the most efficient and effective way to improve discharge processes, the majority of facilities that were presented the Discharge Study agreed that incorporating transportation had the potential to improve discharge planning.

The VA New Jersey HCS (VANJHCS) determined that current processes did not give VTS staff enough notice to accommodate transportation requests for discharges. To address this, the Mobility Manager was included in daily conversations to discuss upcoming (day-of and next-day) discharges. Participants in these discussions included the Chief of Staff, the heads of Social Work and Nursing services, and transportation staff, including the Mobility Manager, BT Supervisor, and Transportation Coordinators.²³ As a result of this change, which began at the end of March, VANJHCS was able to reduce the number of CS days due to transportation by 79.41% between Q2 and Q3 of FY18. This represents a decrease in the average number of inappropriate CS days from 14.08 to 2.33 days per month.

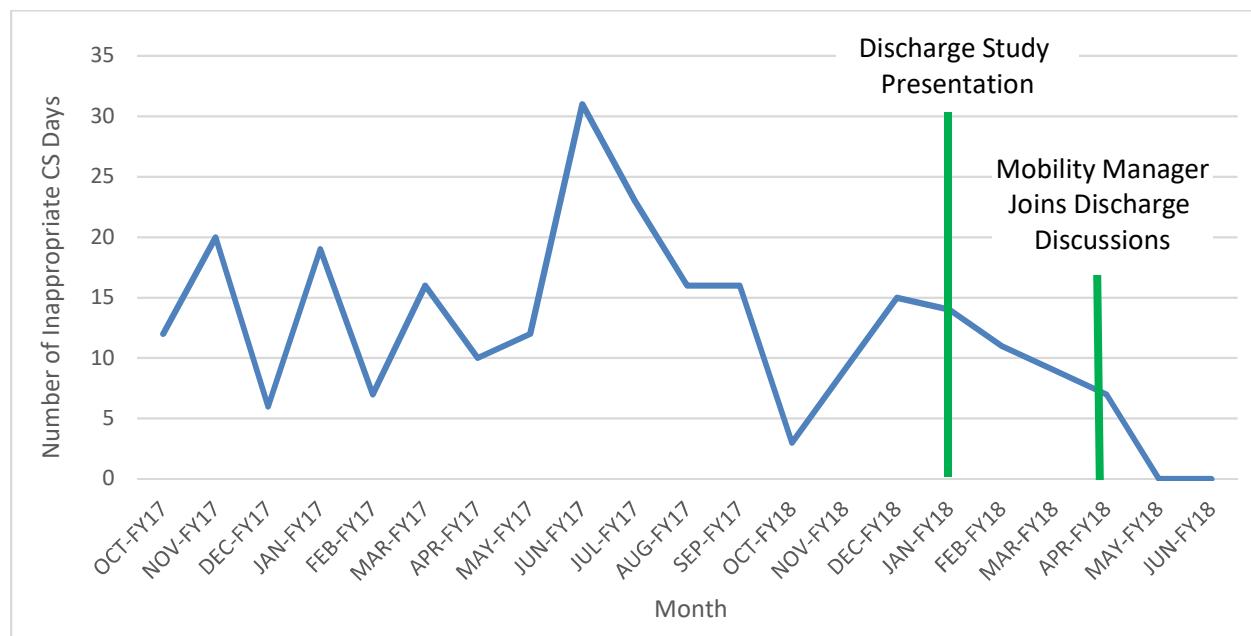


Figure 6: VANJHCS Inappropriate CS Days Due to Transportation per Month

The VANJHCS Mobility Manager disclosed other benefits of the new discharge planning process in addition to the decrease in inappropriate CS days, including medical center staff's increased awareness of VTP's needs and a higher level of support across different services. The Mobility Manager also stated that a gap identified early in their current state

²³ Because the VANJHCS has two campuses (East Orange and Lyons), difficulties in coordinating transportation on different campuses led to the realization of the need to have separate supervisors.

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assessment was a lack of understanding of VTP's regulations and services (i.e., differences between BT and SMT eligibilities). The initial plan of action entailed addressing this deficiency through education. However, after the process changed it became apparent that additional education was no longer necessary due to the direct involvement of VTS in discharge planning. According to the VANJHCS Mobility Manager, the discharge planning study also resulted in identifying a need for additional driver shifts to cover off-hour requests.²⁴ Because these additional drivers are able to accommodate transports from the ED, the Mobility Manager also predicts a decrease in inappropriate admissions as an added benefit.

Although initial discussions with the Mountain Home VAMC indicated that a good working relationship and frequent communications already existed between the Transportation Coordinator and clinical services, including Social Work and Nursing services, participants also identified opportunities to increase collaboration with VTP regarding discharge planning. Shortly after the presentation, the Transportation Coordinator was included in an email distribution list for identifying discharge patients for the day. This led to a decrease of more than one CS day per month on average. Additionally, the Transportation Coordinator states that the decrease in appropriate CS days was realized despite a 60% increase in VTS services requests to support discharge trips.

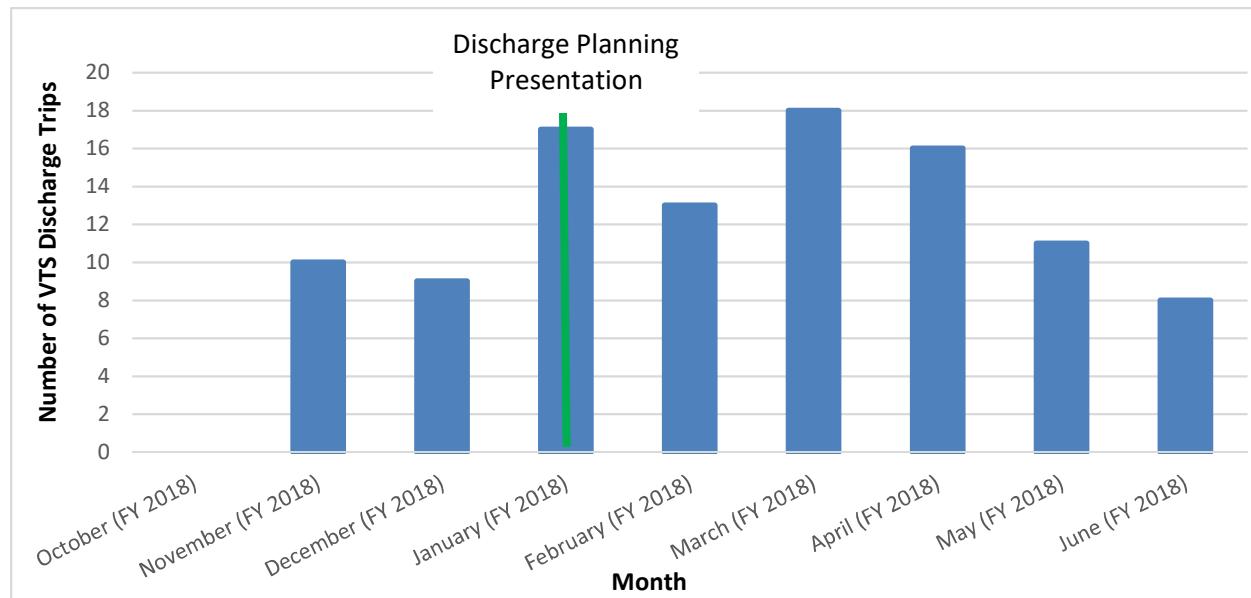


Figure 7: Mountain Home VAMC VTS Discharge Trips, FY 2018

The CS days for the Tennessee Valley HCS shows little indication of a sustained decrease since the presentation (Figure 8). Many different factors may have contributed to the lack

²⁴ Per the VANJHCS Mobility Manager, additional driver shifts were added to cover evening and weekend transportation requests.

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of progress, not least being the retirement of the Mobility Manager shortly after the presentation. Remaining transportation staff did not know whether the former Mobility Manager's discharge planning improvement initiative (a SharePoint site shared between VTS and Social Work Services) was completed before his retirement or taken over by the interim Mobility Manager. This may serve to demonstrate the importance of the Mobility Manager position and his/her ability to collaborate with facility leadership and the different VAMC services.

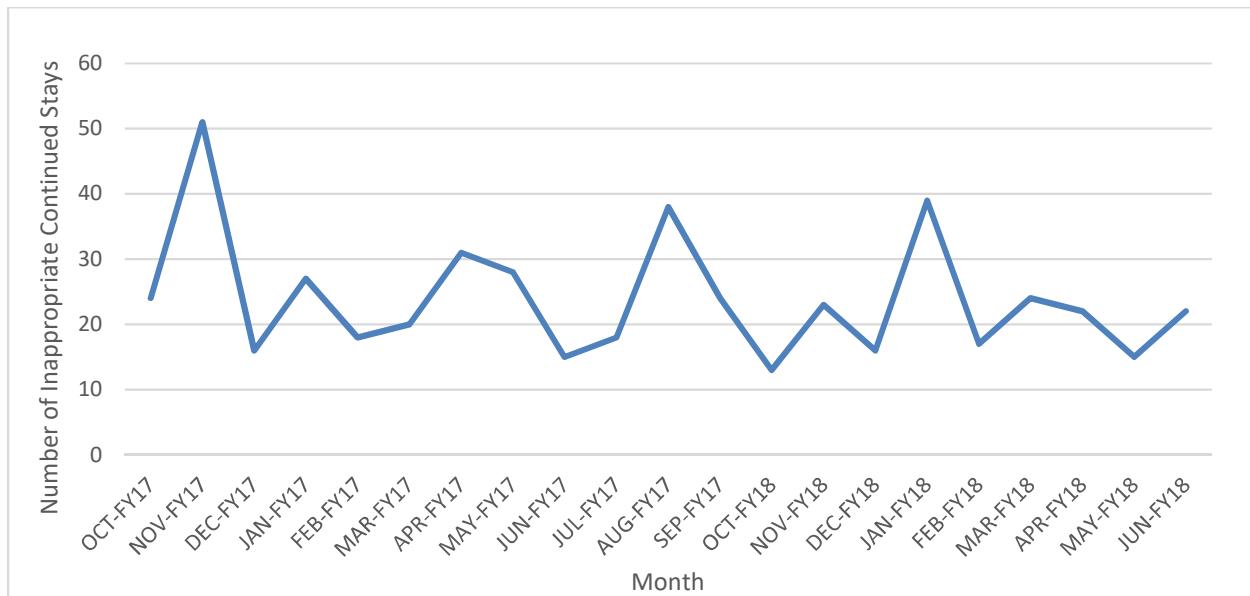


Figure 8: Tennessee Valley HCS Inappropriate CS Days Due to Transportation

In December 2016, VetRide was updated to include a Discharge clinic, which allows transportation staff the ability to identify trips supporting discharges. In the first two quarters of FY18, VetRide recorded 3,575 trips to support inpatient discharges. Using the relatively low national cost average of \$1,847.79 per day of inpatient care, VTS saved more than \$6.6 million in six months by supporting timely discharges. Furthermore, as previously stated, these estimates are believed to be low due to the staggered rollout and inconsistent use of the VetRide application. When considering the 56 facilities that recorded at least one trip supporting a discharge in the 12 months between August 2017 and August 2018, the data in VetRide indicates that VTS supports an average of approximately 11 discharges per facility per month, which equates to a monthly bed day of care cost savings of \$20,325 (or \$243,908 annually) per VAMC.

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Another adverse effect of extended LOS is the unavailability of unnecessarily occupied beds for new patients. These patients are sent to outside community hospitals at a much higher cost to the VA. In FY17, the VA paid for a total of 169,312 inpatient episodes of care.²⁵

Emergency Department visits

In 2017, patients who canceled at least one appointment due to transportation made more than 209,000 ED appointments. This accounts for 7.98% of all ED visits in 2017. However, as stated previously, patients who canceled appointments due to transportation account for only 3.74% of the VA patient population. This implies a likelihood of this patient population to present to the ED.

Further examination of ED encounters in 2017 by patients who canceled appointments due to issues with transportation shows that 7,575 ED visits occurred between the date of the canceled appointment and the patient's next scheduled appointment. This may indicate an association between transportation needs and the usage of the ED to mitigate or address consequences of delaying routine healthcare services.

In 2017, there was a total of 926 occurrences in which a patient presented to the ED within 24 hours after canceling an appointment due to transportation. It is possible that this patient population includes individuals who used ambulance services to travel to medical facilities. Other studies have observed this practice to be a source of unnecessary expenditures to healthcare organizations and has been documented in literature (National Center for Mobility Management 2016).

In addition to ambulance transports that are not medically required, the VA calculated each ED encounter in 2017 to cost an average of \$722, more than triple the average outpatient encounter cost of \$218.21. Additionally, at \$1,799, the average cost per ED Observation encounter is more than five times the amount of an average outpatient encounter.²⁶ Accordingly, any costs to assist patients with keeping originally scheduled outpatient appointments and prevent them from resorting to the ED to obtain transportation through ambulance services will likely be recompensed.

Between December 2016 and December 2017, the number of ED encounters by patients who used VTS services decreased by 34.63% (Figure 9), a significant reduction compared to the 13.29% decrease in ED visits by transportation-challenged patients who have not used VTS services. Applying the ED visit rate for patients who used VTS services (34.63%) to all ED patients who canceled an appointment due to a lack of transportation yields a

²⁵ From the Non-VA Care Management report. Fee Inpatient Payment Records- A fee basis record is a record of treatment by non-VA healthcare providers authorized and paid for by VA.

²⁶ Average cost per ED Encounter as reported by the MCAO Outpatient Cost Report: Cost and Workload for Selected DSS Clinic Stop/Credit Stop

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reduction of 2,636 ED visits in December 2017 alone. This reflects a missed opportunity cost savings of \$1.9 million using the average ED encounter cost of \$722.



Figure 9: ED Visits for Patients Serviced by VTS with Documented Lack of Transportation

Impact on health outcomes

Previous studies have identified transportation as one of the barriers to healthcare. These studies indicate that the benefits of providing and/or planning for patients' transportation needs are manifested both financially and by improved patient health outcomes. Thus, any discussion regarding the benefits VTS provides must include a measure of the health outcomes of patients that can take advantage of its services.

Mental Health

In its 2018-2024 strategic plan, the VA identifies suicide prevention as its highest clinical priority.

Expectedly, the data reflects an increase in both the number of patients with mental health visits, as well as an overall increase in the number of mental health visits. For the purpose of this study, visits were limited to patient-provider outpatient encounters. The visits

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included in the count (and the patients associated with the visits) reflect those flagged with a Service Category of “Ambulatory” or “Telephone.”²⁷

Table 7: Mental Health Patients and Visits by Year

Year	Count of MH Patients	Count of MH Visits
2006	874,877	8,654,169
2007	965,084	9,389,336
2008	1,067,697	10,518,546
2009	1,173,805	12,134,230
2010	1,266,356	13,375,048
2011	1,339,513	13,906,423
2012	1,416,070	14,702,634
2013	1,530,645	16,364,722
2014	1,655,082	18,144,589
2015	1,732,097	18,985,562
2016	1,858,244	20,970,122
2017	1,906,537	21,396,553

Figure 10 shows that the VA observed a steady increase in the number of patients receiving outpatient mental health services through the VA. The application of a linear regression model forecasts that the VA will treat a total of 257,506 more mental health patients in 2020 than in 2017.²⁸

²⁷ In the Visit VistA file, Service Category indicates the kind of service that was provided. Available values include Ambulatory, Chart Review, Daily Hospital Date, Event (Historical), Hospitalization, In Hospital, Not Found, Observation, Nursing Home, Day Surgery, Telecommunications and Ancillary Package Daily Data (Gonsoulin and Ramanathan September 2016; last edited April 2018).

²⁸ The r-squared value of the trendline from 2006 to 2017 = 0.9977. The following slope was used to forecast the count of unique patients for 2006 to 2018: $y = 95,501x + 778,077$.

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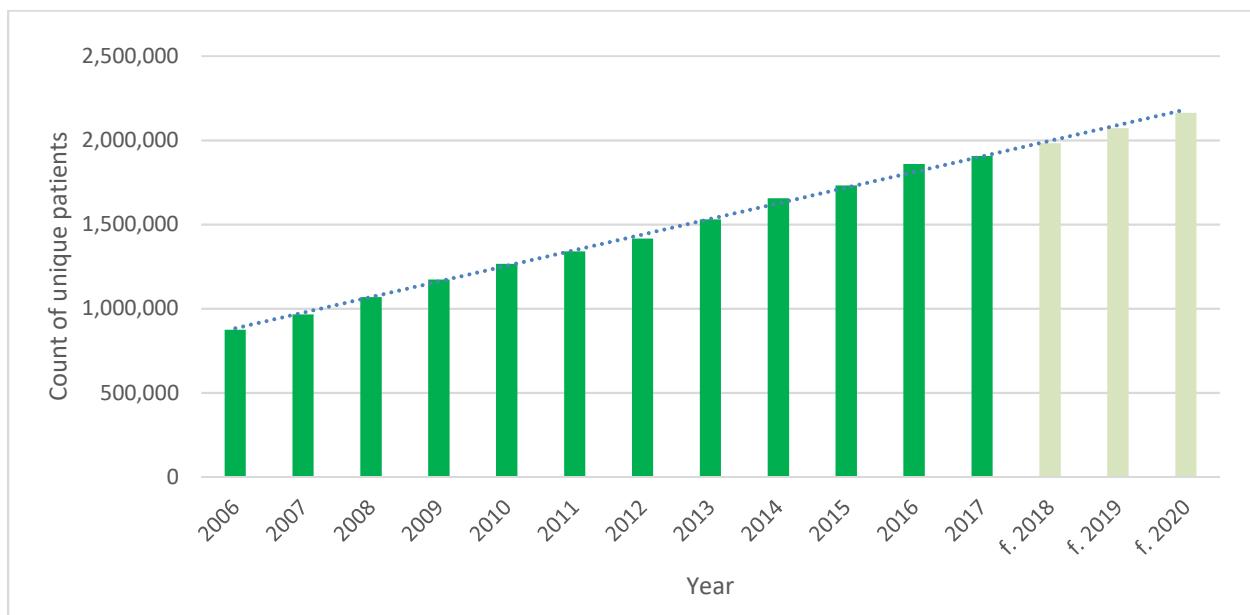
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Figure 10: Count of Mental Health Patients

Figure 11 shows that the previously illustrated increase in the VA's mental health patient population correlates with a yearly increase in the total number of mental health visits. The application of a linear regression model forecasts 3,690,246 more mental health visits in 2020 than in 2017.²⁹ It may also be important to note that the data shows an increase in the average number of mental health visits per patient from 9.89 visits in 2006 to 11.22 visits in 2017.

²⁹ The r-squared value of the trendline from 2006 to 2017 = 0.9917. The following slope was used to forecast the count of unique patients for 2006 to 2017: $y = 1,200,977x + 7,072,144$.

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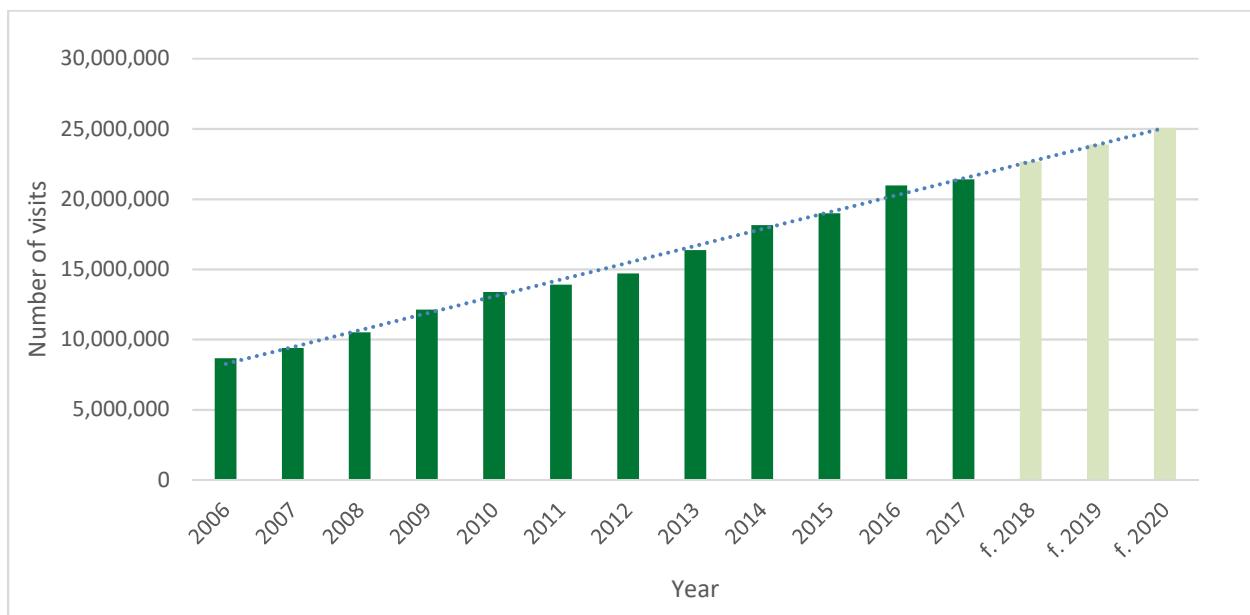


Figure 11: Count of Mental Health Visits

The extent of mental healthcare that the VA provides can be observed by reviewing appointment volume by stop code. The study compared stop code utilization by patients who lacked transportation to the total VA patient population. The research team focused on stop codes for which patients who lacked transportation scheduled a disproportionately high number of appointments.³⁰ The resulting list of stop codes shows that six of the top 10 codes by appointment volume were for mental health appointments, including Substance Use Disorders, Psychosocial Rehabilitation and Recovery Centers, and Intensive Community Mental Health Recovery.

Table 8: Appointment Utilization by Stop Code in 2017³¹

StopCode Name	Total Appointments			Patients Lacking Transportation			
	Appts	PT Cancel or No Show	% PT Cancel or No Show	Appts	PT Cancel or No Show	% PT Cancel or No Show	% Appt Utilization
SUBSTANCE USE DISORDR GRP	1,249,209	280,056	22.42%	177,276	49,677	28.02%	14.19%

³⁰ The average percent of appointment utilization across all stop codes was 8.55%, with a standard deviation of 4.88% and a z-score of 1 = 13.73%.

³¹ StopCode Names associated with mental health are listed in bold type.

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SUBSTANCE USE DISORDER IND	891,628	249,534	27.99%	131,374	44,319	33.73%	14.73%
PRRC GROUP	610,705	122,622	20.08%	115,503	30,793	26.66%	18.91%
INTNSE SUB USE DSRDER GRP	495,075	91,326	18.45%	77,262	17,920	23.19%	15.61%
SPEECH-LANGUAGE PATHOLOGY	330,407	55,304	16.74%	45,888	10,344	22.54%	13.89%
SPINAL CORD INJURY	226,764	40,974	18.07%	38,957	9,233	23.70%	17.18%
ICMHR INDIVIDUAL	174,474	12,697	7.28%	29,752	2,713	9.12%	17.05%
ENTEROSTOMAL WOUND/SKIN CARE	163,223	27,671	16.95%	27,133	6,508	23.99%	16.62%
PRRC INDIVIDUAL	112,732	23,379	20.74%	19,671	4,928	25.05%	17.45%
ADULT DAY HEALTH CARE	89,469	16,463	18.40%	20,082	3,963	19.73%	22.45%

Additionally, those who lacked transportation made up a disproportionate number of patients who were given diagnoses that fall under the Medical Diagnostic Categories of Substance Use & Disorders and Mental Diseases & Disorders in the ED.

Table 9: Top 10 ED Diagnoses by Patients Lacking Transportation in 2017

Medical Diagnostic Category	Patients with Transportation	Count of Diagnoses by Patients with Transportation	Patients Lacking Transportation	Count of Dx by Patients Lacking Trans	% of Patients Lacking Transportation
SUBSTANCE USE & DISORDERS	11,159	16,194	1,620	2,355	12.68%
MENTAL DISEASES & DISORDERS	26,592	35,120	3,345	4,716	11.17%
ENDOCRINE, NUTRIT, METABOLIC	19,574	23,335	2,408	3,005	10.95%
HEMATOPOIETIC, IMMUNITY	5,203	5,988	617	698	10.60%
BURNS	2,435	2,632	287	313	10.54%

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HEPATOBILIARY & PANCREAS	3,325	3,832	377	448	10.18%
CIRCULATORY SYSTEM	52,539	64,508	5,340	6,956	9.23%
NERVOUS SYSTEM	23,501	26,543	2,387	2,795	9.22%
HIV INFECTIONS	122	127	12	12	8.96%
KIDNEY & URINARY TRACT	27,292	34,513	2,672	3,542	8.92%

With regards to inpatients, 4,870 Veteran patients with an inpatient diagnosis of Suicidal Ideations and 395 patients with an inpatient diagnosis of Intentional Harm or Attempted Suicide canceled at least one appointment due to transportation in 2017. The data shows that 13.63% of patients who were diagnosed with Intentional Self-Harm or Attempted Suicide and 12.77% of patients who were diagnosed with Suicidal Ideations had at least one documented instance of canceling an appointment due to a lack of transportation. These rates indicate that patients who lacked transportation were 3.41 times more likely to have a diagnosis of Suicidal Ideations and 3.64 times more likely to have a diagnosis of Intentional Self-Harm or Attempted Suicide during an inpatient encounter than patients who did not lack transportation.

Table 10: Inpatient Admissions with Mental Health Diagnoses in 2017

	All inpatients	Inpatients lacking transportation	Percent of inpatients lacking transportation
Count of patients	463,337	45,598	9.84%
Count of inpatient encounters	765,267	87,657	11.45%
Inpatients with a diagnosis of Intentional Harm or Attempted Suicide	2,899	395	13.63%
Inpatients with a diagnosis of Suicidal Ideation	38,140	4,870	12.77%

Of all inpatient admissions in 2017, more than 11% of patients who were diagnosed with Substance Use & Disorders and Mental Diseases & Disorders had documented appointment cancellations due to a lack of transportation.

Table 11: Top 10 Inpatient Diagnosis Groups by Patients Lacking Transportation

MDC	Patients with Transportation	Count of Dx by Patients Lacking Transportation	Patients Lacking Transportation	Count of Dx by Patients Lacking Trans	% of Patients Lacking Transportation
SKIN, BREAST, SUBCUTANEOUS T	87,082	175,445	12,619	29,796	12.66%
HIV INFECTIONS	3,512	5,919	497	978	12.40%

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EYE	44,994	76,778	6,231	11,316	12.16%
INJURY, POISONING, DRUG TOXICITY	42,708	56,943	5,799	7,979	11.95%
NERVOUS SYSTEM	200,660	469,980	27,151	73,546	11.92%
SUBSTANCE USE & DISORDERS	111,287	299,700	14,913	44,924	11.82%
HEPATOBILIARY & PANCREAS	73,550	170,640	9,528	24,995	11.47%
INFECTIOUS & PARASITIC	80,539	157,915	10,408	21,988	11.44%
FEMALE REPRODUCTIVE SYSTEM	3,914	6,505	502	829	11.37%
MENTAL DISEASES & DISORDERS	234,431	663,807	29,976	99,884	11.34%

The data also indicates that the number of admissions for patients who had been serviced by VTS and diagnosed with Intentional Self-Harm, Attempted Suicide, or Suicidal Ideations steadily decreased in the past two years (Figure 12).



Figure 12: Inpatient Admissions for MH patients served by VTP

VetRide data indicates that more than 20% of this patient population used VTS services. This is comparable to the services that VTS provided to patients who canceled appointments due to a lack of transportation. In 2017, VTS provided at least one trip for 48,477 of the 256,714 VA patients who canceled appointments due to a lack of transportation (more than 18%).

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Perhaps even more indicative of the impact created by the availability of transportation services is that patients with the aforementioned diagnoses who had at least one occurrence of using VTS services reduced their appointment cancelation rates by 20%, while the appointment cancelation rate of patients who did not use VTS services decreased by only 2.66%.

Mental Health surveys self-reported by patients also reveal potential correlations with access to reliable transportation. In 2017, the two most frequently administered PTSD surveys were the Primary Care PTSD Screen (PC-PTSD), which screens for PTSD-related symptoms in a primary care setting, and the PTSD Symptom Checklist for DSM-5 (PCL-5), which assesses the DSM-5 symptoms of PTSD (Table 12).³²

Table 12: PTSD Surveys Administered in 2017

Survey Name	Purpose	Number of Stations Administering the Survey	Number of Surveys Administered
PC PTSD	Screen for PTSD-related symptoms in a primary care setting	130	2,051,667
PCL-5	PTSD Symptom Checklist for DSM 5	130	295,278
MISS	PTSD screening scale	49	2,050
PCLC	PTSD screening	15	1,585
PCLS	PTSD screening	1	4

The PC-PTSD is used to assess and identify patients in the primary care setting who have been exposed to traumatic events and how the trauma may have affected them in the past month.³³ The VA determines a cut-off score of 4 to be indicative of PTSD. Analysis shows that almost 12% of transportation-disadvantaged patients scored 4 on the PC-PTSD, compared to 8.27% patients without transportation issues.

Table 13: PC-PTSD Surveys Administered in 2017

Metric	Patients without Transportation Issues	Patients with Transportation Issues
Total patients	1,824,677	75,467
Total surveys	1,966,659	84,435
Patients with scores of 4	150,939	9,033
Surveys with scores of 4	162,604	9,913

³² The DSM-5 is the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition*. <https://www.psychiatry.org/psychiatrists/practice/dsm>

³³ For more information on the PC-PTSD-5 survey, see <https://www.ptsd.va.gov/professional/assessment/screens/pc-ptsd.asp>.

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Although the VA stresses that structured clinical interviews are the ideal in diagnosing PTSD, the PCL-5 survey is acknowledged as a psychometrically sound means of making a provisional PTSD diagnosis.³⁴ The VA considers a PCL-5 survey with a total symptom severity score of 33 (of a maximum score of 80) to be a reasonable cutoff for a provisional diagnosis of PTSD. Assessing PCL-5 scores of all surveys submitted in 2017 finds an average score of 46.19 for all patients. With regards to transportation, patients who have canceled an appointment due to transportation in the same timeframe exhibit a higher average score (49.00) than patients without transportation issues (46.00). Analysis of PCL-5 survey results also indicates a greater percentage of patients who lacked transportation score more than the cutoff of 33 (85.16%) than patients without documented issues with transportation (80.18%). Additionally, patients who lacked transportation were more likely to have symptom severity scores of more than 60 (34.48%) than patients without documented issues with transportation (26.95%).

Table 14: PCL-5 Surveys Administered in 2017

Metric	Patients without Transportation Issues	Patients with Transportation Issues
Total patients	149,745	10,348
Total surveys	272,970	20,492
Average score	46.00	49.00
Patients with scores ≥ 33	120,087 (80.18%)	8,813 (85.16%)
Patients with scores ≥ 60	40,356	3,568

Other surveys include questions that may indicate the possibility that responders would harm themselves. For example, the PHQ9 screen for depression includes the following text: "Thoughts that you would be better off dead or of hurting yourself in some way." Responders are able to indicate the frequency in which they agree with the statement. In 2017, a total of 567,636 patients were given the survey. Responses show that patients who lacked transportation were more likely to agree having thoughts regarding death or self-harm to some degree.

Table 15: PHQ9 Survey Question Regarding Death and Self-Harm

Question Answer	Patients without Transportation Issues		Patients with Transportation Issues	
	Number of responses	Percentage	Number of Responses	Percentage
Nearly every day	15,329	2.93%	1,737	3.93%
More than half the days	24,963	4.77%	2,629	5.95%
Several days	72,652	13.88%	6,648	15.04%

³⁴ For more information on the PCL-5 survey, see <https://www.ptsd.va.gov/professional/assessment/adult-sr/ptsd-checklist.asp>.

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Not at all	409,959	78.34%	33,150	74.99%
Missing	75	0.01%	1	0.00%
Skipped	351	0.07%	42	0.10%
Grand Total	523,329	100.00%	44,207	100.00%

The MISS PTSD Screening Scale includes the statement: "I feel like I cannot go on" and survey responders are able to indicate the frequency in which they agree. Results from the 49 facilities that administered the survey show that, as with the PHQ9, patients with transportation issues were more likely to agree with the statement at some time.

Table 16: MISS PTSD Survey Question Regarding Resiliency

Question Answer	Patients without Transportation Issues		Patients with Transportation Issues	
	Number of responses	Percentage	Number of Responses	Percentage
Almost always true	55	3.12%	3	3.13%
Very true	158	8.96%	16	16.67%
Sometimes true	503	28.53%	35	36.46%
Rarely true	367	20.82%	19	19.79%
Not at all true	675	38.29%	23	23.96%
Skipped	5	0.28%	-	0.00%
Grand Total	1,763	100.00%	96	100.00%

Lack of transportation also appears to correlate with the appointment schedule and cancelation rates of VA patients diagnosed with PTSD as well as the frequency in which they present to the ED. In 2017, PTSD patients who lacked transportation scheduled almost twice as many (98% more) appointments as those who did not lack transportation. These patients also canceled and no-showed to more appointments (by 50% and 19%, respectively) than PTSD patients who do not lack transportation. Additionally, PTSD patients who lacked transportation were 93% more likely to present to the ED than PTSD patients who did not lack transportation.

Table 17: Appointment and ED Utilization for Patients Diagnosed with PTSD

	PTSD Patients without Transportation Issues	PTSD Patients with Transportation Issues
Patients	1,037,464	60,416
Total appointments	25,944,296	2,993,224
Appointments per patient	25.01	49.54
Patient-canceled appointments	3,412,269	589,497
% Appointments canceled	13.15%	19.69%
No-show appointments	1,968,714	269,874

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% No-show	7.59%	9.02%
ED visits	511,607	57,554
ED visits per patient	0.49	0.95
High-acuity ED visits	61,994	9,153
% High acuity	12.12%	15.90%

In comparing PTSD treatment methods, patients who lacked transportation were more often treated with a combination of medication and therapy than patients without transportation issues. On the other hand, patients who did not lack transportation were more likely to be treated with medication only. There is little difference in the percent of the two populations (with and without transportation issues) who were treated exclusively by therapy. The data also shows that a higher percentage of patients with transportation issues received some form of PTSD treatment than those without.

Table 18: Comparison of PTSD Treatment Methods

Method of Treatment	Patients without Transportation Issues	Patients with Transportation Issues
Medication only	72.26%	65.77%
Therapy only	7.60%	6.59%
Medication and therapy	20.13	27.64%
Percent treated	69.84%	81.33%

Emergency Department visits

Patients with documented lack of transportation issues (identified as the reason for at least one canceled appointment) accounted for 209,064 of the 2,620,851 visits to VAMC EDs in 2017. The disposition records for these encounters show that a considerably higher percentage of this patient population was admitted to inpatient status from the ED (24.57% to 16.76%). As previously stated, this may be indicative of a tendency of this patient population to delay seeking medical care.

Table 19: Emergency Department Dispositions

Disposition	Total ED patients	Total ED visits	ED patients with Transportation Issues	ED visits by patients with Transportation Issues
Admission	299,407	439,304	51,377	31,014
Transferred	1,164,179	49,195	4,760	4,123
Other	880	2,131,463	152,881	71,149
Surgery	43,802	889	46	45
Total	1,508,268	2,620,851	209,064	106,331

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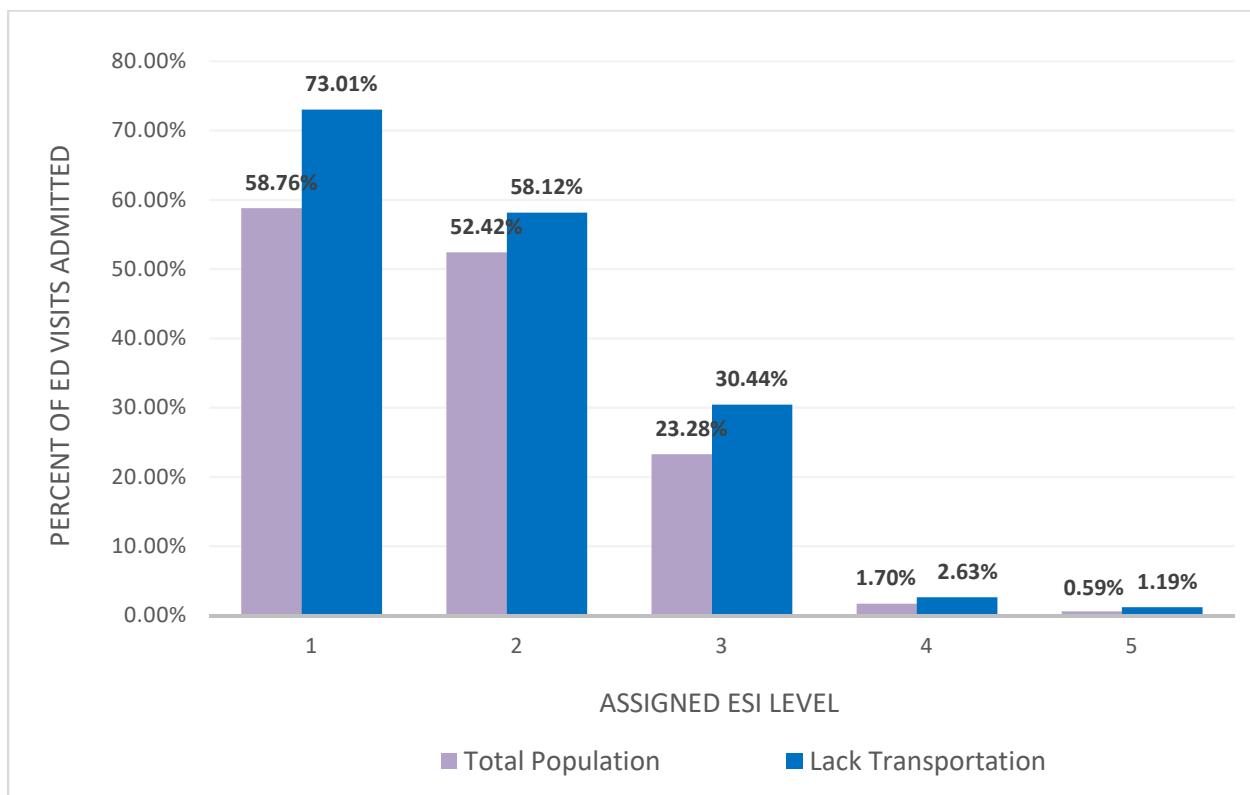


Figure 13: Comparison of Admissions from the ED in 2017 by Assigned ESI Level

This deduction is further supported by the Emergency Severity Index (ESI) levels assigned to each ED encounter. The ESI is a five-level algorithm that provides guidance for triaging ED patients into five groups from 1 (most urgent) to 5 (least urgent) based on acuity and resource needs.³⁵ Analysis of ED encounters in 2017 indicates that patients with a history of lacking transportation who presented to the ED were assigned higher ESI levels than the general ED patient population. ED patients who lacked transportation were given ESI levels of 1, 2, or 3 more often than the general ED patient population.

Table 20: Emergency Department Visits and Admissions in 2017 by ESI

Emergency Severity Index (ESI)	ED Visits by ESI Level		ED Visits Admitted to Inpatient Status	
	All patients	Patients with Transportation Issues	All patients	Patients with Transportation Issues
1	6,382	707	3,750	513
2	273,727	29,572	143,478	17,114
3	1,182,554	105,772	275,255	32,089

³⁵ For more information on ESI, see the *Emergency Severity Index, Version 4: Implementation Handbook* http://vaww.va.gov/nursing/docs/cpp/ESI_Handbook_Version4.pdf

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4	937,714	59,140	15,954	1,558
5	145,404	9,348	865	103
Unknown at this time	2,228	4,368	1	0
Missing	72,841	157	1	0
Total	2,620,850	209,064	439,304	51,377

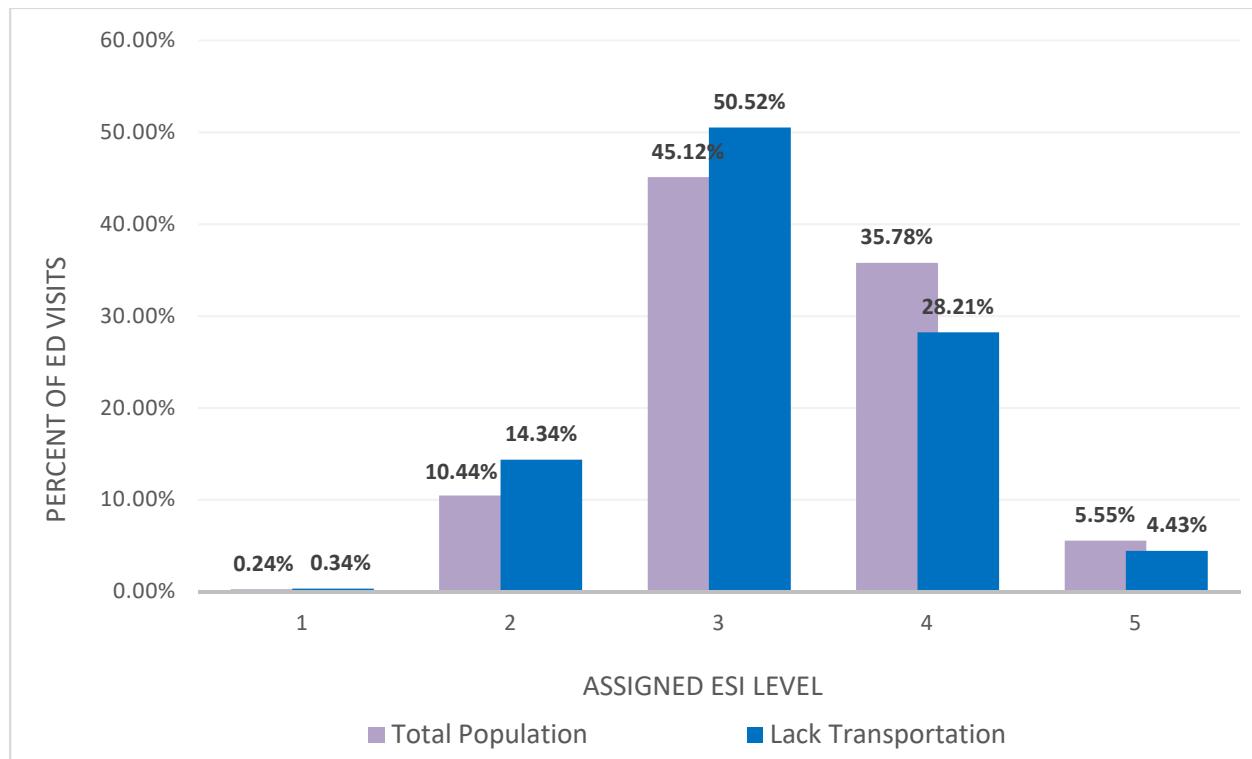


Figure 14: Comparison of ED Visits in 2017 by Assigned ESI Level

As previously stated, in 2017, a total of 7,525 ED visits occurred between appointments that were canceled due to a lack of transportation and the patients' next scheduled appointment. This may demonstrate the association between transportation needs and using the ED to mitigate the consequences of delaying routine healthcare services.

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Inpatient admissions and readmissions

In 2017, a total of 463,337 patients accounted for 765,267 inpatient encounters at VA medical facilities.³⁶ Of these patients, approximately 1 in 10 had a documented appointment cancellation reason attributed to a lack of transportation.

A review of the VA's readmissions from 2013 to 2017 also shows that patients with documented issues with transportation were consistently readmitted at a higher rate than the general patient population.

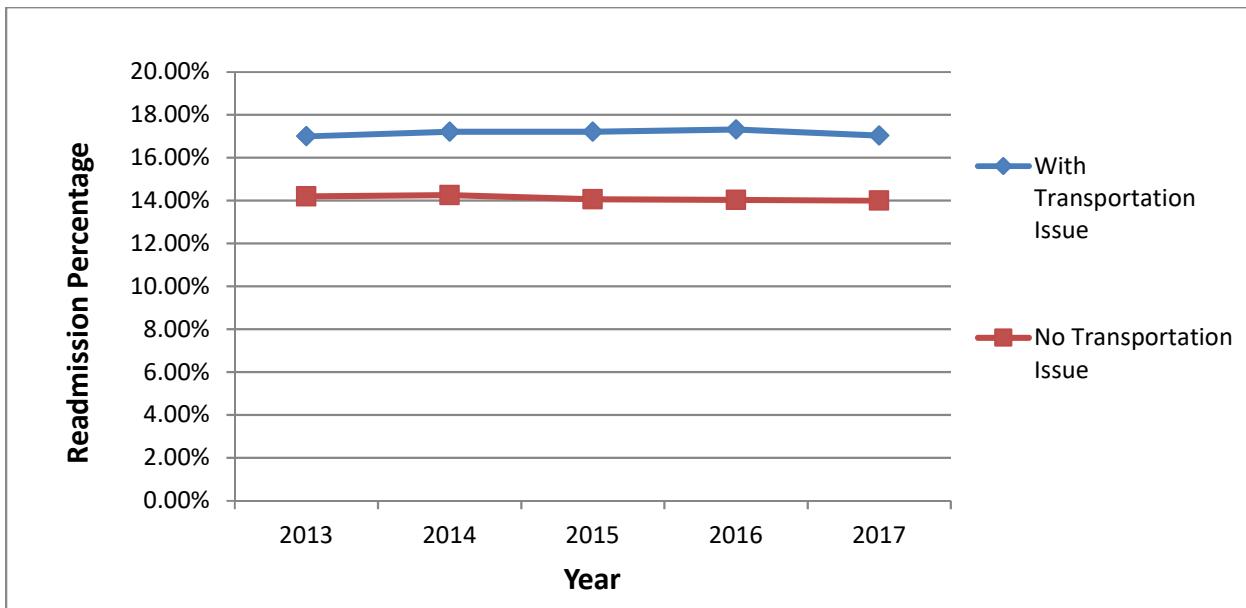


Figure 15: 30-Day Readmission Rate by Year

The data shows that patients with transportation issues are likely to be readmitted shortly after discharge. The difference in readmission rates between the two populations continues to increase over time until 30 days post-discharge (Figure 16). In 2016, 17.04% of patients with transportation issues were readmitted within 30 days of discharge, compared to a readmission rate of 14.00% by patients without transportation issues. Admissions occurring on the same day as the initial admission (same-day readmissions) were not counted when calculating the readmission rates. Also omitted from this analysis were admissions that were documented in the system before the previous admissions' dates of discharge (see Appendix D: Criteria for Readmission Rates analysis and comparison).

³⁶ For this report, inpatient encounter data consists of inpatient records with a discharge in 2017.

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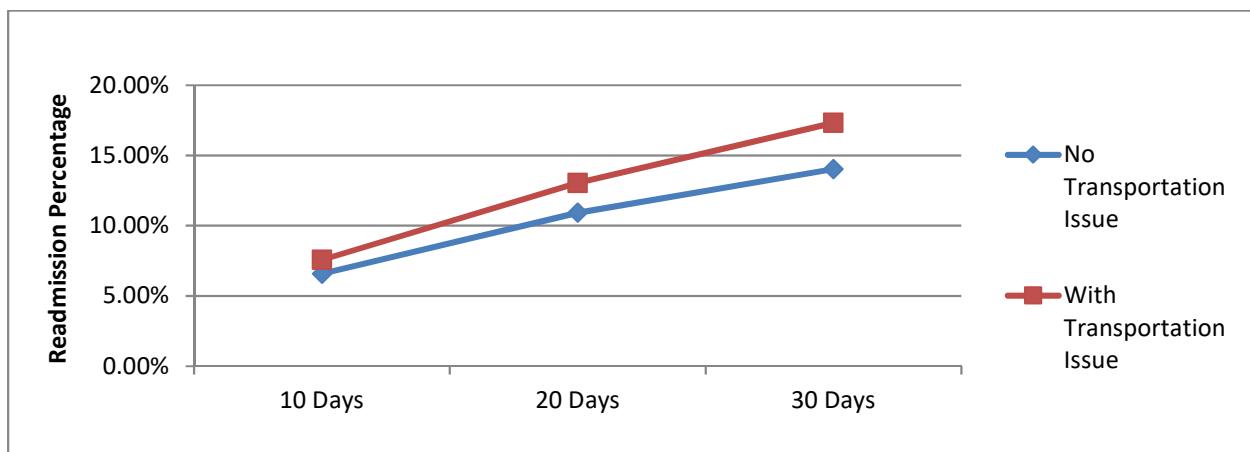


Figure 16: 2016 Readmission Rates Comparison

The study also examined readmission rates in the past 10 years for patients who canceled appointments. To isolate the effects of transportation on readmission instances, the study identified the population of patients who had at least one year in which they canceled an appointment due to issues with transportation and a different year in which all appointments were canceled due to other reasons. The readmission rates for the same patients in the years with and without transportation issues were compared.

Analysis shows that 59% of this patient population had a higher readmission rate in the years in which they lacked transportation.

Table 21: 2016 Readmissions Rates of the Same Patients

Comparison of readmission rates between years	Number of patients	Percent of total patients
More readmissions in years when the patient does not have transportation issues	9,181	33%
Equal	2,377	8%
More readmissions in years when the patient has transportation issues	16,485	59%

Pain score

Patient pain scores indicate a patient's perception of the intensity of their pain and is often self-reported based on a scale from 0 to 10. Available data from 2017 indicates that patients who canceled at least one appointment due to a lack of transportation were more likely to report a heightened pain score than the general patient population. More than 26.28% of all pain scores obtained from this patient population were 7 or higher, compared to 20.77% of the general patient population. This may indicate that this patient population is waiting longer to present to VAMCs for medical care.

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Table 22: Pain Scores in 2017

All Patients		Patients with Transportation Issues
0 to 6	38,483,494	3,522,108
7 or above	10,087,491	1,255,522
Total	48,570,985	4,777,630

Cancer

The timeline of lung cancer from biopsies performed at VAMCs from 2012 to mortality shows that the 5-year survival rate drops from 24.48% to 22.22% for patients lacking transportation.

Table 23: Lung Biopsy, Cancer Diagnosis, and Mortality in 2012

Lack Transportation?	Age Category	Biopsy	Cancer Dx	Cancer Dx Percentage	Secondary Cancer	Secondary Cancer Percentage	5 Year Survival	5 Year Survival Rate Percentage
No	<60	737	237	32.16%	58	24.47%	79	33.33%
	60-70	2,228	1,137	51.03%	279	24.54%	329	28.94%
	>70	1,571	942	59.96%	179	19.00%	159	16.88%
	Subtotal	4,536	2,316	51.06%	516	22.28%	567	24.48%
Yes	<60	159	50	31.45%	11	22.00%	18	36.00%
	60-70	326	176	53.99%	42	23.86%	43	24.43%
	>70	193	125	64.77%	25	20.00%	17	13.60%
	Subtotal	678	351	51.77%	78	22.22%	78	22.22%
Total		5,214	2,667	51.15%	594	22.27%	645	24.18%

A similar review focusing on prostate cancer shows potential correlations with transportation accessibility. While the average number of days between biopsy to diagnosis in 2012 was relatively even between the general patient population and the patients who canceled appointments due to transportation (7.08 and 8.23 days, respectively), the percentage of those populations who wait more than 14 days between having a biopsy performed and receiving a diagnosis shows an increased degree of disparity (24.37% and 30.73%, respectively). This difference increases when evaluating 5-year survival rates. The 5-year survival rate for patients who were diagnosed with prostate cancer in 2012 was 86.56% while the survival rate for those with documented transportation hindrances was 78.83%. This represents a difference of 7.73 percentage points in 5-year survival rate between the two patient populations.

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Table 24: Prostate Biopsy, Cancer Diagnosis, and Mortality in 2012³⁷

Lack Transportation?	Age Category	Biopsy	Cancer Dx	Cancer Dx Percentage	Average Days to Dx	>14 Days Between Biopsy and Dx	>14 Days Between Biopsy and Dx Percentage	Secondary Cancer	Secondary Cancer Percentage	5 Year Survival	5 Year Survival Rate Percentage
No	<60	3,806	1,718	45.14%	8.27	480	27.94%	42	2.44%	1,573	91.56%
	60-70	16,097	7,538	46.83%	7.10	1,859	24.66%	166	2.20%	6,678	88.59%
	>70	4,153	2,290	55.14%	6.12	475	20.74%	78	3.41%	1,743	76.11%
	Sub-Total	24,056	11,546	48.00%	7.08	2,814	24.37%	286	2.48%	9,994	86.56%
Yes	<60	472	239	50.64%	8.93	82	34.31%	9	3.77%	203	84.94%
	60-70	1,268	618	48.74%	8.25	190	30.74%	20	3.24%	494	79.94%
	>70	279	168	60.22%	7.18	43	25.60%	9	5.36%	111	66.07%
	Sub-Total	2,019	1,025	50.77%	8.23	315	30.73%	38	3.71%	808	78.83%
Total		26,075	12,571	48.21%	7.17	3,129	24.89%	324	2.58%	10,802	85.93%

Dialysis

In general, patients are more than twice as likely to receive dialysis if they lack transportation. While dialysis patients constituted 0.19% of the VA patient population, they constituted 0.55% of patients who lacked transportation.³⁸

Over the past 5 years, the VA has seen an increase in the number of dialysis patients and visits to dialysis clinics. However, while the number of patients who received dialysis increased by 9.79% from 2013 to 2017, the number of dialysis patients who lacked transportation increased by 41.24% in the same timeframe. Additionally, while the number of visits to dialysis clinics by VA patients increased by 13.32% from 2013 to 2017, the number of visits by patients who lacked transportation increased by 58.85%. This correlates with a markedly higher number of dialysis visits per patient lacking transportation.

Table 25: Comparison of Dialysis Patients and Visits from 2013 to 2017

Issues with Transportation	N_patients	N_Patient_dialysis	N_Visits	N_Visits_dialysis	N_dialysis_visits_per_patient
2013	No	6,172,869	11,610	177,520,503	505,136

³⁷ Prostate cancer cases counted includes those diagnosed within 31 days after the completion of the biopsy.

³⁸ The percentages of dialysis patients displayed reflects the average for each population over 5 years, from 2013 to 2017.

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2014		6,299,690	11,402	189,096,178	533,205	46.76
2015		6,379,536	12,140	199,831,512	568,533	46.83
2016		6,434,108	12,731	209,697,680	571,319	44.88
2017		6,477,022	12,747	214,536,513	572,428	44.91
2013	Yes	221,158	1,079	15,042,544	55,811	51.72
2014		235,235	1,210	16,959,101	62,053	51.28
2015		238,496	1,287	18,261,274	70,957	55.13
2016		237,176	1,467	18,888,148	75,461	51.44
2017		255,931	1,524	20,503,483	88,656	58.17

The increased frequency in which patients with transportation issues receive dialysis can be attributed to both the severity of End Stage Renal Disease and the necessity of adhering to a dialysis treatment plan. Because missing dialysis treatments can have severe consequences, patients are generally less likely to cancel appointments. This also collaborates with VTS trips captured by VetRide. The clinic reporting capability in VetRide shows that in Q1-Q3 of FY 2018, dialysis was one of the services most frequently accessed by VTS users.

Table 26: Clinical Services Most Frequently Accessed Through VTS

Clinic	FY18 Q1	FY18 Q2	FY18 Q2
CONTRACT DIALYSIS	1700	1883	1840
PRIMARY CARE GROUP	1069	1121	1317
MENTAL HEALTH CLINIC- INDIVIDUAL	1175	991	1096
PRIMARY CARE/MEDICINE	1045	988	1090
PHYSICAL THERAPY	983	882	1024
MENTAL HEALTH CLINIC- GROUP	832	819	871
PODIATRY	620	535	652
OPTOMETRY	767	840	828
CHRONIC ASSISTED HEMODIALYSIS TREATMENT	688	518	733
CARDIOLOGY	597	560	613

Mortality

Analysis of canceled appointment data from the VA CDW from 2013 to 2016 shows that patients who canceled appointments due to issues with transportation exhibited an increased mortality rate. In this timeframe, the mortality rate of patients who canceled appointments due to reasons other than lack of transportation hovers between 4.32% and 5.04%. However, the data indicates that the mortality rate for patients who missed at least

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one appointment due to a lack of transportation jumps over one percentage point. For example, while 4.32% of patients who canceled appointments (but none caused by transportation issues) died in 2017, that figure jumps to 6.16% when accounting for patients who attributed all their canceled appointments to a lack of transportation.

The mortality rates also show a marked increase in death rates for patients of all age groups who canceled appointments due to issues with transportation, compared to those whose canceled appointments were not attributed to a lack of transportation. Mortality rates indicate that 6.92% of patients with transportation-related appointment cancelations in 2015 passed away in 2016, compared to 4.54% of patients who canceled appointments for reasons other than transportation in 2015.

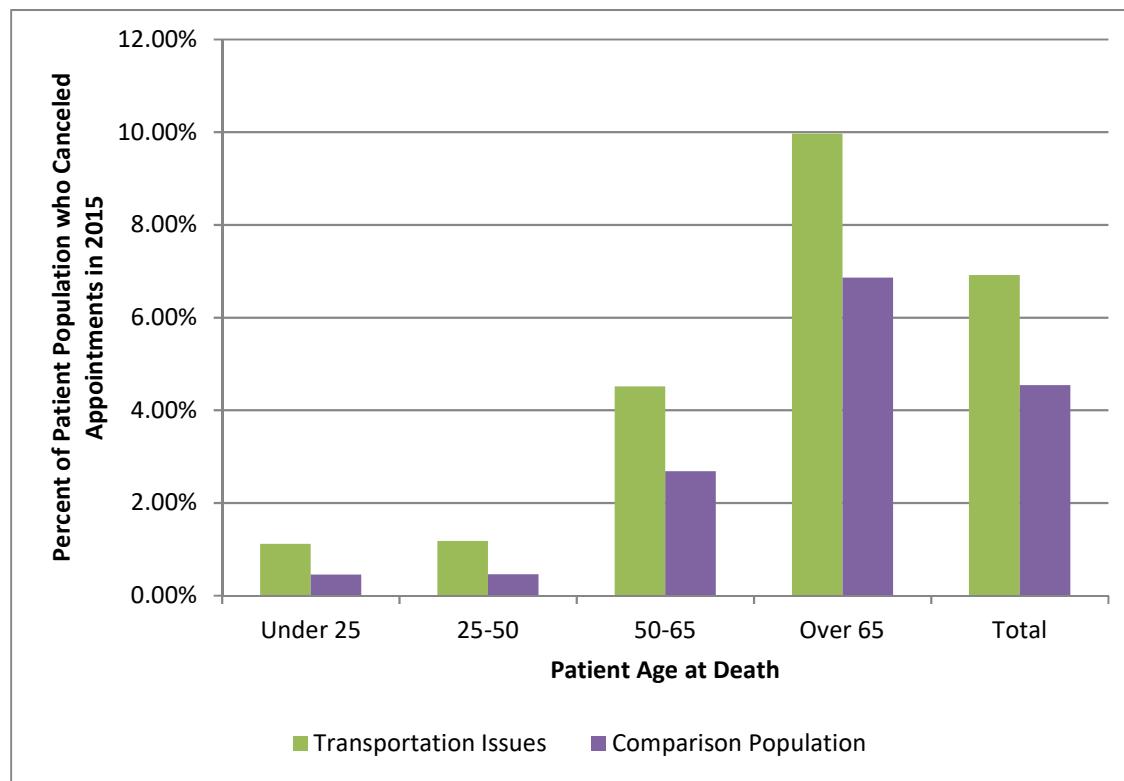


Figure 17: Comparison of Mortality Rates in 2016 per Age Bracket

The data also shows that 85% of all patients who canceled appointments in 2016 due to transportation were over the age of 50, while more than half were over the age of 65. When considering the impact of transportation, of the patients who canceled appointments in 2015 (due to issues with transportation) and passed away the following year, 97% were patients over the age of 50.

Mortality can also be examined by rurality. The 2016 mortality rates of patients who canceled at least one appointment due to transportation were relatively consistent for the

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three rurality groups. However, of patients who cancel appointments for reasons other than transportation, the lowest mortality rates were exhibited by patients in urban areas, and the highest mortality rates by patients in highly rural areas.

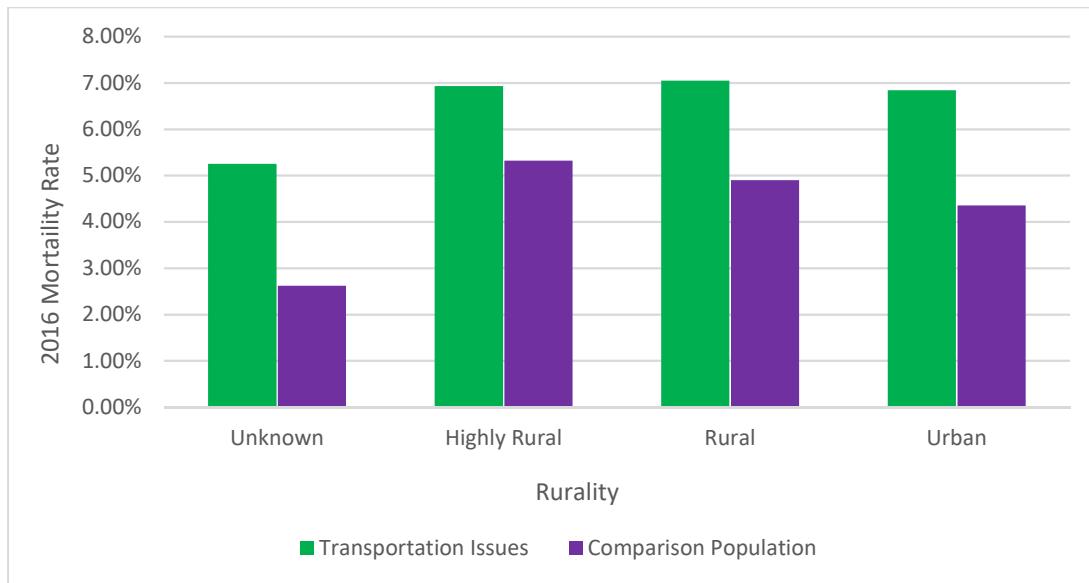


Figure 18: 2016 Mortality Rate by Rurality for Patients Who Canceled Appointments in 2015

Discussion

Unmet demand

Of the 256,714 VA patients who canceled appointments due to a lack of transportation in 2017, VTS provided trips for only approximately 18% (48,477), indicating a likely opportunity to service a greater number of patients.

The existing need for additional support for transportation services can also be assessed by considering the number of appointments that continue to be canceled due to transportation at facilities that participate in VTP. In 2017, a total of 102,106 appointments across 87 VTP-participating facilities were canceled due to transportation, with at least 24-hours' notice given. While this accounts for only 1.87% of all canceled appointments at the facilities, this still amounts to \$22 million worth of healthcare costs to the agency (using the average cost of \$218.21 per VAMC outpatient encounter in FY 2017) for appointments that were rebooked for other patients or left unfilled.

Denied trips

In a survey conducted by the VTP in 2017, 17 VTS programs at different VAMCs recorded more than 30,000 transportation requests that were denied due to a lack of vehicles or

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staff. Using this figure, the PMO projected the denial of more than 153,000 transportation requests by Veteran patients across the 94 VAMCs that participated in the program at the time of the survey.³⁹

The program has also implemented functionality within VetRide that allows users to capture trip requests they cannot accommodate as well as the reason for rejection. From March to June of 2018, VTS programs denied 5,903 Veteran requests for transportation. A reason of "Driver Not Available" accounted for more than 3 out of every 4 denials (4,580 total denials). This correlates with interviews with site Mobility Managers, who state that the biggest hurdle they face in filling transportation requests is staffing due to hiring freezes at the facility level. According to one Mobility Manager, a presentation demonstrating the need for additional vehicles resulted in 6 new vehicles provided by the VTP PMO. However, these vehicles were not immediately put into operation due to an inability to hire additional drivers.

Table 27: VTS Denied Trips, March to June 2018

Denied Reason	Count	Percent
'Driver Not Available' Count	4580	77.59%
'Vehicle Not Available' Count	239	4.05%
'Not Enough Capacity' Count	208	3.52%
Unknown Reason	208	3.52%
'Other Reason' Count	208	3.52%
'Required Vehicle Resource Not Available' Count	121	2.05%
'Outside Site Operating Hours' Count	120	2.03%
'Distance Is Too Great' Count	56	0.95%
'Site Closed' Count	53	0.90%
'Violation Of Local Policy' Count	37	0.63%
'Inclement Weather' Count	36	0.61%
'Medically Unstable' Count	24	0.41%
'Post Sedation (Escort Unavailable)' Count	5	0.08%
'Veteran Is Banned' Count	4	0.07%
'Third Party Ambulance/Flight' Count	4	0.07%
Total	5903	100.00%

Population served by VTS

In 2017, patients who identified transportation as their reason for canceling at least one appointment comprised 4.10% of all female patients and 3.70% of all male patients with an appointment or inpatient encounter. Further analysis shows that males above the age of 60

³⁹ Veterans Transportation Program MS Resource Management Briefing presentation, April 2017.

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accounted for more than 59% of all patients who canceled an appointment due to issues with transportation.

Table 28: Patient Population Seeking Care in 2017 by Age

	Have Transportation	Lack Transportation	Percentage of Patients Lacking Transportation
Under 50			
Male	1,243,307	32,328	2.53%
Female	338,235	9,485	2.73%
50 - 60			
Male	894,754	44,453	4.73%
Female	171,326	9,067	5.02%
Over 60			
Male	3,815,414	151,976	3.98%
Female	144,492	9,398	6.11%

This is not to imply that Veterans under the age of 50 would not benefit from transportation services. ED visits in 2016 totaled 9,553 patients with a documented case of lacking transportation who had used VTS services. When breaking down VTS usage by age group, patients under the age of 50 exhibited the lowest VTS utilization rate, with only 7.28% of patients in this age bracket (with a history of canceling appointments due to transportation difficulties) having used the service. By comparison, 12.33% of patients between the ages of 50 and 60, and 13.51% of patients over the age of 60 had a documented occurrence of using VTS services.

Rurality

The HRTG allocates grants to help Veterans Service Agencies and Veterans Service Organizations to transport veterans in highly rural areas to facilities that provide VA care. The VA previously defined “Highly Rural” counties as those with less than seven civilians per square mile. Recently, they changed their definition to reflect the rural-urban commuting area coding system developed by the Department of Agriculture and the Department of Health and Human Services, which considers population density and socioeconomic links to urban centers.

As expected, the absolute number of patients who have canceled appointments due to issues with transportation directly correlates with population density, with the lowest number of patients in highly rural and highest in urban areas. However, comparing metrics on patients, appointments, and the effects of transportation in facilities with VTS shows rurality to have no apparent correlations with appointment cancelations.

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Table 29: Unmet Demand by Rurality

Rurality	Percentage of all patients	Percent of patients with transportation issues	Percent of all appointments	Percent of all canceled appts due to transportation	Percent of all appointments canceled by patients w/ transportation issues
Urban	65.76%	65.93%	69.07%	65.94%	69.07%
Rural	32.69%	32.65%	29.70%	32.59%	29.69%
Highly Rural	1.30%	1.27%	1.09%	1.32%	1.14%
Unknown	0.25%	0.15%	0.14%	0.15%	0.10%

However, VTS usage among all patients who canceled appointments due to a lack of transportation is relatively comparable for VTS users across all three rurality categories.

Table 30: Comparison of Canceled Appointments and VTS Usage by Rurality

Rurality	Percentage of patients who canceled appointments due to transportation	Percent of patients who canceled appointments due to transportation who have used VTS
Unknown	0.15%	8.35%
Urban	64.88%	20.80%
Rural	33.65%	15.35%
Highly Rural	1.31%	16.21%

Transportation-disadvantaged patients who have a diagnosis of Intentional Self Harm, Attempted Suicide, or Suicidal Ideations and who live in Highly Rural areas demonstrate higher percentages of VTS utilization.

Table 31: Canceled Appointments by MH Patients and VTS Usage by Rurality

Rurality	Percentage of MH patients who canceled appointments due to transportation	Percent of MH patients who canceled appointments due to transportation who have used VTS
Urban	71.99%	19.52%
Rural	27.23%	21.24%
Highly Rural	0.71%	37.93%

Analyzing rurality for each state shows that in the majority (31) of states (including the District of Columbia and Puerto Rico), patients lacking transportation were more likely to live in highly rural areas than the general patient population. This may be an indication of the continued demand of transportation services in highly rural areas.

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Transportation demand may also be assessed by analyzing the 27 states that have a higher percentage of patients who canceled appointments in 2017 living in areas identified as highly rural than the national average of 1.33%. Nine of these 27 states have a higher percentage of patients lacking transportation than the national average of 3.75%, a correlation of 33.33%. When considering the inverse, a total of 20 states have a higher percentage of patients lacking transportation than the national average. Nine of these 20 states have a higher percentage of patients who canceled appointments living in highly rural areas, a correlation of 45.00%. Assessing each state's percentages may help transportation programs assess the way highly rural patients are serviced. For example, while a high percentage (10.18%) of patients in Montana live in highly rural areas, a lack of transportation only accounts for appointments canceled by 2.52% of the patients. It may be worthwhile observing how Montana manages and provides transportation services, particularly those that focus on its highly rural patient population.

Governance structure

The current decentralized model of operation for VTP and lack of permanent authority to operate has resulted in inconsistent operations and service offerings and decreased efficiencies throughout the 92 participating VAMCs.

Mobility Managers may benefit from detailed procedures and guidance, which the PMO currently has no authority to enforce. Overall, facilities in which the VTP program adheres to the PMO's guidance and instruction, and where staff maintains constant communications with the PMO, exhibit an evident decrease in missed appointments over time. Figure 19 shows the facilities exhibiting the biggest decreases in canceled appointments after implementing VTP. It should be noted that the noticeable rise in the cancelation rate for the Battle Creek VAMC corresponds to the time the site's participation in VTP was withdrawn.

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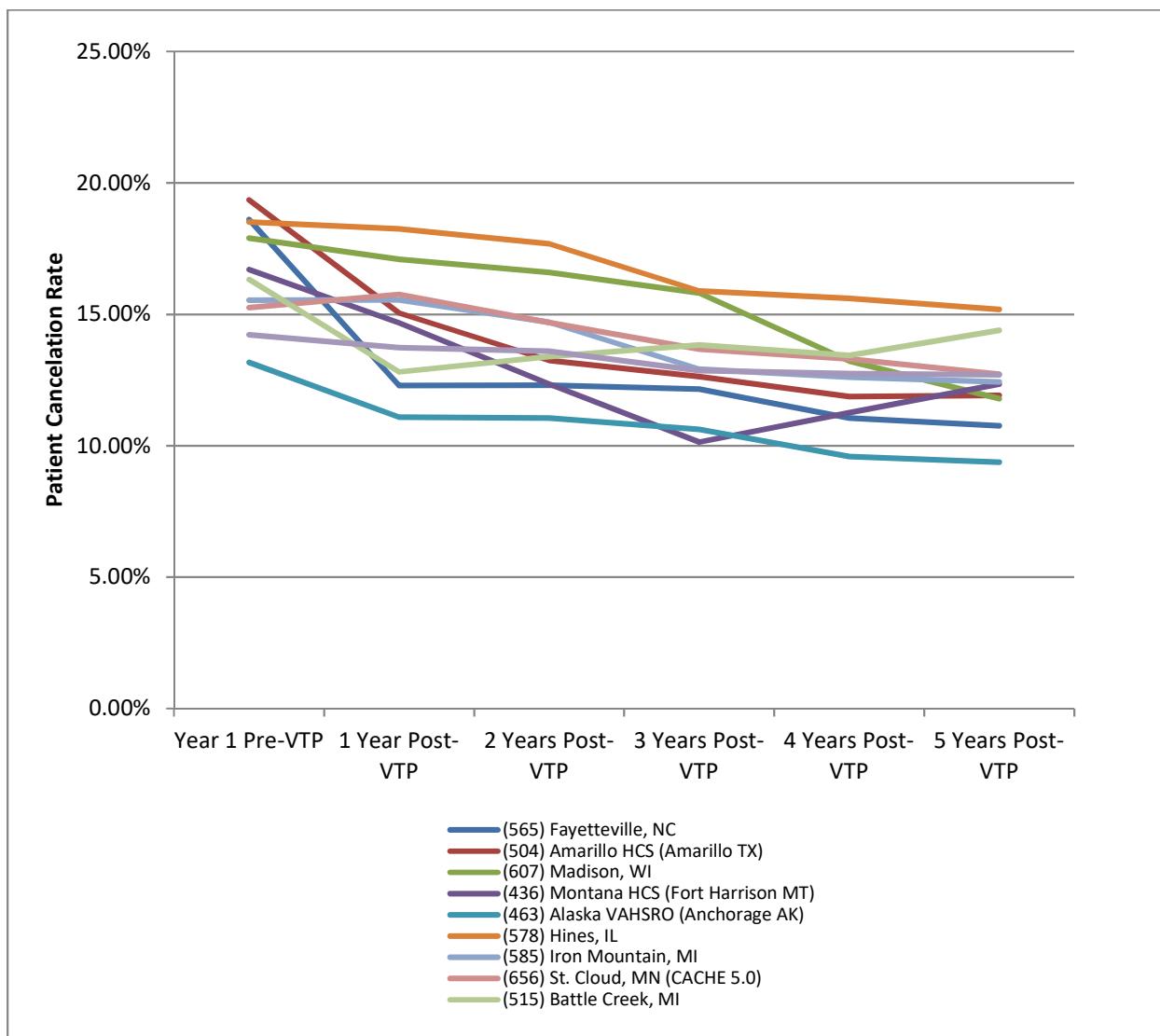


Figure 19: Trend of Cancelation Rate for Top 10 VTP Sites

The existing VHA CBO Policy and Procedure Guide (1601B.05) provides a template for program procedures. Program-wide Standard Operating Procedures (SOPs) would have the ultimate benefit of helping the program reduce the number of improper payments by ensuring that all measures the program has put into place to prevent improper payments are implemented and used correctly. In addition to promoting uniformity and consistency, SOPs reduce work effort, increase opportunities for data comparability, and promote credibility and defensibility. SOPs minimize opportunities for miscommunication and can be added to and edited to reflect newly realized best practices and processes efficiencies.

Additionally, the program lacks standard corrective action processes for facilities that do not follow program instruction. As indicated by VTP officials, disciplinary action is limited

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to removal of its support from the respective facility. Doing so is counterproductive to the program's mission to provide Veterans with access to care. As seen in Figure 20, VAMCs that participate in VTS exhibit a slower increase in the rates by which mental health patients cancel their appointments than by patients at non-VTS participating facilities. The figure also shows that the two lines appear to merge and follow a similar path after year 4 post-VTP implementation. This supports the PMO's claims that once VTP pulls its initial funding, the program often fails due to a lack of facility prioritization and support. Accordingly, corrective actions such as pulling funding would likely result in a similar trend of an unsustained decrease in appointment cancelation rates.

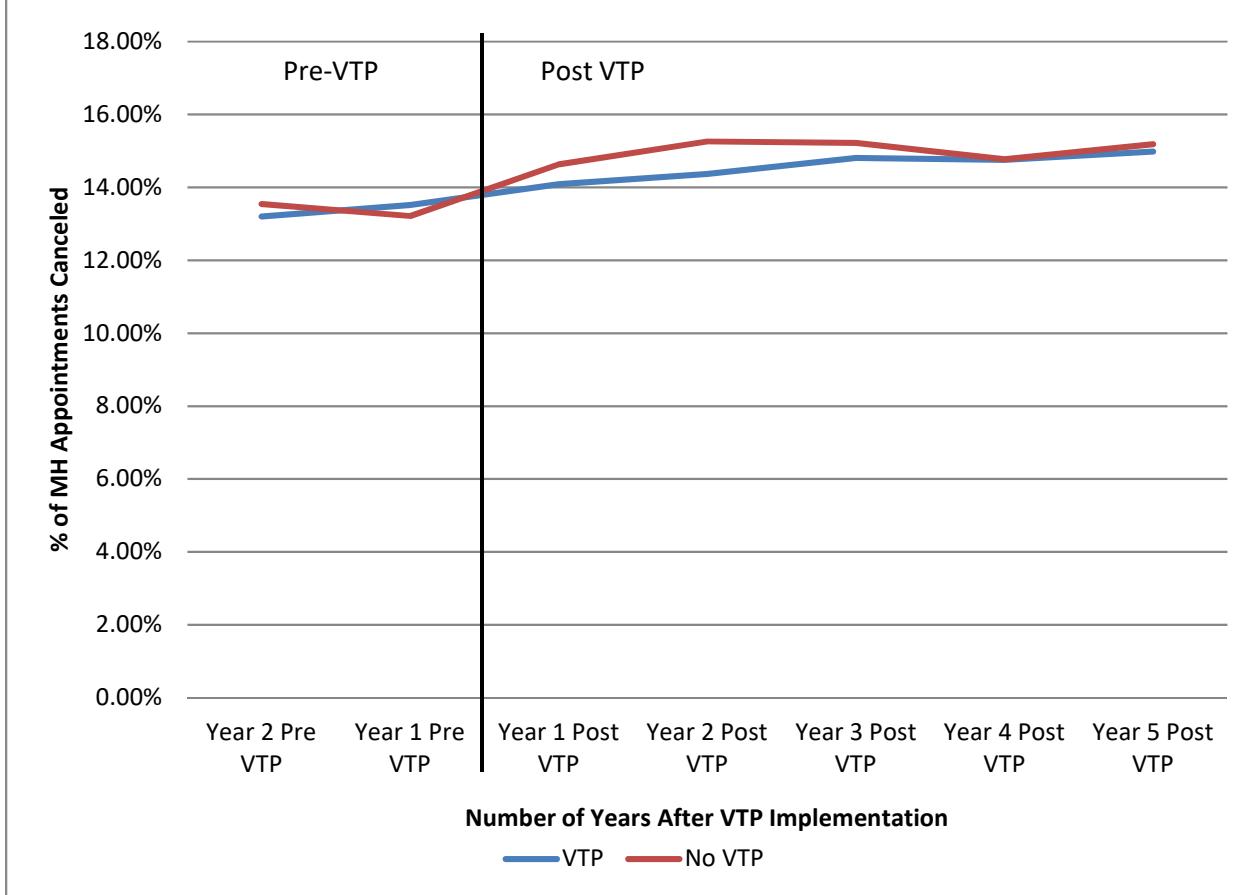


Figure 20: Mental Health Cancelation Rates Pre- and Post VTP

Mandates released by the program cannot be enforced under the existing governance structure. Transportation programs at the individual facilities are only required to acknowledge having received instruction; they are not obligated to prove implementation. In these cases, VTP only realizes that these mandates are not implemented after the analysis and review of extracted data.

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Available Veteran-serving transportation options

Many local and state government-sponsored initiatives offer transportation services for Veterans to medical appointments. The majority of VAMCs have a Disabled Veterans (DAV) office, an organization chartered by the U.S. Congress that provides transportation for ambulatory Veterans. This volunteer organization provides donated vehicles to VAMCs and provides free-of-charge transportation services at those VAMCs with DAV Volunteer drivers through the VA Volunteer Transportation Network as well as other services, including assistance during major disasters and for the Disability Transition Assistance Program service.

Additionally, many VTS Mobility Managers actively engage with local Veteran Service Organizations, nonprofit transportation providers, and state Veterans Agencies to develop networks of low-cost or no-cost transportation for Veterans.

On-demand transportation services

Recently, app-based on-demand transportation providers such as Uber and Lyft have focused its efforts on getting patients to medical appointments. On March 1, Uber launched Uber Health, an initiative to support the transport of ambulatory patients. Lyft is also developing a strategy on how to provide services to the patient population. Both have performed trials with and formed partnerships with various segments of industry, including Medicare Advantage plans, private transportation benefit managers, Healthcare Management and Electronic Health Record technology firms, individual healthcare providers, and large healthcare systems.

Autonomous vehicles

The adoption of self-driving vehicles continues to make progress throughout the nation. Regarding Autonomous Vehicle legislation, more than half of the states have either enacted or have Executive Orders in place. Many states have approved road testing of autonomous vehicles, and Lyft recently deployed 30 self-driving cars for public use in Las Vegas. The U.S. government has considered the use of autonomous vehicles in the delivery of supplies to troops in combat zones. In connection to healthcare services, May Mobility, a self-driving micro-transit service developer and operator, plans to pilot public transit routes for servicing medical facilities in 2018.

The VA is also taking initial steps to explore the adoption of autonomous vehicles as a new technology process. At this time, the VTP has received and is reviewing documentation guiding the exploratory process for identifying the applicability of autonomous vehicles for different medical facilities. It has also identified a potential medical facility in which the integration of self-driving vehicles can be planned, tested, and assessed based on specific

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criteria. This initial pilot will involve including the VAMC into the route planned for self-driving vehicles within a designated public catchment area.

Limitations

As stated earlier, the accuracy of indicators used to determine the subject population is dependent on the details provided by patients when canceling the appointment, as well as the way medical center staff documents the cancellation. Due to the availability of vague Cancelation Reason options in VistA, such as "Other," as well as the free-text nature of the Cancelation Remarks, there is a possibility of a larger universe of transportation-disadvantaged patients.

The data extracted from the VA's CDW is also subject to review. VistA allows for some degree of customization between facilities. Accordingly, useful data may be available from some VAMCs but not others. There are also variations by which data is entered by facilities and by individuals. Many variables included in our analysis are input by manual entry. During site visits, the team directly observed various processes and procedures for entering data. For example, one facility may include all trips that cannot be provided by VTS as "unmet demand," while another may include only trips for which they are responsible (i.e., transports for BT and/or SMT-eligible patients).

Recreating the results such as those documented in this report would require access to the version of the data source available at the time of the original query. When possible, the team validated findings by extracting the equivalent data from multiple sources.

Recommendations

1. Recognize transportation as a part of the patient care process

As a service, transportation should be accepted as an integral part of the patient care process. For the program to gain this level of acceptance, it will need support from lawmakers, other government agencies, and internal champions within the VA.

Opportunities to optimize scheduling between medical and transportation services should also be considered. Observation of transportation services at facilities and conversations with multiple transportation coordinators has shown that coordinating the transportation service at the time the medical appointment is scheduled ensures that VTS will be able to transport the patient. The benefits of increased collaboration with medical center services is also evident in the results obtained from the discharge study. One contributing factor to the overall decrease in CS days in incorporating Transportation into Discharge Planning processes is that VTS is given adequate time to schedule transports.

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2. Mandate VTP participation

All facilities should be mandated to participate in the VTP, which should have governing authority over all facility transportation programs. To maintain clear oversight of transportation practices and to ensure the optimization of its processes, the VTP PMO should have input in the hiring, performance evaluation, and feedback of facility VTP staff.

3. Develop the Mobility Management concept

Data, onsite visits to VAMCs, and interviews with focus groups and current VTS program sites provide a clear indication of the need for unified transportation service management through the VTS mobility management concept. Veteran patients or medical center staff requesting transportation on a Veteran's behalf may not be aware of all the options available in addition to VTS, including VSOs and local and state transit systems.

The mobility management concept, as promoted by the National Center for Mobility Management, promotes the idea that all transportation is coordinated and managed by a single unit to achieve superior customer service.

Mobility management is an approach to designing and delivering transportation services that starts and ends with the Veteran. It begins with a vision in which the entire transportation network—public transit, private operators, on demand services, Veterans Service Organizations, volunteer drivers, and others—works together with VAMC Mobility Managers, Clinical staff, Executive Leadership to deliver the transportation options that best meet access to care for our nations Veterans.

One integral function of the VTP Mobility Manager is to be aware of all transportation resources available to the VA patient population in their catchment area, as well as to perform continuous assessments of the need for their services. To ensure efficient and effective management of transportation, the Mobility Manager position is uniquely equipped to serve as the single focal point for all transportation planning, scheduling, and monitoring and management. The ability to do so is fundamental to offering the most efficient and cost-effective transportation options to VAMC patients.

4. Continuously monitor user populations

VTS should increase the frequency in which it performs ad-hoc analysis of VetRide user data to gain a continuous understanding of its current user population. For example, for patients who canceled appointments due to transportation, those under the age of 50 exhibited the lowest VTS utilization rate. This may indicate the need to identify potential root causes of decreased ridership as well as assess the need of an effort to increase awareness of VTS for this patient demographic.

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Periodic evaluations of population trends as they pertain to patient demographics and diagnoses may also help the program exercise strategic foresight and allow the program to plan for and take appropriate preparatory actions. One trend that can be observed is the growing number of mental health patients serviced by the VA. To accommodate this patient population, VTP should consider providing Mental Health Crisis response training for transportation providers.

5. Identify performance metrics

VTP should continue to identify metrics that represent the true benefits and demand for transportation services. Existing metrics and newly identified performance measures should be incorporated into the VTP's business plan as well as the yearly business plans compiled by programs at each facility. According to both VTP PMO and site transportation staff, facilities often experience an unmet demand for services after the number of trips requested by patients exceeds both initial expectations and the limited number of available resources. Along with providing a baseline for performance assessments and indicating areas in which improvements can be made, identifying a complete set of performance metrics would allow the PMO to more accurately predict and prepare for upcoming demand.

Health outcome measures, such as those included in this report, should be considered along with population and cost data. The PMO should monitor the number of appointments that continue to be canceled due to transportation at facilities that participate in the program. VAMC leadership and staff should assess the quality of appointment data to ensure that cancelation reasons and other appointment data are captured consistently and accurately.

Overviews of canceled appointments by Veterans Integrated Service Network (VISN), state (shown in Figure 21) and/or facility should help VA leadership identify areas for which additional assessments and/or improvement measures are required.

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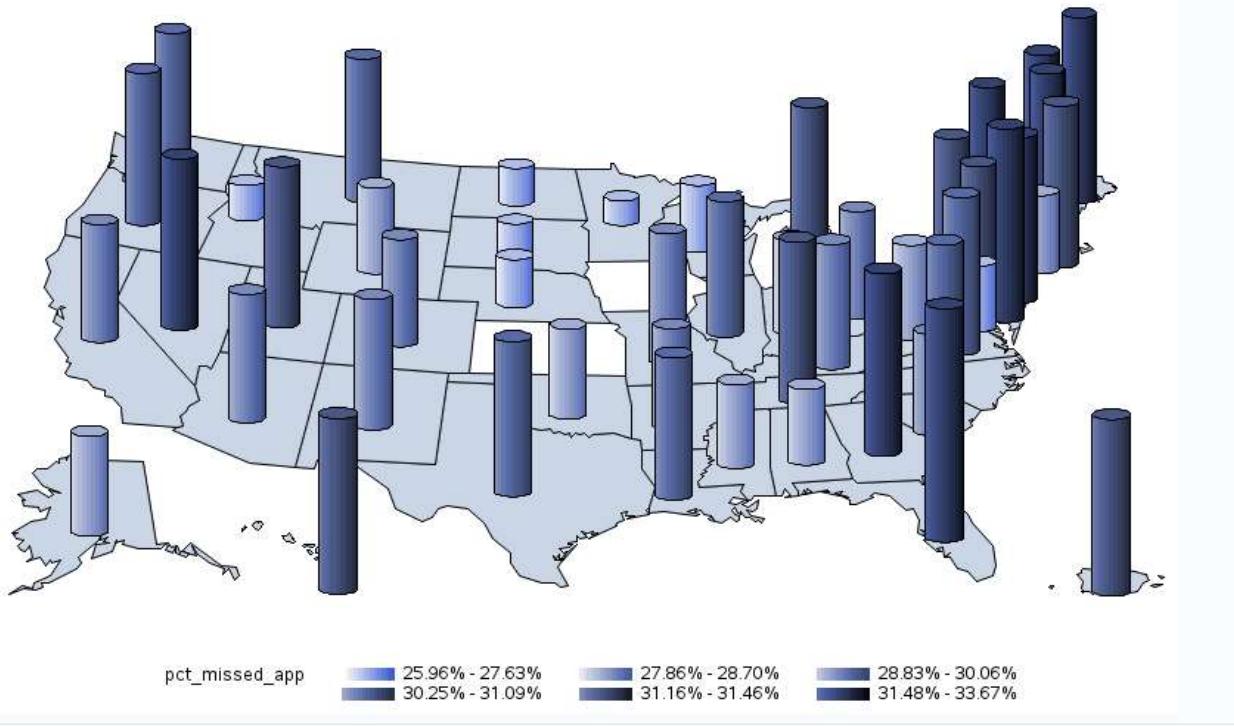


Figure 21: Canceled Appointment Percentages by State

6. Assess transportation needs and options by rurality

VTP should continue to develop its assessments of the services provided to the different rurality segments. Table 29 shows that the majority of canceled appointments are made by patients who live in urban areas. Interviews with Mobility Managers and Transportation Coordinators disclose that instances occur in which multiple urban patients are denied trips for an extended period due to a need to pick up a patient from a highly rural area. In this instance, providing transportation for one patient occupies one vehicle and driver for the duration of the trip. In terms of cost savings and cost avoidance, costs incurred by providing transportation for patients in highly rural areas should be offset by the number of appointments realized (at an average of \$218 per outpatient visit) by providing transportation for patients in urban locations.

Means of transporting patients in highly rural areas should continue to be developed, as transportation also has positive correlations with canceled appointments by this patient population demographic. Considering the percent of patients who live in highly rural areas and cancel appointments due to transportation—and comparing these metrics with national averages—may serve to identify transportation programs that effectively provide services to patients in these areas. Findings from analysis and plans for improvement

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should also be discussed with the Office of Rural Health to determine the plausibility and cost-effectiveness of available options.

Conversely, alternative options for transporting patients in urban areas who do not require SMT should also be considered.

On-demand and ride sharing options should be considered when assessing the most cost-effective and medically appropriate means of transporting patients.

7. Assess opportunities to collaborate with other agencies

The VTP PMO should continue to scan for potential opportunities to collaborate with other government agencies. Approaching the concept of transportation from an enterprise approach may lead to improved operations and lower costs (Fountain 2016). Although enterprise mission outcomes are often dependent on the government-wide strategic plan, following a similar approach to solve problems of other common government services may yield solutions that can only be accomplished and executed through interagency collaboration. Similar to VTS's services, Medicare and Medicaid covers NEMT services for eligible patients to and from medical appointments. Accordingly, opportunities may exist for VTP and CMS to tackle shared problems such as limitations on resources and improper payments.

Driving mission outcomes via interagency collaboration may also serve to identify shared performance metrics. The data included in this report may be used to analyze the benefits of similar services provided by other agencies, including DOD and CMS. In turn, metrics captured and used by these agencies may be applicable in assessing the VA's programs, including VTP.

Conclusion

Existing studies have demonstrated the cost and health benefits offered by increasing accessibility to transportation (Syed, Gerber and Sharp 2013). This has recently led healthcare organizations to consider incorporating transportation into the services provided to their patients (National Center for Mobility Management 2016). One instance of this need is the ongoing assessment of using app-based on-demand transportation providers such as Uber and Lyft to transport patients to medical appointments. These opportunities are currently being investigated by private transportation benefit managers, healthcare management and electronic health record technology firms, individual healthcare providers, and large healthcare system piloted the use of similar on-demand transportation services to support inpatient discharges within predetermined catchment areas (UI Health 2017).

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Many factors contribute to the financial benefits of using VTS. For example, cost avoidances are realized by removing the need to reimburse BT benefits for Veterans or pay contracted rates of SMT vendors. Secondly, because VTS services are not constrained by the eligibility rules, additional cost savings and avoidances are realized by decreasing unnecessary inpatient stay days, canceled appointments and visits to EDs. Analysis of available data for FY 2017 estimates agency savings of approximately \$110,840,000 in cost avoidances due to VTS services.⁴⁰

The aforementioned reductions affected by VTS regarding canceled appointments and ED usage also have implications for the improvement of patient outcomes. Patients who lack transportation are more likely to visit the ED, exhibit with more urgent clinical presentations, and be admitted to inpatient status. Additionally, a high number of patients present to the ED between their missed appointment and their next scheduled visit.

Patients with documented issues regarding transportation are also shown to exhibit higher readmission rates and pain scores than the general patient population.

Mortality rates also appear to correlate with canceled appointments due to transportation. The 5-year lung cancer survival rate is 2.26% lower for patients who have canceled appointments due to transportation. For prostate cancer, the difference in survival rate jumps to 7.73%.

Given the current VA environment, perhaps the most noteworthy outcome of providing transportation services is the effect on mental health, specifically suicide. In the past decade, the VA has experienced steady growth in the number of mental health patients it treats. In 2016, a total of 4,099 Veterans with an inpatient diagnosis of Intentional Self-Harm, Attempted Suicide, or Suicidal Ideations canceled at least one appointment due to transportation. These patients were 3.75 times more likely to be diagnosed with Suicidal Ideations and 4.04 times more likely to be diagnosed with Attempted Suicide or Intentional Self-Harm than patients who did not lack transportation.

The negative effects of lacking transportation on mental health are also manifested in the prevalence of associated diagnoses. Of all diagnoses assigned in VAMC EDs in 2017, the diagnoses with the highest prevalence of patients who lack transportation were Substance Use & Disorders and Mental Diseases & Disorders. Additionally, three of the top 10 outpatient visit diagnoses are also associated with mental health: Substance Use & Disorders; Injury, Poisoning & Drug Toxicity and Mental Diseases & Disorders.

⁴⁰ Yearly cost avoidance was calculated by projecting annual cost avoidances using the 6-month data captured in VetRide: Cost avoidances for Beneficiary Travel (\$970,000) and SMT (\$7.6m), and the number of trips supporting inpatient discharges (3,575) multiplied by the average cost inpatient stay day of \$1,847.79. The annual projections for these were added to the reduction in canceled appointments multiplied by the average cost per outpatient visit (\$74.4m) and the dollar amount attributed to avoided ED encounters (\$6.1m).

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There also appears to be correlations between a positive PTSD and/or Depression survey(s) and a lack of transportation, with a greater percentage of patients who lack transportation being more likely to have scores that identify probable PTSD. These patients are also more likely to submit concurring answers to questions regarding death, self-harm, and resiliency.

VTS has proven to be effective in improving missed appointment rates. VAMCs that implement VTS experience a decrease in canceled appointments three times greater than VAMCs that did not. Participating VAMCs have experienced a combined decrease of 341,360 canceled appointments one year after VTS becomes operational.

The effects of VTS on patient behaviors can also be corroborated by comparing patients who utilize VTS services and those who do not. Of patients who lack transportation, those who have used VTS services cancel three less appointments on average and account for a greater decrease in ED encounters than those who do not utilize VTS services.

Perhaps even more indicative of the impact created by the availability of transportation services is that patients diagnosed with Intentional Self-Harm, Attempted Suicide, or Suicidal Ideations who have at least one occurrence of using VTS services reduced their appointment cancellation rates by 20%, while the appointment cancelation rate of those who did not use VTS services decreased by only 2.66%.

Although the current state of VTS allows for the realization of the positive outcomes identified above, there is still room for improvement, as evidenced by the 250,000 patients who canceled an appointment in 2017 due to a lack of transportation. Often, the initiation of VTS at a VAMC leads to an increased demand for transportation services. The program then faces an unmet demand for services once limited resources reach maximum capacity.

While VTS tracks unmet demand in the form of denied trips (1,743 requests for transportation denied in March 2017 alone), the actual need for transportation services is likely much greater. Multiple factors contribute to the lack of a comprehensive assessment of transportation need. The first is a dependence on reliable data; appointment scheduling options allow for a great degree of variation in entered information. Second, and perhaps even more significant, is the lack of transportation coordination across VAMC services and available transportation resources.

The data demonstrates that the current deployment of VTS at 91 of 170 VAMCs has produced a reduction in missed appointments, a reduction in ED visits, inappropriate length of stays, cost avoidance and savings, and improved health outcomes for Veterans.

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Abbreviations and Acronyms

ALS	Advanced Life Support
BLS	Basic Life Support
BT	Beneficiary Travel
CBOC	Community-Based Outpatient Clinic
CDW	Corporate Data Warehouse
CS	Continued Stay
DAV	Disabled Veterans
ED	Emergency Department
ESI	Emergency Severity Index
HCS	Health Care System
HRTG	Highly Rural Transportation Grant
ICHOM	International Consortium for Health Outcomes Measurement
IDR	Interdisciplinary Round
LOS	Length of Stay
MCAO	Managerial Cost Accounting Office

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NEMT	Non-Emergency Medical Transportation
NHIS	National Health Interview Survey
NUMI	National Utilization Management Integration
PCL-5	PTSD Symptom Checklist for DSM-5
PC-PTSD	Primary Care PTSD Screen
PMO	Program Management Office
PTSD	Post-Traumatic Stress Disorder
SMT	Special Mode Transportation
SOP	Standard Operating Procedure
UM	Utilization Management
VA	Department of Veterans Affairs
VAMC	Veterans Affairs Medical Center
VCP	Veterans Choice Program
VSO	Veterans Service Organization
VSSC	VHA Support Service Center
VTP	Veterans Transportation Program
VTS	Veterans Transportation Service
WRJ VAMC	White River Junction VAMC

Appendices

Appendix A: Variables and definitions

Variable	Definition
Admission	An emergent, urgent or routine admission to a medical hospital which marks the beginning of an inpatient episode and entails a full admission procedure with completion of registration documents and formal acceptance of the patient by the hospital, the specialty and consultant for inpatient care.
Age	Patient age at the time of an event. For death rate, it is the age at which the patient died as recorded in the patient table. In the analysis of VTS utilization, it is the patient's age as of January 1, 2017
Appointment	All appointment-related data is for appointments scheduled in 2017; Count of AppointmentSID FROM CDWWork.Appt.Appointment. Patients are identified using

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	unique PatientIDs associated with an AppointmentSID FROM CDWWork.Appt.Appointment
Bed Day of Care (BDOC)	Also referred to as an Inpatient Stay Day or Continued Stay Day. An inpatient day of stay where DSS reports the total cost of care per bed day; including physician and nursing care, pharmacy, and meals. Appropriateness of inpatient status is determined by assessing whether the patient meets clinical criteria.
Beneficiary Travel (BT)	Eligible patients may be reimbursed for transportation costs associated with health services at VA- or VA-approved facilities. VetRide has the functionality to calculate a cost avoidance report for servicing patients flagged as being BT-eligible.
Biopsy	A medical test involving extraction of sample cells or tissues for examination to provide insight into possible cancerous and inflammatory conditions. In this study, the following CPT codes were considered cpt.cptcode in ('0137T','55700','55705','55706');
Canceled appointment	Occurrence in which the patient did not keep the originally scheduled appointment; cases where CDWWork.Appt.Appointment.AppointmentStatus in ('PC','PCA')
Control VTP	Records for sites that have not implemented VTS; sta3n in ('358','437','438','442','452','460','502','503','512','514','517','520','521','523','529','542','543','553','555','558','562','564','567','570','580','583','586','590','595','597','598','610','620','622','623','630','632','637','640','642','654','655','658','659','667','670','671','674','692','693')
Cost per Bed Day of Care	Per the Managerial Cost Accounting Office's Inpatient Cost Report: Total Cost by Diagnostic Related Groups by Major Components, includes the total cost of care per bed day; including physician and nursing care, pharmacy, and meals.
Cost per Stop Code	Extracted from the Managerial Cost Accounting Office Outpatient Cost Report: Cost and Workload for Selected DSS Clinic Stop / Credit Stop. This report has the capability to display volume of workload and cost information associated with unique patient encounters for selected Primary Stop Code(s) and/or Secondary Clinic Stop(s), the average number of encounters per unique, the local and national average encounter cost, and the percent variance of the local compared to the national average cost per encounter.
Dialysis visits	Dialysis visits are identified by stop codes = (601, 602, 603, 605, 606, 607, 610)
Discharge (inpatient)	The point at which the patient leaves the hospital and either returns home or is transferred to another facility such as one for rehabilitation or to a nursing home.
ED acuity	Displays scoring as documented in cdwwork.Dim.EDISTrackingCode.SectionDisplayName. Associated with patient ED encounters from CDWWork.EDIS.EDISLog.
Emergency Department visit	Patient encounters to Emergency and Urgent Care Departments at VAMCs and Community Care ED encounters.
Emergency Severity Index (ESI)	Level system from 1-5, used by Emergency Department clinicians as a guide for triaging patients based on acuity and resource needs.
Inpatient encounter	All inpatient data is for inpatient records with a discharge in 2017; Patients with inpatient encounters include all unique patient IDs for inpatient records with a discharge in 2017
Lung biopsy	Lung biopsy is identified using CPT codes '31628','31632','32405','32096','32097','32098','32507','32601','32602','32607','32608','32668','G9283','G9284','G9289','G9290','G9418','G9421"
Lung cancer (diagnosis)	Initial diagnosis for lung cancer is the first occurrence where the visit diagnosis is recorded with ICD9 code = '162.3', '162.4', '162.5', '162.8', '162.9', '209.21', '231.2', '176.4', '217.0', '220.5'
Mental Health Diagnoses	Substance Use and Disorder; Mental Diseases & Disorders; and Injury, Poisoning & Drug Toxicity are ED diagnoses identified from cdwwork.EDIS.EDISLogDischargeDiagnosis. Suicidal Ideations, Attempted Suicide, Intentional self-harm are inpatient diagnoses

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	identified from CDWWork.Inpat.InpatientDiagnosis where ICD10code = 'T14.91' and 'R45.851' or ICD10Description like '%intentional self-harm%'.
Mental Health visits	Visits to mental health services were identified by stop codes = (76,452, 502,512, 527, 528, 529, 533, 534, 535, 536, 539, 542, 546, 550, 552, 562, 564, 565, 566, 567, 568, 573, 574, 575, 576, 579, 582, 583, 584, 586, 587, 598, 599, 516, 542, 562, 504, 507, 508, 511, 522, 530, 555, 556, 513, 519, 523, 545, 547, 548, 560
Mortality	The number of deaths in a given area or period, or from a particular cause. Patient mortality status is identified from information in the following field (or lack thereof): [cdwwork].[SPatient].[SPatient].[DeathDateTime]
No Shows	Appointments that the patient failed to show; cases where CDWWork.Appt.Appointment.AppointmentStatus in ('N','NA')
Outpatient encounter	Visit record for medical treatment without an admission. Cancer outpatient encounters were filtered to include face to face visits only.
Pain Score	Scaled (0-10), self-reported indication of a patient's perception of the intensity of their pain. Extracted from [CDWWork].[Vital].[VitalSign].[VitalResultnumeric]. All pain scores were recorded in 2017
Post-implementation VTS	Records for the years after the VAMC went live with VTS; indicated by year(AppointmentDateTime) = 'implementation year + n') from CDWWork.Appt.Appointment. Population served by VTS is performed by matching the study population to a patient extract from the VetRide Scheduling software using a combination of the following fields: Last Name, Last 4 digits of SSN, DOB, and gender
Pre-implementation VTS	Records for the year before the VAMC went live with VTS; (sta3n = '463' and year(AppointmentDateTime) = '2009') or (sta3n in ('506','515','565','660','688') and year(AppointmentDateTime) = '2010') or (sta3n in ('402','436','500','504','508','518','519','528','532','5a37','538','539','549','550','561','578','585','589','596','605','607','609','621','648','649','653','656','663','668','676','678','687','757') and year(AppointmentDateTime) = '2011') or (sta3n in ('405','459','516','541','552','557','581','603','608','612','613','614','626','650','679') and year(AppointmentDateTime) = '2012') or (sta3n in ('509','531','534','544','546','548','568','573','584','593','629','644','657','664','666','672','673','675','677','689','740','756') and year(AppointmentDateTime) = '2013') or (sta3n in ('526','554','575','600','618','619','631','635','636','647','652','662','691','695') and year(AppointmentDateTime) = '2014') or (sta3n in ('501','540','646') and year(AppointmentDateTime) = '2015') from CDWWork.Appt.Appointment
Prostate biopsy	Prostate biopsy is identified using CPT codes '0137T','55700','55705','55706'
Prostate Cancer (Diagnosis)	Diagnosis of Prostate Cancer is identified using ICD9Code = '185.'
Psychotherapy	CPT code in '90791','90792','90832','90834','90836','90837','90838','90847','90849','90853','96150','96151','96152','96153','96154','96155'.Treatments considered were provided through either ambulatory or Telehealth visit or through a claim filed with the VA.
PTSD	ICD10 code in 'F43.10','F43.11','F43.12' (Service category in 'A','T' was used to identify diagnoses in ambulatory or TeleHealth visits.)
PTSD medications	Medications used to treat PTSD. Using Drugnamewithoutdose in 'TRAZODONE','PRAZOSIN','SERTRALINE','BUPROPION','ACETAMINOPHEN/HYDROCODONE','SEROQUEL','QUETIAPINE','CLONIDINE','CATAPRES','VENLAFAKINE','EFFEXOR','PAROXETINE','FLUOXETINE','VENLAFAKINE'
Rurality	A classification given to an area using measures of population density, urbanization, and daily commuting.
Same Day Cancellations	Appointments that were canceled on the same day as the scheduled appointment; cases where CDWWork.Appt.Appointment.AppointmentDateTime =

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	CDWWork.Appt.Appointment.CancelDateTime and where CDWWork.Appt.Appointment.AppointmentStatus in ('PC', 'PCA')
Secondary malignant neoplasms	Secondary malignant neoplasms are identified through ICD9 codes like = '196%', '197%' or '198%'
Special Mode Transportation (SMT)	Eligible patients may be provided medically necessary transportation to VA- or VA-approved facilities for health services. VetRide has the functionality to calculate a cost avoidance report for servicing patients flagged as being SMT-eligible.
Stop Code	DSS Identifiers are the single and critical designation by which VHA defines clinical work units for costing purposes. They characterize VHA Outpatient Clinics by indicating the work group responsible for providing the specific set of clinic products and serving as a stable identification method that can be used to compare costs between facilities. The first three numbers of the DSS Identifier represent the primary stop code. The primary stop code designates the main clinical group responsible for the care.
Survival Rate	Patient survival status is identified from the lack of data in the following field: [cdwwork].[SPatient].[SPatient].[DeathDateTime]
Wasted appointment	Appointment cancellations (same-day or no-shows) that cannot be filled by another patient

Appendix B: SQL Criteria to Determine Different Types of Patients and Appointments

Purpose	SQL Conditions
To determine a canceled appointment	case when a.CancelationReasonSID > 0 or a.AppointmentStatus in ('C','CA','PC','PCA') and (a.AppointmentStatus in ('PC','PCA') or b.CancelationReason in ('CANCELED BY PATIENT' , 'PATIENT CANCELED' , 'VET REQUESTING RESCHEDULE')
To determine an appointment that is canceled by patients	and (upper(a.CancelationRemarks) like '%TRANSPORT%' or upper(a.CancelationRemarks) like '%NO CAR%' or upper(a.CancelationRemarks) like '%VEHICLE ISSUE%' or upper(a.CancelationRemarks) like '%VEHICLE PROBLEM%' or upper(a.CancelationRemarks) like '%NO RIDE%' or upper(a.CancelationRemarks) like '%TRAVEL DIFF%' or upper(a.CancelationRemarks) like '%NO VEHICLE%' or upper(a.CancelationRemarks) like '%UNABLE TO TRAVEL%' or upper(a.CancelationRemarks) like '%LATE FOR TRAVEL%' or upper(a.CancelationRemarks) like '%TRAVEL ISSUES%' or upper(a.CancelationRemarks) like '%TRAVEL WAS DENIED%' or upper(a.CancelationRemarks) like '%NO TRAVEL%' or upper(a.CancelationRemarks) like '%NO MONEY TO TRAVEL%' or upper(a.CancelationRemarks) like '%NOT RECIEVED TRAVEL%' or upper(a.CancelationRemarks) like '%CANNOT TRAVEL%' or upper(a.CancelationRemarks) like '%DOESNT HAVE VEHICLE%' or upper(a.CancelationRemarks) like '%DOESNT HAVE VEHICLE%' or upper(a.CancelationRemarks) like '%DUE TO TRAVEL%' or upper(b.CancelationReason) like '%NO TRANSPORTATION%' or upper(b.CancelationReason) like '%TRAVEL DIFFICULTY%'
To determine an appointment that is canceled due to transportation issues	

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	or upper(b.CancelationReason) like '%TRANSPORTATION PROBLEMS%')
To determine the period of date of an appointment	where cast(AppointmentDateTime as date) >= '2013-01-01' and cast(AppointmentDateTime as date) <= '2017-12-31'
To calculate the percentages in each category (Bracket)	pct_canceled = N_Canceled_App /N_App ; pct_canceled_ByPat = N_Canceled_By_Pat /N_Canceled_App ; (Column D) pct_canceled_DueToTran = N_Canceled_App_Transport /N_Canceled_App ; pct_canceled_ByPat_DueToTran = N_Canceled_ByPat_Transport /N_Canceled_By_Pat ; (Column C) pct_canceled_ByPat_NoneTran = (N_Canceled_By_Pat - N_Canceled_ByPat_Transport) /N_Canceled_By_Pat ;

Appendix C: Criteria for Missed Appointment analysis

Appointments were made between 2013 and 2017
Overbooked appointments were included in assessing missed appointments by years and by states.
Overbooked appointments were removed in the assessment of Missed Appointments by stations.
Missed appointments include appointments canceled by clinic or patients and patient no-shows.
Corrected appointments are appointments removed from test patients and non-count clinic appointments.

Appendix D: Criteria for Readmission Rates analysis and comparison

Considered for the study were inpatient admissions from 2013 to 2017.
Only admissions with matched transportation status are kept in this comparison; admissions without a transportation status were removed.
Each admission is counted as a readmission when the next admission of the same patients occurs within a given number of days.
Same-day readmissions are not counted.
In cases where a patient's discharge date is later than the patient's next admission date, the next admission is not counted in total admissions.
The overlapped admissions are removed. Overlapped admissions are those where the admission dates are within the previous admissions' dates.

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