



A review of dual health care system use by veterans with cardiometabolic disease

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Abstract: Many Veterans Affairs (VA) patients with the complications of cardiometabolic syndrome (CMS) use both VA and community providers and facilities outside of VA. Although dual health care systems increase care options, dual use also increases coordination needs. The fragmentation and duplication of health care due to the use of multiple facilities and providers may hinder effective care coordination, result in less efficient and more costly care, and lead to poorer outcomes. This article, which is based upon bibliographic searches in PubMed, reviews the evidence on dual use of VA and community health care by Veterans for acute myocardial infarction (AMI), congestive heart failure (CHF), and diabetes mellitus, the most common CMS complications requiring acute care and post-acute care services. A total of 179 articles were identified. After screening the full texts or abstracts of the 179 articles, 11 studies met the eligibility criteria, including two qualitative studies and 9 quantitative using administrative and Medicare records for veterans with AMI, CHF, or diabetes. Among the analytic studies, 3 had a cross-sectional design and 6 were cohort studies. The results of studies completed to date suggest that dual healthcare system use by older male veterans with cardiometabolic conditions is not associated with improved outcomes and may lead to unnecessary tests or procedures and increased healthcare costs. Additional research is warranted to examine the prevalence of dual health care system use by male and female veterans during recent time periods and to compare outcomes among patients who receive only VA care, only community care, or both VA and community care.

Keywords: Congestive heart failure (CHF); coronary heart disease (CHD); diabetes; dual-system use; Medicare; quality of care; Veterans Affairs (VA)

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Introduction

The fragmentation and duplication of health care due to the use of multiple facilities and providers may hinder effective care coordination, result in less efficient and more costly care, and lead to poorer outcomes (1,2). Many Veterans Affairs (VA) patients in the US use both VA and community providers and facilities outside of VA. These

patients, referred to as dual users, often have alternative sources of insurance coverage. In one series, older VA-enrolled patients hospitalized for cardiovascular disorders relied on VA hospitals for only 27% of their hospital care (3). Although dual health care systems increases care options, dual use also increases coordination needs and requires clarity in the roles and responsibilities of VA and community providers (4). Dual use is likely to become more

frequent as VA purchases more community care under the Veterans Access, Choice and Accountability Act of 2014 (5).

Cardiometabolic syndromes (CMS), which are prevalent in veteran and non-Veteran populations, constitute one large group of related illnesses for which quality and efficiency of health care is of concern. Among the complications of CMS, acute myocardial infarction (AMI), congestive heart failure (CHF) and diabetes mellitus account for the top most common diagnoses for hospitalizations and post-acute care service uses (6,7). An estimated 16.5 million Americans >20 years of age have coronary heart disease (CHD) (6). About 3% of adults in the US have had a myocardial infarction (MI). CHF affects over 5 million Americans (8). Patients with CHF experience over 1.1 million hospitalizations and over 800,000 emergency department visits each year (9). Over 30 million Americans had diabetes in 2015 (10). The Veterans Health Administration estimated that 1 in 4 veterans in the US have diabetes.

The goal of the current article was to review the evidence on dual use of VA and community health care by Veterans for AMI, CHF, and diabetes mellitus. Of particular interest was whether dual use improves or worsens outcomes such as repeat hospitalizations or survival among these patients.

Methods

This review is based upon PubMed bibliographic searches and appropriate search terms. Articles published in English from 1997 through May 2018 were identified using Boolean algebra commands and MeSH search terms: veterans AND dual use AND (myocardial infarction OR coronary heart disease OR heart failure OR diabetes). The searches were not limited to words appearing in the title of an article. Only studies of US veterans were eligible. The references of articles identified in the literature review were also reviewed. Information obtained from the bibliographic searches (information presented in abstract, keywords, and study design) was used to determine whether to retain each identified article. Studies with a cohort or cross-sectional study design were included along with qualitative studies.

A total of 179 articles were identified. After screening the full texts or abstracts of the 160 articles, 11 studies met the eligibility criteria.

Results

The 11 studies included one qualitative study of providers, two qualitative studies of veterans with CHF, and 9 analytic studies of administrative and Medicare records for veterans with AMI, CHF, or diabetes (*Table 1*). Among the analytic studies, 3 had a cross-sectional design and 6 were cohort studies (*Table 1*).

Difference in outcomes of acute care services

Nuti *et al.* (11) conducted a cohort study of 30-day mortality and hospital readmission rates involving older male veterans hospitalized to VA hospitals or non-VA hospitals with AMI, CHF, and pneumonia. Mortality rates were lower in VA hospitals than non-VA hospitals for AMI (13.5% *vs.* 13.7%, $P=0.02$) and CHF (11.4% *vs.* 11.9%, $P=0.008$) but higher for pneumonia (12.6% *vs.* 12.2%, $P<0.05$); absolute differences between these outcomes were small. In addition to worse health outcomes, VA patients who utilized non-VA health services were found to have a high frequency of acute care utilizations.

In a retrospective cohort study of veterans with CHF who used VA care or community care for CHF, Axon *et al.* (12) examined rates of acute health care utilization. The cohort of veterans with CHF was constructed by combining VA, Medicare, and a comprehensive state data set with information on hospitalizations and emergency department visits. Compared to VA-only users, dual users had significantly higher rates of emergency department rates for CHF [rate ratio (RR) 1.15; 95% confidence interval (CI), 1.04–1.27], hospitalization for CHF (RR 1.4; 95% CI, 1.26–1.56), hospital readmission after CHF hospitalization (RR 1.46; 95% CI, 1.30–1.65), and CHF-specific hospital readmission after CHF hospitalization (RR 1.46; 95% CI, 1.31–1.63).

In another retrospective cohort study of VA-only and dual user veterans with CHF, Hunt *et al.* (13) examined emergency department visits, hospitalizations, and 30-day hospital readmissions. The association between dual use compared to VA-only use and emergency department visits was stronger in rural veterans (RR 1.28; 95% CI, 1.21–1.35) than in urban veterans (RR 1.17; 95% CI, 1.11–1.22), interaction $P=0.0109$. The association between dual use and all-cause hospitalizations was similar in rural veterans (RR 2.00; 95% CI, 1.87–2.14) and in urban veterans (RR 1.87; 95% CI, 1.77–1.98).

Table 1 Studies of dual-use of health care systems by veterans with cardiometabolic illness

Study	Sample	Design	Outcomes	Results	Limitations
Wright <i>et al.</i> 1997	25,312 male veterans age ≥ 65 years admitted to a VA or Medicare hospital for AMI	Retrospective cohort	Use of cardiac catheterization, CABS, and PTCA in the 90 days after initial admission for AMI, and survival at 30 days, 90 days, and 1 year	Veterans initially hospitalized in a Medicare hospital were more likely to receive cardiac catheterization (OR 1.24; 95% CI, 1.17–1.32), CABS (OR 2.01; 95% CI, 1.83–2.20), and PTCA (OR 2.56; 95% CI, 2.30–2.85) than VA patients; mortality was not significantly different between veterans admitted to VA vs. Medicare hospitals	Limited to males
Tseng <i>et al.</i> 2004	218,528 veterans with diabetes who used VA care and were dually enrolled in Medicare fee for service	Cross-sectional	Prevalence of baseline foot risk factors and amputations	The addition of CMS data significantly increased the prevalence of amputations and risk factors (all P values < 0.001); risk factors and amputations were substantially underestimated using VA data only	
Helmer <i>et al.</i> 2008	74,252 veterans with diabetes aged 65–75 years enrolled in both VA and Medicare fee for service	Cross-sectional	Hemoglobin A1c level	Higher proportions of Medicare visits were significantly associated with higher hemoglobin A1c values; a 40% increase in the proportion of Medicare visits by those who did not use Medicare was associated with a 0.23% point increase in hemoglobin A1c value	99% of sample was male
Gellad <i>et al.</i> 2015	260,688 veterans age ≥ 65 years with diabetes	Cross-sectional	Quantity of test strips received from the VA, Medicare only, or both the VA and Medicare	Veterans receiving test strips from both the VA and Medicare received more strips (median, 600) than the Medicare only (median, 400) and VA only (median, 200) groups and were more likely to overuse test strips than the VA only group (55.4% vs. 15.8%)	98.7% of sample was male
Kini <i>et al.</i> 2015	15,330 veterans age ≥ 65 years with CHF who used VA care and 224,525 veterans who used Medicare; dual users were excluded	Cohort	Use of transthoracic echocardiography	The Medicare cohort had a higher rate of transthoracic echocardiography use compared with the VA cohort (1.25 vs. 0.38 per person-year, incidence RR 2.89; 95% CI, 0.37–0.59)	Rural residents were excluded
Cooper <i>et al.</i> 2015	1,637 veterans aged ≥ 65 years enrolled in VA and 5,006 who were both VA and Medicare Advantage users	Cohort	Control of LDL cholesterol, blood pressure, and glycosylated hemoglobin among persons with CHD, hypertension, and diabetes	No significant differences were observed in intermediate outcomes between VA-only and dual-user populations	
Nuti <i>et al.</i> 2016	7,900 veterans age ≥ 65 years hospitalized to VA hospitals or non-VA hospitals with AMI, CHF, and pneumonia	Cohort	30-day mortality and readmission rates	Mortality rates were lower in VA hospitals than non-VA hospitals for AMI (13.5% vs. 13.7%, $P=0.02$) and CHF (11.4% vs. 11.9%, $P=0.008$) but higher for pneumonia (12.6% vs. 12.2%, $P<0.05$)	Limited to males

Table 1 (continued)

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Study	Sample	Design	Outcomes	Results	Limitations
Axon <i>et al.</i> 2016	13,977 veterans with CHF who used VA care or community care for CHF	Retrospective cohort	Rates of acute health care utilization	Compared to VA-only users, dual users had significantly higher rates of emergency department rates for CHF (RR 1.15; 95% CI, 1.04–1.27), hospitalization for CHF (RR 1.4; 95% CI, 1.26–1.56), hospital readmission after CHF hospitalization (RR 1.46; 95% CI, 1.30–1.65), and CHF-specific hospital readmission after CHF hospitalization (RR 1.46; 95% CI, 1.31–1.63)	
Pope <i>et al.</i> 2017	20 VA and 11 non-VA providers caring for veterans with CHF	Semi-structured interviews	Provider perceptions of veteran knowledge and motivations for dual use, provider roles in recommending and coordinating dual use, systems barriers and facilitators, and suggestions for improving cross-system care	VA and non-VA providers described variable CHF knowledge and self-management among veterans, and both groups described the need for improved education addressing medication adherence, self-care, and management of acute symptoms; non-VA providers expressed frustration with and difficulty in contacting VA providers, accessing records, and making referrals into the VA system	Small sample size
Pope <i>et al.</i> 2018	25 VA-only and dual user veterans with CHF	Semi-structured interviews	Perceptions of their heart condition, how they managed CHF, what influenced their decision to seek emergency assistance, and how they made the choice to use VA vs. non-VA services	VA-only users praised specific VA providers, called services helpful, and expressed capacity for managing CHF; dual users more often reported unmet needs, nonresponse to VA requests, and faster services in non-VA facilities	Small sample size
Hunt <i>et al.</i> 2018	4,985 VA-only and dual user veterans with CHF	Retrospective cohort	Emergency department visits, hospitalizations, and 30-day hospital readmissions	The association between dual use compared to VA-only use and emergency department visits was stronger in rural veterans (RR 1.28; 95% CI, 1.21–1.35) than in urban veterans (RR 1.17; 95% CI, 1.11–1.22), interaction $P=0.0109$; the association between dual use and all-cause hospitalizations was similar in rural veterans (RR 2.00; 95% CI, 1.87–2.14) and in urban veterans (RR 1.87; 95% CI, 1.77–1.98)	

CABG, coronary artery bypass surgery; CI, confidence interval; CMS, Centers for Medicare and Medicaid Services; LDL, low density lipoprotein; MI, myocardial infarction; OR, odds ratio; PTCA, percutaneous transluminal coronary angioplasty; RR, rate ratio; VA, Veterans Affairs.

Besides service overuse, dual users were more likely to require high resource use in acute care setting. In a retrospective cohort study of older male veterans admitted to a VA or Medicare hospital for AMI, Wright *et al.* (14) examined use of cardiac catheterization, CABS, and PTCA in the 90 days after initial admission for acute MI, and survival at 30 days, 90 days, and 1 year. Veterans initially hospitalized in a Medicare hospital were more likely to receive cardiac catheterization [odds ratio (OR) 1.24; 95% CI, 1.17–1.32], CABS (OR 2.01; 95% CI, 1.83–2.20), and PTCA (OR 2.56; 95% CI, 2.30–2.85) than VA patients. Many VA index patients crossed over to Medicare hospitals to obtain bypass surgery (27.6%) or coronary angioplasty (12.1%). Mortality was not significantly different between veterans admitted to VA *vs.* Medicare hospitals. Furthermore, Kini *et al.* (15) conducted a cohort study of older, urban veterans with CHF who used VA care and additional veterans who used Medicare. The outcome of interest was use of transthoracic echocardiography. The Medicare cohort was found to have a higher rate of transthoracic echocardiography use compared with the VA cohort (1.25 *vs.* 0.38 per person-year, incidence RR 2.89; 95% CI, 0.37–0.59).

Difference in outcomes of post-acute care services

During the post-acute care period, patients following AMI, exacerbation of CHF and DM need intensive, complex and comprehensive disease management, as well as seamless care coordination and care transition, which pose great challenge for dual users. In a cross-sectional study of predominately older male veterans with diabetes, Helmer *et al.* (16) examined hemoglobin A1c level, the indicator of the quality of diabetic management. Higher proportions of Medicare visits were significantly associated with higher hemoglobin A1c values, suggesting that veterans who chose to receive care outside the integrated VA healthcare system received poorer post-acute care management than those who receive care only within the system. A 40% increase in the proportion of Medicare visits by those who did not use Medicare previously was associated with a 0.23% point increase in hemoglobin A1c value. In a cohort study of older veterans enrolled in VA and additional veterans who were both VA and Medicare Advantage users, Cooper *et al.* (17) examined control of LDL cholesterol, blood pressure, and glycosylated hemoglobin among persons with CHD, hypertension, and diabetes. No significant differences were observed in intermediate outcomes

between VA-only and dual-user populations. On the other hand, dual users likely overused healthcare resources due to poor care coordination between care system. In a study of older veterans with diabetes, Gellad *et al.* (18) examined the quantity of test strips received from the VA, Medicare only, or both the VA and Medicare. Veterans receiving test strips from both the VA and Medicare received more strips (median, 600) than the Medicare only (median, 400) and VA only (median, 200) groups and were more likely to overuse test strips than the VA only group (55.4% *vs.* 15.8%).

Possible explanations

Multiple factors could contribute to the differences in healthcare utilization and its associated outcomes between only VA and dual users. Axon *et al.* (12) reported higher comorbidity in dual users compared to VA-only users, which could explain the greater service utilization among dual users. However, Cooper *et al.* found more comorbid conditions in VA-only users. Tseng *et al.* (19) examined the prevalence of baseline foot risk factors and amputations in a cross-sectional study of veterans with diabetes who used VA care and were dually enrolled in Medicare fee for service. The addition of CMS data significantly increased the prevalence of amputations and risk factors (all P values <0.001). Risk factors and amputations were substantially under-estimated using VA data only, which underscores the importance of evaluating dual-system utilization when evaluating healthcare systems with a substantial number of dual enrollees.

Pope *et al.* (20) conducted semi-structured interviews of 20 VA and 11 non-VA providers caring for veterans with CHF. VA and non-VA providers described variable CHF knowledge and self-management among veterans, and both groups described the need for improved education addressing medication adherence, self-care, and management of acute symptoms. Non-VA providers expressed frustration with and difficulty in contacting VA providers, accessing records, and making referrals into the VA system. Suggestions for improved care focused on patient education and care coordination.

In addition to clinical factors (e.g., comorbidity, risk factor), system/provider factors (e.g., patient education, care coordination), patient preference also account for the differences in service use and care outcomes between VA-only and dual users. Pope *et al.* (21) conducted semi-structured interviews of 25 VA-only and dual user veterans with CHF. The qualitative study explored veteran

perceptions of their heart condition, how they managed CHF, what influenced their decision to seek emergency assistance, and how they made the choice to use VA *vs.* non-VA services. VA-only users praised specific VA providers, called services helpful, and expressed capacity for managing CHF. In contrast, dual users more often reported unmet needs, nonresponse to VA requests, and faster services in non-VA facilities.

Discussion

In this review, we synthesized the healthcare utilization pattern and its associated outcomes among VA patients with the common diagnoses for acute-care and post-acute care service uses and dual system uses. The results indicate that older, male VA patients who are hospitalized for AMI may experience differences in cardiac procedures (cardiac catheterizations, coronary artery bypass surgery (CABG), percutaneous transluminal coronary angioplasty) depending upon whether they are treated at a VA hospital or Medicare fee for service hospital (14). In addition, outcomes such as survival at 30 days are not necessarily improved by dual use (14). In the study by Nuti *et al.* (11), older male veterans hospitalized with AMI or CHF had lower 30-day mortality rates if they were treated at a VA hospital. The lower mortality rates may be due in part to quality improvement efforts implemented in the VAs integrated delivery system (11). Dual use has been associated with increased health care use and worse outcomes in CHF patients (13). Veterans with CHF may experience increased emergency department visits, all-cause hospitalizations, and overtreatment if they are dual users of VA and non-VA healthcare (12,13). In the study of veterans with CHF by Kini *et al.* (15), use of Medicare fee for service was strongly associated with a higher rate of transthoracic echocardiography use compared with VA-only healthcare. Variation in cardiac imaging across healthcare systems may be explained in part by differences in clinical appropriateness and fee for service incentives. The variation in transthoracic echocardiography could also be explained by delays in scheduling of testing and underuse of imaging at the VA due to constrained budgets. Dual use may be a marker for poorer access to CHF care in the primary care setting or in a cardiology clinic (12).

Studies of older male veterans with diabetes have found that dual healthcare system use is associated with worse intermediate clinical outcomes (hemoglobin A1c level

and overuse of test strips (16,18). Studies of emergency department visits, repeat hospitalizations, and survival in diabetic veterans who are VA-only healthcare and dual users have not been reported.

There are several limitations in this review. First, the majority of studies that have examined dual health care system use by veterans with cardiometabolic conditions utilized administrative data and Medicare data collected prior to recent developments such as the Veterans Access, Choice and Accountability Act of 2014 or the introduction of Medicare Advantage, which is a managed care plan administered by private health insurance companies that contract with the Centers for Medicare and Medicaid Services. The findings of these published studies may or may not be applicable to the changing healthcare landscape. Because both the VA and Medicare Advantage are federally funded managed care systems, expenditures are duplicated for veterans who are dually enrolled (17). There is little evidence suggesting that such increased federal spending is associated with better health outcomes for veterans with cardiometabolic conditions who are enrolled in both systems.

Second, published studies of the use of dual healthcare systems by patients with cardiometabolic conditions such as AMI, CHF, and diabetes are also limited by the demographic characteristics of the veterans included in the studies. The majority of the studies have been limited to males and to persons aged 65 years older. Thus, the effect of dual use on the healthcare utilization and outcomes of patients <65 years of age and of women veterans is largely unstudied. Some studies have focused on veterans who live in large urban areas (11). Little research has been conducted of the use of dual healthcare systems by patients with cardiometabolic conditions who live in rural areas (13).

With respect to limitations, outcomes, procedures, and tests varied among the studies. Caution is therefore required in comparing results across studies. In addition, the studies by Axon *et al.* (12) and Hunt *et al.* (13) were not completely independent. Potential sources of bias include under-detection of cardiac and diabetic outcomes and procedures due to the sole use of administrative data in some studies.

In summary, the results of studies completed to date suggest that dual healthcare system use by older male veterans with cardiometabolic conditions is not associated with improved outcomes and may lead to unnecessary tests or procedures and increased healthcare costs. Additional research is warranted to examine the prevalence of dual

health care system use by male and female veterans during recent time periods and to compare outcomes among patients who receive only VA care or both VA and community care that is fee for service.

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Footnote

Conflicts of Interest: Both authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/jhmhp.2018.07.05>). The contents do not represent the views of the U.S. Department of Veterans Affairs or the U.S. Government. The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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