Investigating The Associations Between Rurality, Distance, And Quality Of End-Of-Life Care For Veterans And Their Families

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Investigating The Associations Between Rurality, Distance, And Quality Of End-Of-Life Care For Veterans And Their Families

Abstract
Rurality, access, and distance are important and intertwined concepts in end-of-life (EOL) care. Prior research has shown that rural residents are less likely than urban residents to use hospice, yet little is known about family-reported outcomes and other care processes associated with quality EOL care. Rural EOL care providers and caregivers describe distance to care as a challenge, but its relationship to quality has yet to be measured. The Veterans Health Administration (VA) is an ideal setting to address these gaps due to its clinically and geographically diverse patient population, and its capability to uniformly evaluate care.

We reviewed studies that compared urban and rural EOL care in the U.S. and found research gaps in population and health care delivery characteristics, and consumer satisfaction. Then, we conducted retrospective, cross-sectional analyses of Veterans who died from October 2009 through September 2016 in inpatient settings across 151 VA facilities. Using unadjusted and adjusted logistic regression, we examined evaluations of care from the Bereaved Family Survey and quality indicators for receipt of (1) a palliative care consultation (2) chaplain visit (3) death in an inpatient hospice unit, and (4) bereavement support. Comparing quality by urban-rural residence showed that rural Veterans had lower odds of dying in an inpatient hospice unit compared to urban Veterans. Differences in other quality indicators were small and of mixed significance. Finally, we compared quality between categories of Veterans based on driving time from residence to facility of death: 0-5 minutes, 5-60 minutes (reference category), and 60-360 minutes. Distance was significantly associated with all quality indicators. The strongest associations were for death in an inpatient hospice unit (0-5 minutes OR 0.77, 95% CI: 0.73-0.80; P < .001, 60-360 minutes OR 0.76, 95% CI: 0.73-0.79; P < .001), and receipt of a palliative care consultation (60-360 minutes OR 0.78, 95% CI 0.75-0.81; P < .001). In both urban-rural and distance-based analyses, family members of Veterans across all categories were equally likely to rate overall care as excellent. Our findings call for further investigation into unmeasured individual characteristics and facility processes related to rurality, in addition to other measures of access.

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INVESTIGATING THE ASSOCIATIONS BETWEEN RURALITY, DISTANCE, AND QUALITY OF END-OF-LIFE CARE FOR VETERANS AND THEIR FAMILIES

Cindy S. del Rosario

A DISSERTATION

in

Nursing

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in

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Degree of Doctor of Philosophy

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For those who shall have borne the battle and their families and survivors
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And you that shall cross from shore to shore years hence are more to me, and more in my meditations, than you might suppose.

- Walt Whitman, *Crossing Brooklyn Ferry*, 1855
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ABSTRACT

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Cindy S. del Rosario
Mary Ersek

Rurality, access, and distance are important and intertwined concepts in end-of-life (EOL) care. Prior research has shown that rural residents are less likely than urban residents to use hospice, yet little is known about family-reported outcomes and other care processes associated with quality EOL care. Rural EOL care providers and caregivers describe distance to care as a challenge, but its relationship to quality has yet to be measured. The Veterans Health Administration (VA) is an ideal setting to address these gaps due to its clinically and geographically diverse patient population, and its capability to uniformly evaluate care.

We reviewed studies that compared urban and rural EOL care in the U.S. and found research gaps in population and health care delivery characteristics, and consumer satisfaction. Then, we conducted retrospective, cross-sectional analyses of Veterans who died from October 2009 through September 2016 in inpatient settings across 151 VA facilities. Using unadjusted and adjusted logistic regression, we examined evaluations of care from the Bereaved Family Survey and quality indicators for receipt of (1) a palliative care consultation (2) chaplain visit (3) death in an inpatient hospice unit, and (4) bereavement support. Comparing quality by urban-rural residence showed that rural
Veterans had lower odds of dying in an inpatient hospice unit compared to urban Veterans. Differences in other quality indicators were small and of mixed significance. Finally, we compared quality between categories of Veterans based on driving time from residence to facility of death: 0-5 minutes, 5-60 minutes (reference category), and 60-360 minutes. Distance was significantly associated with all quality indicators. The strongest associations were for death in an inpatient hospice unit (0-5 minutes OR 0.77, 95% CI: 0.73-0.80; \( P < .001 \), 60-360 minutes OR 0.76, 95% CI: 0.73-0.79; \( P < .001 \)), and receipt of a palliative care consultation (60-360 minutes OR 0.78, 95% CI 0.75-0.81; \( P < .001 \)). In both urban-rural and distance-based analyses, family members of Veterans across all categories were equally likely to rate overall care as excellent. Our findings call for further investigation into unmeasured individual characteristics and facility processes related to rurality, in addition to other measures of access.
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CHAPTER 1:

INTRODUCTION

In recent decades, interest in end-of-life (EOL) care and use of hospice and palliative care have grown immensely.\(^1,2\) Accompanying this growth is concern that the benefits of such care remain inaccessible to certain populations, including rural residents. EOL care providers in rural areas report challenges posed by staffing issues, low availability of resources such as technology and specialists, and geographic barriers posed by greater distances and travel times.\(^3\)–\(^5\) Compared to urban residents, rural residents are less likely to use hospice,\(^6\)–\(^10\) a service associated with higher family satisfaction with EOL care.\(^11\) Palliative care—individualized care aimed at reducing symptom burden and improving quality of life—has the potential to benefit people facing serious illness in settings outside of hospice, but is often unavailable in rural hospitals.\(^12\) Geographic accessibility of care may be of special importance to people near EOL, since travelling to distant specialists could be burdensome and dying in a familiar place is a common preference.\(^13\),\(^14\) Because families are central to many interventions, such as spiritual or bereavement support, proximity to sites of EOL care may influence whether such interventions are achieved.

Increasing access to care for rural Veterans and improving the standard of end-of-life (EOL) care for all Veterans are both explicit priorities of the Veterans Health Administration (VA).\(^15\),\(^16\) Nearly 2.7 million Veterans residing in rural areas depend on the VA for health care, half of whom are 65 years or older.\(^16\) Rural Veterans comprise
33% of enrollees in the VA healthcare system, and Veterans as a whole are more likely to live in rural areas than the general population in the United States. In the face of a growing body of evidence of urban-rural differences in EOL care outside of the VA system, an investigation of potential geographic disparities within the VA is imperative.

Since 2009, the Veteran Experience Center (formerly known as the Performance Reporting and Outcomes Measurement to Improve the Standard of care at End-of-life [PROMISE] Center) has collected data on EOL care processes and outcomes across the nationally integrated VA system. The Veteran Experience Center (VEC) examines these data for nearly all deaths that occur in VA inpatient settings, including acute and ICU hospital beds, nursing home like- settings known as community living centers (CLCs), and specialized inpatient palliative/hospice units, which are generally located in CLCs. The VA routinely monitors four quality indicators of care processes, chosen for their association with high quality EOL care. The quality indicators are receipt of a palliative care consult, patient/family contact with a chaplain, death in an inpatient hospice unit, and bereavement support. Additionally, the VA uses the Bereaved Family Survey (BFS), a validated National Quality Forum-endorsed instrument, to solicit overall evaluations of EOL care by Veterans’ next-of-kin [NOK] as an additional outcome of care.

To date, little is known about the EOL experiences of rural Veterans, Veterans who receive care far from their homes, or their families. Given the changes in the rural
health care landscape, a study is needed to measure the degree to which the needs of rural residents facing EOL are being met, and also to guide future efforts to improve geographic access to EOL care. The purpose of this study is to identify possible geographic disparities in the quality of EOL care, as measured by four quality indicators of processes and family evaluations of care. We examined quality of EOL care, first by comparing urban and rural Veterans, then by categories based on Veterans’ distance from residence to facility of death.

Study Aims

1) Describe the research literature comparing urban and rural EOL populations, care delivery, and outcomes in the U.S. by conducting an integrative review.

2) Compare receipt of high-quality EOL care between rural and urban Veterans, as measured by NOK evaluation of care on the BFS and four quality indicators.

3) Examine the relationship between distance to care as measured by minutes of travel to facility where death occurred and quality of EOL care, as measured by NOK evaluation of care on the BFS and four EOL quality indicators.

Hypothesis: NOK of Veterans who die farther away from their homes are less likely to rate EOL care received highly.

As the largest nationally integrated healthcare system in the U.S., the VA is expansive in both its geographic reach and its ability to capture EOL care processes across a variety of inpatient settings. This study contributes to literature on rural EOL
care by incorporating family perspectives’ on quality of care and accounting for the effect of distance.

Approach

Conceptual Framework

This study is informed by Donabedian’s framework for assessing health care quality\(^23\) and Aday and Andersen’s framework for the study of access to medical care.\(^24\) Donabedian conceptualizes the measurement of health care quality into indicators related to structure, process, and outcomes. Our study analyzed quality indicators for processes of care known to be associated with high quality EOL care (i.e. palliative care consultation, chaplain contact, death in an inpatient hospice unit, and bereavement support), and family evaluations of care on the BFS as an outcome. Aday and Andersen’s original framework, shown in Figure 1-1, conceptualizes the measurement of access with five interrelated variables: health policy, characteristics of health delivery system, characteristics of the population at risk, utilization of health services, and consumer satisfaction. Each variable is subdivided further into components, defined in Table 1-1. Our adapted conceptual model, shown in Figure 1-2, focuses on parts of Aday and Andersen’s framework, which are further classified as elements of Donabedian’s model.

Methods Overview

We addressed Aim 1 by conducting a literature review of data-based studies comparing EOL outcomes and care delivery between urban and rural areas in the U.S.
Study findings were organized using Aday and Andersen’s framework. We also examined how rurality was operationalized in each study, which is a common methodological challenge in rural healthcare research.

The remaining aims were addressed through cross-sectional, retrospective analyses based on a sample comprised of nearly all inpatient deaths within 151 VA facilities from October 2009 through September 2016. For Aim 2, we compared EOL quality indicators for four care processes and family evaluation of care as an outcome among Veterans from urban, large rural, small rural, and isolated rural areas, using a series of logit models that accounted for important facility and Veteran characteristics. We categorized the rurality of each Veteran’s residence by a modified version of the Rural-Urban Commuting Area Codes classification schema, which classifies areas based on population density, urbanization, and commuting patterns. According to Aday and Andersen’s commentary on the framework for the study of access, urban or rural residence is considered an immutable, enabling component under characteristics of the population at risk, describing the community resources in which an individual lives.

For Aim 3, we examined the association between quality of EOL care and Veterans’ distance to facility of death, again using a series of logit models accounting for facility and Veteran characteristics. Veterans’ distance to facility of death was measured in minutes of driving time and derived using a combination of existing VA data and spatial analysis techniques. We categorized Veterans into three intervals, guided by classification and regression tree analysis. Within the framework for the study of access,
distance as driving time corresponds to the component of ‘entry’ within characteristics of the health delivery system.

We hypothesized that studying quality of EOL care by distance could be an improvement over comparing by urban-rural residence. Rurality is a multidimensional concept that may encompass low population density, distance from urban areas, or individual attributes. Within healthcare research, rural residence often serves as a proxy for proximity access to services, which are often concentrated in urban areas. However, the categorization does not take into account the variation in geographic access among both urban and rural areas. Measuring residents’ distance to sites of care could better account for this variation, and thus add to our understanding of access and quality.
References


Figures and Tables

Figure 1-1: Aday and Andersen's Framework for the study of access
Figure 1-2. Study conceptual framework

CHARACTERISTICS OF HEALTH DELIVERY SYSTEM
- Resources
- Facility complexity level
- Facility region
- Availability of inpatient hospice unit
- Organization: Entry
- Distance to facility from residence

CHARACTERISTICS OF POPULATION AT RISK
- Predisposing
  - Age, Sex, Race/ethnicity
  - Next-of-kin relationship
- Enabling
  - Rural or urban residence
  - Community income level
  - Need
  - Comorbidities
  - Prior hospitalization or ICU stay

UTILIZATION OF HEALTH SERVICES
- Type
  - Palliative care consult
  - Chaplain contact
  - Bereavement follow-up
- Site
  - Death in inpatient hospice

CONSUMER SATISFACTION
- Quality
- Family evaluations of care

Structure  
Covariates  
Process  
Outcomes
Table 1-1: Variables and Components of the Aday and Andersen Framework for the Study of Access to Medical Care

<table>
<thead>
<tr>
<th>Variables</th>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Policy</td>
<td>Financing Education Manpower Organization</td>
<td>Programs, often political, alter access to medical care, the effect of which should be evaluated Included because &quot;improved access&quot; to care is a goal of much of health policy</td>
</tr>
<tr>
<td>Characteristics of health delivery system</td>
<td>Resources Volume Distribution Organization Entry Structure</td>
<td>Resources - labor and capital devoted to health care, such as health personnel, structures in which health care and education are provided, equipment and materials used in providing health services. Includes both volume and distribution of medical resources in an area. Organization - what the system does with its resources. Entry is the process of gaining entrance to the system (travel time, waiting time, etc.), means through which the patient gains entry to the medical care system and continues the treatment process Structure - the characteristics of the system that determine what happens to the patient following entry into the system (whom he sees, how he is treated)</td>
</tr>
<tr>
<td>Characteristics of the population at risk</td>
<td>Predisposing Mutatable Immutable Enabling Mutatable Immutable Need Perceived Evaluated</td>
<td>Predisposing variables describe the propensity of individuals to use services which exist prior to the onset of illness episodes (i.e. age, sex, race, religions, and values concerning health and illness). Enabling components includes &quot;means&quot; individuals and families have available to them for the use of services (e.g. income, insurance coverage) and attributes of the community (e.g. rural-urban character, region) Need component covers illness level, the most immediate cause of health service use. Need for care may be either that perceived by the individual or that evaluated by the delivery system.</td>
</tr>
<tr>
<td>Utilization of Health services</td>
<td>Type Site Purpose Time interval</td>
<td>Level and pattern of the population's actual utilization of the system Type - kind of service received and who provided it (hospital, physician, dentist, pharmacist, etc.) Site - place where the care was received (physician's office, hospital outpatient department, emergency room, etc.) Purpose of a visit - whether it was for preventive, illness-related, or custodial care Time interval for a visit - contact, volume, or continuity measures Contact - whether or not a person entered the medical care system in a given period of time Volume - number of contacts and revisits in a given time interval Continuity - degree of linkage and coordination of medical services associated with a particular illness experience or episode</td>
</tr>
<tr>
<td>Consumer satisfaction</td>
<td>Convenience</td>
<td>Costs</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------</td>
<td>-------</td>
</tr>
<tr>
<td>Consumer satisfaction refers to the attitudes toward the medical care system of those who have experienced contact with it, distinguished from predisposing medical beliefs component</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 2:
INTEGRATIVE REVIEW

Assessment of Access in Urban and Rural End-of-Life Care: An Integrative Review of Comparative Studies in the U.S.

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Abstract

Background: Improving access to services and achieving equity are goals that have dominated much of U.S. health care policy in the last century, particularly for rural residents and seriously-ill older adults. Because demand for high quality end-of-life (EOL) care is growing and dying at home is a common preference, examining possible geographic disparities in quality of and access to such care is needed.

Purpose: To identify and integrate studies comparing urban and rural EOL care in the U.S., using Aday and Andersen’s framework of access to medical care.

Methods: We searched three databases for publications using keywords relevant to end-of-life care and rural areas. Our primary inclusion criteria were studies that (1) focus on EOL care (2) compare rural and urban residents or settings, and (3) are based on data collected in the U.S.

Results: Our search yielded twenty-one publications fulfilling our inclusion criteria, using data from 1999 to 2013. Most of the nineteen quantitative studies were based primarily on Minimum Data Set (MDS) and Medicare utilization data. The two qualitative studies used focus groups to examine challenges faced by home hospice staff or caregivers of cognitively impaired older adults near EOL. Characteristics of the health delivery system, and consumer satisfaction were less represented in our findings. Although nearly all studies used one of three classification schemas to operationalize their definition of rurality, there was variation in the application of each schema across studies. Among the few trends validated by multiple studies were lower use of hospice in rural areas.

Conclusion: Reviewed studies span several settings, populations, purposes, measures, and variables related to access in EOL care. In order to better evaluate access in rural and
urban areas, further research is needed, especially in the areas of population and health care delivery system characteristics, and consumer satisfaction.
Introduction

Ensuring access to essential healthcare services has driven much of U.S. health care over the last century, especially among rural residents and seriously-ill older adults.¹ For decades, healthcare services have become increasingly more concentrated in urban areas. Rural areas have fewer physicians per capita² and hospitals have been closing at alarming rates.³ Even among existing rural hospitals, there is an absence of certain services that would benefit seriously-ill older adults, such as palliative care,⁴ home health, chemotherapy, or hospice services.⁵ Despite federal programs devoted to increasing physician supply and countering rural hospital closures, the regionalization of health provider networks to densely populated urban areas shows no signs of slowing.¹,³ In the U.S., 15-19% of the population resides in rural areas, depending on the definition of rurality chosen.⁶,⁷ As rural residents tend to be older, have poorer health-related quality of life,⁸ and lower life expectancy,⁹ the impact of regionalization on access to and quality of end-of-life (EOL) care for rural residents should be assessed.

According to the National Academy of Medicine (NAM), high quality EOL care should be compassionate, person-centered, family-oriented, and evidence-based.¹⁰ Providing such care could be challenging in rural areas. Rural providers of EOL care report difficulties due to fewer resources, difficulty retaining and educating staff,⁴ and time costs of travelling over large distances.¹¹ The vastness of rural geography also creates challenges for those who prefer to stay at home, the preferred place of death among rural residents and their caregivers.¹² For people seeking care, poor access to specialists and technology could mean delays in diagnosing life-threatening illnesses, as well as delays in initiating supportive care.¹³ For family members and caregivers, who
could benefit from emotional, spiritual, and educational aspects of EOL care interventions, travel to distant healthcare settings may be perceived as burdensome.\textsuperscript{13,14}

Although scientific interest in rural EOL and palliative care is growing, published reviews concluded that the literature devoted to rural EOL or palliative care is sparse.\textsuperscript{11,16} Generally, published research consisted of exploratory studies limited to provider perspectives at a single rural site.\textsuperscript{15} Many of these studies lacked perspectives of patients or families, as well as urban comparison groups, which are both critical to evaluating access in rural areas. Between reviewed studies, definitions of rurality differed and at times were unspecified, or were unique to a specific country, making generalizability or applicability of findings problematic.\textsuperscript{12,16}

In light of urban-rural disparities in mortality and accessibility of basic health care,\textsuperscript{9} identifying potential geographic differences in access to and quality of EOL care is warranted. Thus, the purpose of this paper was to review studies that compared EOL care between urban and rural areas. To maximize actionability of findings for policymakers and stakeholders, we focused on studies in the U.S. population and healthcare system.

\textbf{Methods}

We followed the integrative review methodology proposed by Whittemore and Knafl\textsuperscript{17} to synthesize studies that may differ in methodology and purpose. With the aid of a research librarian, we searched PubMed, HealthStar, and CINAHL databases in June 2018 using MeSH headings relating to rural and EOL care, expanding on the latter with keywords \textit{terminal}, \textit{hospice}, and \textit{palliative} (\textbf{Table 2-1}). Our database searches were restricted to peer-reviewed articles in English from the U.S. Our primary inclusion
criteria were (1) data-based comparisons between rural and urban residents or settings, (2) studies focused on care or outcomes at end-of-life, and (3) studies conducted in the U.S.

Data from each study were abstracted by category: purpose, design, setting, sample, definition of rurality, and findings (Table 2-2). Findings were further organized by using the five concepts of Aday and Andersen’s framework\textsuperscript{18} for the study of access to healthcare (Figure 2-1). These concepts are health policy, characteristics of the healthcare delivery system, characteristics of the population at risk, utilization, and consumer satisfaction. Using this broad framework allowed us to organize a variety of findings within EOL care. Additionally, the quality of published articles was evaluated using Consolidated Criteria for Reporting Qualitative Research\textsuperscript{19} (COREQ) for qualitative studies and Strengthening the Reporting of Observational Studies in Epidemiology\textsuperscript{20} (STROBE) checklist for quantitative studies. Evidence grades and agreement between studies guided the integration and identification of major findings (Table 3). Because definitions of rurality across studies were also of interest, we documented each study’s operational categorization of urban and rural.

Results

Our database search identified 1,101 records, which were reduced to 845 records after duplicates were removed (Figure 2-2). All search results were evaluated for relevancy to EOL care based on title and abstract when available, and 71 were evaluated through full-text review. Additionally, we examined the full-text of 17 publications found via hand search of the reference lists of the reviewed articles. Of the fully reviewed...
records, 45 were excluded as follows: 17 focused on EOL care outside of the U.S., 15 did not include urban/rural comparisons, eight were commentary, and two were not related to EOL care. Further, eight review articles that included U.S. studies were excluded from our analysis as neither their results nor discussion were specific to the U.S.

The final sample for the review was comprised of 21 publications, published between 2001 and 2018. Studies varied widely in purpose, setting, and design, but several overlapped in author teams and data sets. Nineteen were quantitative studies and two were qualitative. Of the 19 quantitative studies, all but three were retrospective analyses of Medicare data—mainly claims data for hospice, inpatient, and outpatient services—or the Minimum Data Set (MDS) for nursing home (NH) residents. Thirteen of the studies were national comparisons, while the remainder were limited to a single or small number of states. Overall, these studies were based on older data: the newest were based on 2013 data, while the oldest were based on data from the 1990s. The two qualitative studies were interviews of administrators and focus groups of staff from seven certified home health and five hospice agencies, and focus groups of caregivers of cognitively impaired residents in 11 nursing homes.

We found no interventional studies that reported rural-urban differences.

Four studies focused primarily on hospice and eight on NH residents and facilities. Three studies examined data across inpatient and outpatient settings. Seven studies used facility (NH or hospice) as the unit of analysis, and the remainder analyzed individual patients. Only two studies solicited input from patients or family caregivers. Some studies examined rural-urban EOL
healthcare utilization in NHs: three examined outcomes of hospice referrals in NHs,\textsuperscript{30,32,36} and two examined hospitalizations following a NH stay.\textsuperscript{30,37}

\textit{Definitions of rurality}

Within the U.S. alone, several definitions of \textit{rural} exist, and research findings may be dependent on the definition used.\textsuperscript{42} All but one national study\textsuperscript{24} used one of three classification systems to define rural-urban comparison groups: Rural-Urban Continuum Codes (RUCC), Urban Influence Codes (UIC), or Rural-Urban Commuting Area Codes (RUCA). RUCC and UIC are based on county-level OMB partitions, further subdividing rural areas into those adjacent to an urban area (i.e., “rural-adjacent”) and those not adjacent to urban areas (i.e., “rural non-adjacent” or “remote rural”). The RUCA classification system classifies census tracts into four main categories—urban, large town, small town, and rural/isolated—which are further partitioned by the percentage of residents who commute to other areas, and by the type of areas to which they commute.\textsuperscript{32}

Generally, authors did not justify their choices of classification schema. Although most study teams used these coding schemas, study teams differed by partitioning them into two, three, or four rural-urban categories. Furthermore, different author teams disagreed on classifying micropolitan areas as urban or rural,\textsuperscript{1-3} while some omitted the category altogether to provide a starker contrast between groups.\textsuperscript{37,41} As a result, each study team, in effect, defined rural-urban categories differently despite ostensibly sharing similar coding schema.
Health Policy

According to Aday and Andersen’s framework, health policy is the starting point of increasing access through programs in financing, education, manpower, and organization. Three studies directly examined healthcare financing, and collectively suggested that rural-urban differences exist related to the economics of EOL care. First, among Medicare beneficiaries with cancer, rural decedents cost the program 4-10% less than urban decedents in the last year of life, depending on the diagnosis.\textsuperscript{29,34} One study suggested that changes in reimbursement rates have different effects in urban and rural NHs. Specifically, an increase in Medicaid-reimbursement rates was associated with increased hospice use among urban NH decedents, but decreased among rural NH decedents.\textsuperscript{32}

Three studies addressed census-based hospice reimbursement and found that rural hospices tend to have lower daily patient censuses than urban ones, resulting in lower revenues.\textsuperscript{23,26,40} Collectively, these studies conflicted on whether lower census counts posed financial strain on agencies. These lower revenues may make it difficult to cover overhead costs and hire and retain staff.\textsuperscript{26,40} However, rural hospices in California, despite having lower censuses, were more profitable than urban hospices, discounting revenues from grants and donations.\textsuperscript{23}
Characteristics of the Healthcare Delivery System: Access to Hospice Care and Quality of Palliative Care Services

Five studies established that much of the U.S. is serviced by or is near hospice services; nonetheless, residents of rural areas were more likely to live farther from a hospice agency or in an area without hospice service. \textsuperscript{24–26,30,39} Using Medicare hospice provider information from 2008, Carlson et al.\textsuperscript{24} found that 98\% of the general U.S. population lived within 60 minutes of a hospice, with residents in the most rural areas living 26 minutes farther than residents in urban areas on average. In a study based on Medicare enrollment and provider data from 2000-2002, Virnig et al.\textsuperscript{25} found that less than 1\% of Medicare decedents resided in a ZIP code that lacked hospice service, but also found a small and significant association between lack of service and level of rurality. Furthermore, differences in service availability did not fully explain the lower rates of hospice use observed in rural areas.

Two studies conducted in two states suggested differences in access to and quality of EOL care between rural and urban nursing homes and hospice agencies. In a survey of Pennsylvania NH administrators, Hodgson et al.\textsuperscript{21} found that facilities in urban areas were more likely to have high levels of palliative care services, as defined by several criteria mainly related to policies and procedures for symptom management. In a qualitative study of home health and hospice agencies in Western New York, participants described rural-urban differences that focused on market forces, programming issues, and geographic challenges.\textsuperscript{40} Rural administrators reported that working in an economically depressed area made it difficult to recruit and retain staff, and to guarantee full-time work for existing staff. Staff at rural agencies drove long
distances along routes, which were sometimes inaccessible due to weather. Meanwhile, staff at urban agencies were impeded by traffic and crime in some neighborhoods. Cai et al.\textsuperscript{36} found a negative association between the number of hospice providers in a particular skilled nursing facility and hospitalizations near EOL among its residents. In a stratified analysis, the negative association was found among urban facilities, but not rural ones.

\textit{Characteristics of the Population at Risk}

Five studies compared characteristics of urban and rural EOL populations, all of which focused on NH residents: four described residents’ clinical characteristics, and one study described their caregivers’ attitudes toward EOL decision-making. Two studies evaluated pain. Temkin-Greener et al.\textsuperscript{30} found that rural NHs had significantly higher observed prevalence of severe pain compared to urban NHs. But after creating a risk-adjusted quality measure for severe pain, they found no significant rural-urban differences. Bolin et al.\textsuperscript{31} similarly found that the proportion of residents with any pain or daily pain upon admission increases slightly but significantly with rurality, but neglected to adjust for factors that may influence pain. Bolin et al.\textsuperscript{31} also conducted numerous unadjusted comparisons of disease prevalence and clinical needs, but found few significant linear associations with rurality.

Two studies by Gessert and colleagues examined rural-urban differences in the use of feeding tubes in NH residents with cognitive impairment using data from three states.\textsuperscript{37,38} Both studies found that urban residents were more likely than rural ones to have a feeding tube in place and to receive artificial nutrition. To understand rural-urban differences in feeding tube use and other family EOL decision-making, Gessert et al
conducted focus group interviews with 38 family caregivers of NH residents with severe cognitive impairment. Almost unanimously, rural caregivers expressed acceptance of death as a natural part of life and a lack of interest in aggressive therapies to prolong life. In contrast, urban caregivers expressed a range of attitudes from unconditional acceptance of death to active resistance against death, with some in favor of aggressive therapies at EOL.

**Utilization of Health Services**

Nine studies examined rural-urban differences in hospice outcomes. Eight of these studies examined rural-urban differences in hospice utilization near EOL. Six found that hospice use decreased as the degree of rurality increased. This finding was consistent across studies of Medicare beneficiaries, NH residents, women, and among decedents with breast, colorectal, or prostate cancer. Three studies that examined Medicare decedents with lung cancer conflicted. Two studies identified lower hospice use among rural lung cancer beneficiaries, whereas a more recent study with differing methodology found higher hospice use among rural beneficiaries with lung cancer. Additionally, two studies found no rural-urban differences in late hospice enrollment (i.e., within three days prior to death) among Medicare beneficiaries with certain cancer diagnoses. One study limited to one large hospice found no differences in inpatient hospice use among its enrollees within 4-10 days of admission.

Eight studies evaluated differences in hospitalizations near EOL. Collectively, no clear pattern emerged, but varied depending on the population studied. Among decedents with prostate cancer and cognitively impaired non-hospice NH
residents, rurality was associated with higher likelihood of being hospitalized near EOL. Rural and urban decedents with breast cancer had similar odds of being hospitalized near EOL. Studies of hospitalization among rural and urban lung cancer and colorectal cancer decedents conflicted in findings. When hospitalized, rural residents may be experiencing shorter, less costly, and less intense inpatient stays. Two studies evaluated the rate of in-hospital deaths by rural-urban status. No significant differences were found in examining all Medicare beneficiaries. However, in a comparison of NH residents, the ratio of in-hospital deaths was lowest in urban facilities and highest in small town facilities.

Four studies evaluated outpatient services near EOL. Rurality was associated with more emergency visits among Medicare beneficiaries with lung cancer, but no significant association was found among those with colorectal cancer. The two remaining studies conflicted on whether rurality was associated with physician or outpatient expenditures.

Consumer Satisfaction

Only two studies addressed patient or family satisfaction with EOL care, and both suggested that rural consumers are more satisfied with care than their urban counterparts. Baernholdt et al. surveyed 743 family members or patients shortly after admission to a large hospice program in the southeastern U.S. Rural respondents were significantly more likely to be satisfied with care received, although urban respondents also reported high levels of satisfaction. There was little variability between urban and rural groups in specific aspects of care, yet small differences existed; for example, rural respondents...
were more likely to report receiving information about a patient’s condition and receiving emotional support. In Gessert et al., family caregivers of cognitively-impaired NH residents described their relationship with staff in the context of end-of-life decision making. Urban caregivers tended to describe their relationship with staff as adversarial, whereas rural caregivers described their relationship with NH staff as collegial, which may imply higher levels of satisfaction with care.

Discussion

Collectively, the reviewed studies that compared rural and urban EOL care covered a variety of purposes, settings, and populations. Individually, most studies narrowly focused on sub-populations limited by setting (i.e., NHs or hospice), diagnosis (i.e., certain forms of cancer or cognitive impairment), or geographic area; few examined EOL care nationally, across settings, and inclusive of all diagnoses. While all five concepts in Aday & Andersen’s framework were addressed, some were focused on more than others. Most studies examined utilization of health services, likely due to their availability via Medicare data. Similarly, several studies addressed the concept of characteristics of the population of risk, but mainly in NH residents, where MDS data is regularly collected. In contrast, fewer studies addressed health policy, characteristics of the health delivery system, and consumer satisfaction. Because of the variety of outcomes examined and narrowness of individual study samples, generalizations about rural-urban EOL differences should be treated with caution. Future studies could be designed to examine these understudied aspects of care in more broadly defined EOL samples that cut across diagnoses and settings.
One of the few findings that was consistent across multiple studies is that rural residents, in and out of NHs, tend to use hospice at lower rates.\textsuperscript{26–30} The one conflicting study, which found that rural lung cancer decedents used hospice at higher rates,\textsuperscript{34} is based on newer data. One study that examined hospice use longitudinally found that the rate of hospice use in NHs increased over time, in both urban and rural settings.\textsuperscript{32} Although lower hospice utilization among rural residents is well documented, it is unclear how much of the difference is attributable to lack of access to hospice or to other factors, such as differences in health delivery systems. Although an older study found that service availability partly explained lower hospice use,\textsuperscript{25} a newer descriptive study found that much of the U.S. population lived near a hospice.\textsuperscript{24} Outside of EOL care, some rural experts have attributed rural health disparities to unequal benefits from health financing programs.\textsuperscript{43} Reviewed articles implied this may bear out in EOL care as well. Miller et al.\textsuperscript{32} showed that increases in state-level Medicaid nursing home reimbursements correlates to lower use of hospice in rural facilities, although the exact mechanism for this finding remains unknown. Carlson et al.\textsuperscript{24} found that Certificate of Need policies, which dissuade excessive growth of new healthcare organizations, was associated with less geographic access to hospice.\textsuperscript{24} Studies showed that rural NHs had lower rates of hospice use, higher risk of hospitalization,\textsuperscript{30,37} and less organizational structure conducive to palliative care delivery.\textsuperscript{21} Yet Cai et al.’s finding that NHs with multiple hospices present was associated with more in-hospital deaths only among urban facilities suggest that they face unique challenges as well.\textsuperscript{36} These findings suggest that facility-level differences, which are often correlated with urban-rural status, may impact
quality of care. With about one-quarter of Medicare beneficiaries dying in nursing homes, further research to explain these differences is needed.  

Also unclear is whether lower hospice use among rural residents in general indicates unmet need. Reviewed studies that compared clinical needs through population characteristics were limited and found relatively few significant rural-urban differences. The more remarkable rural-urban difference was in perceived need, in that rural caregivers were more likely to be against aggressive treatment near EOL. This finding is consistent with an international review of rural caregivers of people at EOL, which indicated that rural residents held accepting attitudes toward death. In a study of rural attitudes toward health in general, Weinert and Long found that rural residents may have different expectations from the healthcare system, valuing self-reliance and independence to the point of resisting help from outsiders. Perhaps lower hospice use among rural residents could be understood consistent with the rural trend of lower utilization of other services near EOL, such as intensive care, lengthy hospitalizations, or feeding tubes.

There was little appreciable difference in studies that could be attributed to choice of classification system, whether investigators opted to the use RUCC, RUCA, or UIC schemas. However, studies that used finer partitions of rurality—such as rural areas not adjacent to urban areas or remote rural areas—detected some notable differences, particularly in hospice use. Compared to rural areas adjacent to urban areas, NH decedents and Medicare beneficiaries in isolated rural areas were less likely to use hospice, and hospices were more likely to have extremely low census counts. Furthermore, research outside of EOL care suggests that residents of very remote, less
dense areas experience high levels of psychological health and relational quality of life,\textsuperscript{45,46} implying that treating these residents as their own separate category could be informative.

In order to more directly determine whether EOL needs are being met, larger comparative studies on satisfaction that capture more geographically and clinical diverse populations are needed. Only two studies incorporated any patient and family perspectives, and both were small and geographically limited.\textsuperscript{22,41} Although the one reviewed study that directly surveyed satisfaction showed marginally higher satisfaction among rural participants over urban participants, it was limited to a single established hospice agency in one area of the U.S. Similarly, the qualitative study of family caregivers for nursing home residents was small, local, and furthermore, did not ask directly about satisfaction with care. Still, these small qualitative studies show that perspectives on EOL care could help contextualize findings from larger quantitative studies, particularly those related to differences in utilization. Comfort-focused hospice care appears to be aligned with the values of rural patients and caregivers, yet the reason behind lower hospice use in rural areas remains unexplained.

This review has several limitations. Because of our search methodology and reliance on abstract review, it is possible that there are studies where rural-urban differences were reported as a secondary finding but were not captured. Similarly, we may have failed to identify and include studies reporting rural-urban differences in areas related to EOL, such as symptom management, spiritual care, or home care. Finally, many of the studies reviewed were based on older data. Newer studies included in this
review, together with recent growth in hospice and changes in rural healthcare delivery overall, indicate that our findings may not fully reflect current conditions.

Conclusion

Our review found evidence of rural-urban differences in EOL care, with the strongest finding being lower hospice use among rural residents. A handful of studies indicated that differences may exist in characteristics of urban and rural populations, and in delivery of EOL care between urban and rural NHs. However, reviewing the totality of findings reveals that much research is needed, especially in the areas of consumer satisfaction, and healthcare resources and organization, in order to fully evaluate whether differences in access to care exist. With growing demand for EOL care and interest in rural-urban differences in access, it is imperative to continue efforts to identify, understand, and possibly resolve geographic differences in EOL care.
References


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36. Cai S, Miller SC, Gozalo P. Nursing home--hospice collaboration and end-of-life hospitalizations among dying nursing home residents. *JAMDA.*


Figures and Tables

Figure 2-1: Aday and Andersen's Framework for the study of access
### Table 2-1: Search Terms

<table>
<thead>
<tr>
<th>Database</th>
<th>Terms</th>
</tr>
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<tbody>
<tr>
<td>Healthstar</td>
<td>Rural Health/ or Rural Population/ or Hospitals, Rural/ or Rural Nursing/ or Rural Health Services/ AND Hospices/</td>
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<tr>
<td>CINAHL</td>
<td>(Rural Health Centers OR Hospitals, Rural OR Rural Population OR Rural Health Services OR Rural Health Nursing OR Rural Areas OR Rural Health OR &quot;rural&quot;) AND (Terminal Care OR Palliative Care OR Hospice and Palliative Nursing OR Terminal Care (Saba CCC))</td>
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<tr>
<td>PubMed</td>
<td>Search (&quot;Rural Health Services&quot;[Mesh] OR &quot;rural population&quot;[All Fields] OR &quot;rural healthcare&quot;[All Fields] OR &quot;rural&quot;[tiab] OR &quot;remote&quot;[All Fields]) AND (&quot;Terminal Care&quot;[Mesh] OR &quot;end of life&quot;[All Fields] OR &quot;palliative care&quot;[mesh])</td>
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### Figure 2-2: Search results

![Diagram showing search results process](image-url)
<table>
<thead>
<tr>
<th>Author &amp; Date</th>
<th>Study Purpose and Design</th>
<th>Setting/sample</th>
<th>Definition of rurality</th>
<th>Findings</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baernholdt et al. (2015)</td>
<td>Compare urban versus rural patients’ and families’ perceptions about quality of hospice care Telephone survey of patients and/or adult family/significant others 4-10 days after admission 1 large hospice program in southeastern United States 743 hospice patients (331 rural, 412 urban) admitted to hospice September 1, 2009 – April 30, 2010 RUCC (Codes 1-3 considered urban, 4-9 rural)</td>
<td>Overall satisfaction with hospice care: Rural patients were more likely to be satisfied (Urban 93.9%, Rural 99.4%) No significant differences in receipt of hospice intervention (provided 89.8-94.9% of the time), satisfaction with pain management, satisfaction with other symptom management Patient characteristics No significant difference in care location, patient race/ethnicity, primary diagnosis, relationship of respondent to patient No significant difference in care location (home vs. inpatient hospice)</td>
<td>Medium</td>
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<tr>
<td>Carlson et al. (2010)</td>
<td>Estimate geographic access to hospice and identify community characteristics associated with being within 30 minutes driving time of a hospice Cross-sectional study based on Medicare and U.S. Census data 3,306 active Medicare certified hospices 64,260 Census tracts in 50 states and Washington D.C. Quartiles by population by square mile (1: less than 250, 2: 250-2,099, 3: 2,100-5,499, 4: ≥5,500)</td>
<td>Travel time to nearest hospice: Overall, 88% of the U.S. population lived in communities within 30 min driving time of a hospice and 98% lived within 60 min. Mean travel time increased as rurality increased (Quartile 4 (most population dense): 6.5 min, Quartile 3: 8.6 min, Quartile 2: 13.9 min, Quartile 1 (least population dense): 33.1 minutes***). Nearest to a hospice established to newer hospice established since 2000: Proportion living nearest to a newer hospice decreased as rurality increases (Quartile 4 36%, Quartile 3: 37%, Quartile 2: 34%, Quartile 1 30%)</td>
<td>High</td>
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<tr>
<td>Madigan et al. (2009)</td>
<td>Examine availability of community-based, Medicare-eligible EOL care providers in eight states County-level analysis of Census population data and geocoded addresses of providers provided by Medicare and hospice membership organization website Vermont, New York, Ohio, Arkansas, Louisiana, Montana, Texas, and California Home Health Agencies, Skilled Nursing Facilities 2005-2006 Modified UIC; Metropolitan (Codes 1-2), Micropolitan (3,4,5,8), Rural (6,9,11,7,10,12) based on service provider location Hospice presence: Among states, 62-92% of rural counties did not have hospice providers (except Vermont had 0% without hospice providers) Home health agency presence: 13.5-76.9% of rural counties did not have a home health agency Skilled nursing facility presence: 0-38.5% of rural counties did not have a skilled nursing facility Proportion of ZIP codes served by hospice decreases with rurality (Urban 97.2%, Rural 90%, Rural nonadjacent 76%)</td>
<td>High</td>
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<td>O’Neill et al. (2009)</td>
<td>To assess whether financial performance differs between existing urban and rural hospices 144 urban hospices, 14 rural hospices in California Office of Management and Budget (urban, rural) Post-tax profit minus grants and donations: Rural hospices gained +$47 per patient-day Revenue, Total cost, post-tax profit: No significant effect for rurality</td>
<td>High</td>
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<tr>
<td>Study</td>
<td>Methodology</td>
<td>Facilities</td>
<td>Patients</td>
<td>Patient referral source</td>
<td>Race/ethnicity</td>
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<td>Virnig et al. (2004)</td>
<td>Observational study based on 2003 California Office of Statewide Health Planning and Development survey</td>
<td>Total patients: Rural hospices had lower mean of total patients than urban hospices (Urban 450, Rural 151) Not-for-profit status: Rural hospices have higher proportion of not-for-profit (Urban 56%, Rural 100%**) Integration status: Rural hospices more likely to be freestanding sole hospice (Urban 35%, Rural 50%), less likely to be a freestanding chain hospice (Urban 24%, Rural 0%), less likely to be Home-health based (Urban 24%, Rural 7%), and more likely to be hospital-based (Urban 16%, Rural 43% )</td>
<td>Not -</td>
<td>Rural hospices have higher proportion of not - for-profit (Urban 56%, Rural 100%**)</td>
<td>Rural hospices have lower proportion of non-White patients (Urban 25.8%, Rural 5.8%***</td>
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<p>| Virnig et al. (2004) | Retrospective study based on Medicare data | Hospice and in-hospital deaths 1.76 million Medicare beneficiaries who died in 1999 (365,700 used hospice) | Urban hospices | Rural hospices more likely to be referred by physician (Urban 37.3%, Rural 55.7%), less likely to be referred from Long-term care facility (Urban 14.8%, Rural 2.5%<strong>) | Rural hospices have lower proportion of non-White patients (Urban 25.8%, Rural 5.8%</strong>* | Rural hospices have lower proportion of noncancer diagnoses (Urban 55.5%, Rural 46.8%) | <strong>UIC (urban, rural-adjacent, rural nonadjacent)</strong> | In hospice death rate (all areas, served and unserved): Deaths in hospice per 100 decrease with rurality (Metropolitan 27.4%, Rural adjacent 21.4%, Rural nonadjacent 18.8%) In-hospice death rate (only areas served by a hospice: Deaths in hospice per 100 decrease with rurality (Metropolitan 27.4%, Rural adjacent 21.7%, Rural nonadjacent 19.6%) | Low |</p>
<table>
<thead>
<tr>
<th>Authors</th>
<th>Describe relationship between location (rural–urban) and type of agency (CHAA–hospice) in providing care for persons with very advanced chronic illnesses.</th>
<th>Seven home health and five hospice agencies (nonprofit Medicare certified) in Western New York State. Individual interviews with 12 administrators, focus groups with 21 key constituents (social workers or nurses) at four agencies.</th>
<th>RUCC (2003), urban and rural. Rural home health and hospice workers described geographic challenges posed by long driving distances and weather limiting access to patients, while those in urban areas mentioned traffic and crime as concerns. Rural administrators described the financial challenges of being smaller (census and staff), affected by the county economy and workforce shortages, being unable to offer specialty care programs such as IV or music therapy.</th>
<th>High</th>
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### Nursing Homes

<p>| Authors | Examine geographic differences in diseases, pain assessments, and treatment orders. | Nursing homes 6,084 NH residents identified as having end-stage disease with six or fewer months to live upon admission. Descriptive study based on MDS. | RUCA codes (urban, large town, small town, and rural/isolated) based on facility. Cancer: proportion of residents with cancer increases with rurality (Urban 50.7%, Large town 55.5%, Small town 55.9%, Rural/isolated 60%). Pain frequency: Proportion of residents with no pain was highest in urban and lowest in large town areas (Urban 33%, Large town 26%, Small town 29%, Rural/isolated 29%). Proportion of residents with daily pain was lowest in urban areas, but proportions are similar across areas (Urban 46%, Large town 52%, Small town 50%, Rural/isolated 48%). Pain intensity: No significant differences in proportions of residents who have mild, moderate, or excruciating pain. Decubitus treatments: Proportion of residents requiring decubitus treatment decreased with rurality (Urban 27%, Large town 26%, Small town 23%, Rural/isolated 20%). | Low |</p>
<table>
<thead>
<tr>
<th>Cai et al. (2017) (^6)</th>
<th>Understand how changes in Medicaid nursing home (NH) reimbursement policy and rates affect a NH's approach to end-of-life care (ie, its use of hospice)</th>
<th>Freestanding nursing homes in contiguous 48 states 3,111 facilities (9,161 urban, 2,464 rural adjacent, 1,486 rural nonadjacent), 74,090 facility year observations</th>
<th>RUCC for Metro and Nonmetro Counties (urban, midsize, or rural) based on facility location</th>
<th>Wound care treatments: Proportion of residents requiring wound care decreased with rurality (Urban 12%, Large town 12%, Small town 10%, Rural/isolated 8%)</th>
</tr>
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<tr>
<td>Crouch et al. (2018) (^{34})</td>
<td>Examine rural-urban differences in utilization and expenditures in the last 6 months of life for patients with breast, lung, or colorectal cancer.</td>
<td>5% Medicare Research sample breast, lung, or colorectal cancer during last 6 months before death (6,214) 2013 Inpatient, outpatient, home health agency, hospice, SNF</td>
<td>Modified UIC: urban (metropolitan only) and rural (micropolitan, small rural adjacent, and remote rural combined)</td>
<td>There exists a negative relationship between the number of hospice providers and EOL hospitalizations among high volume SNFs, but this effect is not present in rural NHs.</td>
</tr>
<tr>
<td>Crouch et al. (2017) (^{33})</td>
<td>Examine whether rural and urban Medicare beneficiaries differed in rates of inpatient hospital admissions in the last six months of life.</td>
<td>Inpatient hospitalizations 35,831 Medicare decedents 2013 (non-HMO) who died between July 2013-December 2013</td>
<td>Modified UIC: urban (metropolitan only) and rural (micropolitan, small rural adjacent, and remote rural combined)</td>
<td>Total Medicare expenditures: Median expenditures during last 6 months of life were lower among rural residents for all cancer types: overall ($22,549 vs. urban $26,504), breast (Rural $21,839 vs. $25,698), (lung rural $22,814 vs. Urban $27,635), colorectal (Rural $24,156 vs. urban $28,035). Inpatient expenditures: Rural patients less likely to have incurred inpatient costs for lung (rural 76.1% vs. Urban 80.4%), colorectal (rural 76.4% vs. 82.5%), but not for breast cancer decedents. Outpatient expenditures: Rural residents more likely to have outpatient expenditures in overall sample (rural 92.5% vs. urban 85.9%), and among those with colorectal cancer (rural 91.8% vs. urban 83.6%). Rural residents also more likely to have higher median costs (rural $2,915 vs. urban $2,155). Hospice utilization: no difference overall. Rural beneficiaries with lung cancer were more likely to use hospice (68.1%, vs. urban 64.3%), but rural beneficiaries with colorectal cancers less likely to use hospice (rural 56.8%, vs. 61.9%) Overall costs (adjusted): Rural beneficiaries with lung cancer cost 8% less than urban beneficiaries during the last 6 months of life. Beneficiaries with colorectal cancer, rural beneficiaries cost 10% less than urban beneficiaries.</td>
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<p>| | | | | | Medium |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Objective</th>
<th>Methods</th>
<th>Findings</th>
<th>Qualification</th>
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<tbody>
<tr>
<td>Crouch et al. (2017)&lt;sup&gt;33&lt;/sup&gt;</td>
<td>Examine whether service utilization in the last six months of life differs across gender and rurality.</td>
<td>39,058 Medicare beneficiaries who died between July 2013-December 2013 Inpatient, outpatient, home health agency, hospice, SNF, ambulance services</td>
<td>Utilization: No urban-rural differences found in utilization of inpatient, physician, or skilled nursing facility services during the last six months of life. [comparison of hospice not offered, adjustment unclear] Rural beneficiaries were more likely to use outpatient services (rural 86.6% vs. 76.1%). [adjustment unclear] Rural female beneficiaries were less likely to use home health (rural 26.3% vs. urban 32.2%), hospice (rural 44.9% vs. urban 50.1%), and ambulance services (rural 59.3% vs. urban 65.4%). [adjustment unclear] After adjustment for demographic and supply-side variables, rural residents more likely to use outpatient services (1.77 OR), and physician services (1.09). Rural residents less likely to use home health services (0.87), hospice (0.82), and ambulance services (0.83).</td>
<td>Medium</td>
</tr>
<tr>
<td>Hodgson et al. (2006)&lt;sup&gt;22&lt;/sup&gt;</td>
<td>Describe existing palliative care services within nursing homes in Pennsylvania, and to classify these services by level of care delivery.</td>
<td>Nursing homes in Pennsylvania 91 administrators</td>
<td>Pain management policies: Urban facilities are more likely than rural facilities to have written American Geriatric Society standard policies for pain management (Odds Ratio 3.20, 95% CI 1.11-10.80) Administrators of rural facilities reported a need for training in pain management, where those of urban facilities reported the need for bereavement training.</td>
<td>Medium</td>
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<tr>
<td>Gessert &amp; Calkins (2001)&lt;sup&gt;38&lt;/sup&gt;</td>
<td>Examine the use of feeding tubes among Kansas nursing home residents</td>
<td>Nursing homes in Kansas 4,847 NH residents with very severe, persistent and irreversible cognitive impairment who died between January 1, 1994 – June 30, 1998. R-UCC for Metro and Nonmetro Counties (urban, midsize, or rural) based on facility location</td>
<td>Feeding tube use: Overall rate decreases with rurality (Urban 19.3%, Midsize county 8.0%, Rural 6.4%<strong>). Patient attributes: Age (Percent 86 or older): Proportion of adults older than 86 years increases with rurality (Urban 52.2%, Midsize county 58.8%, Rural 60.8%</strong>). Gender (percent female): no significant difference. Race: Percent of nonwhite patients decreases with rurality (Urban 11.8%, Midsize county 3.4%, Rural 2.0%*<strong>). Living will: difference not significant. Medicaid-eligible: Proportion of Medicaid-eligible residents decreases with rurality (Urban 59.6%, Midsize county 57.5%, Rural 52.7%</strong>). Chewing problem: Proportion of residents with chewing problem increases with rurality (Urban 60.6%, Midsize county 68.3%, Rural 75.0%<strong>). Swallowing problem: Rural and midsize counties have lower proportion compared to urban counties (Urban 47.6%, Midsize county 40.8%, Rural 40.0%</strong>).</td>
<td>High</td>
</tr>
<tr>
<td>Source</td>
<td>Description</td>
<td>Study Details</td>
<td>Findings</td>
<td></td>
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</tbody>
</table>
| Gessert et al. (2006)
37 | Identify factors associated with the use of selected medical services near the end of life in cognitively impaired residents of rural and urban nursing homes. | Retrospective cohort study based on Medicare and MDS data; Nursing homes in Minnesota and Texas; 3,170 residents aged 65 and older with severe cognitive impairment who died during 2000-1 (Residents with hospice or HMO benefits excluded); RUCC for Metro and Nonmetro Counties, (urban or rural, intermediate midsize counties excluded) based on facility location. | Tube feeding: Rural residents have lower proportion using tube feeding in last 90 days of life (Odds ratio 1.67 (1.41-1.98)**) Hospitalization: Rural residents had higher risk of any hospitalization in the last 90 days of life (Odds ratio, rural reference: 0.78 (95% CI 0.67-0.91)) Hospital days: Rural residents less likely to be hospitalized for more than 10 days in last 90 days of life (Odds ratio, rural reference: 1.41 (95% CI 1.11-1.80)) Facility attributes: Facility size: Proportion of residents in large facilities (≥ 100 beds) was lower in rural areas (Urban 78.9%, Rural 46.0%**) For-profit status: Proportion of residents in for-profit facilities was lower in rural areas (Urban 74.8%, Rural 62.5%**) Patient attributes: Age: Mean age of residents was slightly higher in rural areas (Urban 86.7 years, Rural 87.8 years) Race: Proportion of white residents was higher in rural areas (Urban 79.1%, Rural 92.5%) Resuscitation: Proportion of residents with DNR was higher in rural areas (Urban 66.3%, Rural 78.0%**) Stroke: Proportion of residents with stroke diagnosis was lower in rural areas (Urban 32.7%, Rural 29.3%) Living will: Proportion of residents with a living will was higher in rural areas (Rural 22.9%, Urban 19.0%) Medicaid per diem: Higher proportion of rural residents financed by Medicaid (Urban 59.1%, Rural 66.7%,**) No significant difference in proportion female, prevalence of Alzheimer's disease, other dementia, any dementia, or do not hospitalize order. |
| Gessert et al. (2006)
41 | Describe and understand rural-urban differences in attitudes toward death and in end-of-life decision making. | Nursing homes in Minnesota; 38 family members of nursing home residents; RUCC for Metro and Nonmetro Counties (urban or rural, intermediate midsize counties excluded) | Both groups saw themselves as advocates of their loved one, although rural caregivers viewed themselves as protecting patients from aggressive care and urban caregivers described adversarial relationships with NH staff. |
Focus groups with severe cognitive impairments in 11 nursing homes based on facility location

Rural caregivers tended to express acceptance of death as a natural part of death, placing few conditions on acceptance. Urban caregivers expressed a diversity of attitudes, some matching those of rural caregivers, others conditioning acceptance of death on the circumstances. Urban caregivers "uniformly" described nutrition and hydration as essential.

Temkin-Greener et al. (2012) Examine urban–rural differences in end-of-life quality of care provided to nursing home residents

Retrospective, observations

National sample of 915,688 Medicare long-term NH residents who died between January 1, 2005 – December 31, 2007

RUCA Codes (urban, large town, small town, isolated rural) based on facility location

Hospice use: Proportion of decedents who used hospice within 100 days of life decreased as facilities are more rural: 37.15% in urban areas, 24.32% in large towns, 21.71% in small town facilities, and 19.08% in isolated rural facilities. After risk adjustment, differences persisted (regression coefficients: Urban reference, Large town rural -0.108, Small town rural -0.132, Isolated rural -0.143**).

In-hospital deaths: Unadjusted models show proportion of in-hospital deaths were lowest in urban areas and highest in small towns (Urban 16.81%, Large town rural 18.23%, Small town rural 19.51%, Isolated rural 17.41%**). After risk adjustment, differences persisted (Coefficients: Urban reference, Large town rural 0.013, Small town rural 0.026, Isolated rural 0.023**).

Severe pain: Unadjusted models show proportion of residents with severe pain generally increased with rurality (Urban 13.14%, Large town rural 15.01%, Small town rural 14.68%, Isolated rural 14.44%***). After adjustment, differences were not significant.

Facility-level attributes

For-profit ownership: Proportion of NHs with for-profit ownership decreased as rurality increased (Urban 72.54%, Large town rural 70.85%, Small town rural 67.43%, Isolated rural 54.17%**).

Chain membership: Proportion of NHs belonging to a chain significantly associated with rurality, although not a linear relationship.

Hospice providers in the county: Mean number decreased as rurality increased (Urban 9.60, Large town rural 1.40, Small town rural 0.79, Isolated rural 0.55**).

Distance to a hospice (miles): Mean distance to a hospice increased as rurality increased (Urban 4.41 mi, Large town rural 6.13, Small town rural 13.98, Isolated rural 18.92**).

Distance to a hospital (miles): Mean distance to a hospital generally increased as rurality increased (Urban 2.63 mi, Large town rural 1.64, Small town rural 2.92, Isolated rural 8.36***).

Admission case mix: Decreased slightly as rurality increased (Urban 1.06, Large town rural 1.06, Small town rural 1.04, Isolated rural 1.02***).
<table>
<thead>
<tr>
<th>Study</th>
<th>Objective</th>
<th>Data Collection</th>
<th>Key Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miller et al. (2011)</td>
<td>Understand how changes in Medicaid nursing home (NH) reimbursement policy and rates affect a NH's approach to end-of-life care (ie, its use of hospice)</td>
<td>Freestanding nursing homes in contiguous 48 states, RUCC for Metro and Nonmetro Counties (urban, midsize, or rural) based on facility location</td>
<td>A $10 increase in the Medicaid reimbursement rate for NH resulted in a 0.41% increase in hospice use among urban NH decedents and a 0.37% decrease in hospice use among NHs in rural nonadjacent to urban areas. Effect of increase on rural adjacent to urban areas not significant. Annual increases in hospice use among NH residents over study period were smaller as degree of rurality increased (Urban 3.03%, Rural adjacent to urban 2.75%, Rural not adjacent to urban 2.30%) Hospice use: Mean rates of hospice use among decedents over the study period decreased with rurality (Urban 21.6%, rural adjacent 15.1%, rural nonadjacent 12.6%)</td>
</tr>
<tr>
<td>Nayar et al. (2014)</td>
<td>Examine geographic and race/ethnic disparities in access to end of life care among elderly patients with lung cancer.</td>
<td>Inpatient, outpatient, home health agency, hospice, Modified UIC; Metropolitan (Codes 1-2), Micropolitan (3,4,5,8), Rural (6,9,11), Remote Rural (7,10,12) based on beneficiary residence</td>
<td>Hospice use: The odds of ever using hospice decreased with rurality (Odds ratios, Metropolitan reference, Micropolitan 0.86***, Rural 0.81***, Remote rural 0.71***) Hospice admission in last 3 days before death: Residents in micropolitan areas were less likely to enroll in hospice in last 3 days compared to metropolitan residents (Odds ratio: Metropolitan reference, Micropolitan 0.87**, Rural and Remote rural were non-significant) Emergency room visits in last 90 days: Number of ER visits generally increased with rurality (Model coefficients, Metropolitan Reference: Micropolitan 0.06**, Rural 0.08***, Remote rural 0.07***) Inpatient admissions in last 90 days: Number of inpatient admissions was lower in micropolitan areas compared to metropolitan areas (Model coefficient, Metropolitan reference: Micropolitan -0.02*, Remote rural and Rural non-significant)</td>
</tr>
</tbody>
</table>
ICU days in the last 90 days: Number of days in ICU decreased with rurality (Model coefficients, Metropolitan reference: Micropolitan -0.28***, Rural -0.38***, Remote rural -0.41***)

Wang et al. (2016)  
Examine the rural-urban differences in Medicare expenditures on end-of-life care for elderly cancer patients. 
Retrospective cohort study based on Medicare data

<table>
<thead>
<tr>
<th>Inpatient, outpatient, physician services, hospice, home health, skilled nursing facilities (SNF)</th>
<th>Modified UIC; urban (metropolitan and micropolitan combined), rural (rural and remote rural combined)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All 175,181 Medicare beneficiaries with lung, colorectal, female breast, or prostate cancer diagnosis who died in 2008</td>
<td>Total Medicare expenditures: Median expenditures were lower among rural residents for all cancer types: breast (Rural $32,816 vs. Urban $42,480), prostate (Rural $34,010 vs. Urban $40,693), colorectal (Rural $42,548 vs. Urban $45,879) and lung cancer (Rural $36,859 vs. Urban $42,538)</td>
</tr>
</tbody>
</table>

Inpatient expenditures: Median expenditures lower among rural residents for all cancer types: breast (Rural $13,310 vs. Urban $16,574), Prostate (Rural $14,133 vs. Urban $18,716), colorectal (Rural $20,746 vs. Urban $24,502), and lung (Rural $16,595 vs. Urban $18,647) |

Outpatient expenditures: Proportion of residents with nonzero expenditures greater in rural areas for all cancer types: breast (Rural 98.1% vs. Urban 92.6%), prostate (Rural 97.3% vs. Urban 92.8%), colorectal (Rural 96.8% vs. Urban 90.0%), and lung cancer (Rural 96.9% vs. Urban 91.9%) |

Physician expenditures: Median expenditures were lower among rural residents for all cancer types: breast (Rural $5,404 vs. Urban $7,830), prostate (Rural $4,826 vs. Urban $7,452), colorectal (Rural $5,824 vs. Urban $8,068), and Lung (Rural $6,120 vs. Urban $8,183) |

Hospice expenditures: Proportion of residents with nonzero expenditures is smaller in rural areas for all cancer types breast (Urban 56.3% vs. Rural 49.4%), Prostate (Urban 48.0% vs. Rural 42.8%), colorectal (Urban 55.4% vs. Rural 50.1%), and Lung (Urban 59.5% vs. Rural 53.1%) |

Home health expenditures: Proportion of residents with nonzero expenditures is smaller in rural areas for all cancer types breast (Urban 41.7 % vs. Rural 35.2 %), Prostate (Urban 41.6 % vs. Rural 36.0 %), colorectal (Urban 41.6% vs. Rural 36.0 %), and Lung (Urban 40.6 % vs. Rural 34.9%). Additionally, median expenditures were lower among rural residents for all cancer types: breast (Urban $3,459 vs. Rural $2,856), prostate (Urban $3,635 vs. Rural $3,106), colorectal (Urban $3,355 vs. Rural $2,680), and Lung (Urban $2,772 vs. Rural $2,235). |

Durable Medical Equipment: Proportion of residents with nonzero expenditures greater in rural areas for all cancer types: Breast (Rural 63.6% versus Urban 60.4%), prostate (Rural 57.9% vs. Urban 55.4%), colorectal (Rural 64.6% vs. Urban 61.5%), and Lung (Rural 70.4% vs. Urban 65.7%) |

Other significant differences in median and nonzero expenditures were found for certain cancer types.
<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Population</th>
<th>Outcomes</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>Watanabe-Galloway et al. (2014)</td>
<td>Compare quality of end-of-life care among colorectal cancer patients</td>
<td>Inpatient, outpatient, home health agency, hospice</td>
<td>ICU days in the last 90 days: Number of days in ICU decreased with rurality (Rate ratios, Metropolitan reference: Micropolitan 0.73***, Rural 0.65***). Hospice use: The odds of ever using hospice decreased with rurality (Odds ratios, Metropolitan reference: Micropolitan 0.83***, Rural 0.78***). Inpatient admissions in last 90 days: Number of inpatient admissions was lower in micropolitan areas compared to metropolitan areas (Rate ratio, Metropolitan reference: Micropolitan 0.97*, Rural not significant). Emergency room visits in last 90 days: No significant difference in rate ratio found. Hospice admission in last 3 days before death: No significant difference found in fully adjusted model.</td>
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UIC = Urban influence codes, RUCA = Rural-Urban Commuting Area m RUCC = Rural-Urban Continuum Codes

STROBE Out of 31 items, High quality studies scored 23 or above, Medium quality studies scores 20-22, Low quality studies scored 19 or less.

* P value significant at 0.05 unless otherwise noted

** P value < .001, *** P value < .0001
<table>
<thead>
<tr>
<th>Description</th>
<th>Synthesis of major findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health policy</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Programs in financing, education, manpower, and health care reorganization and their effect in altering access to medical care | - Rural Medicare decedents with breast, prostate, lung, or colorectal cancer have lower overall expenditures in the last year of life compared to their urban counterparts.\(^2^9\)  
- Rural hospices more profitable once charitable donations excluded from revenue.\(^2^1\) |

| **Characteristics of the Health Delivery System** | |
| Resources - labor and capital devoted to health care (e.g. health personnel, structures in which health care and education are provided). Includes both volume and distribution of medical resources in an area. | Resources -  
- Most of the U.S. population (98% in 2008) lived within a 1 hour drive of a hospice, and the majority of deaths (99%) in 1999 died in an area not served by hospice.\(^2^4\)  
- Rurality was associated with increased likelihood of living in an area not served by hospice\(^2^6\), and with longer travel time to a hospice.\(^2^4,3^0\) |
| Organization - what the system does with its resources, how resources are coordinated. Entry is the process of gaining entrance to the medical care system (e.g. travel or wait time). Structure is the characteristics that determine what happens to the patient after entry (e.g. how she is treated). | Organization -  
- Urban hospices\(^2^3\) and nursing homes\(^3^0,3^7\) are more likely to be for-profit entities. |

| **Characteristics of the population at risk** | |
| Predisposing characteristics – those that describe the propensity of individuals to use services which exist prior to the onset of illness episodes (i.e. age, sex, race, religions, and values concerning health and illness). | Predisposing -  
- Rural populations tend to have higher proportions of White persons, and higher mean ages  
- Rural caregivers tended to express acceptance of death as a natural part of life, placing few conditions on acceptance. Urban caregivers "uniformly" described nutrition and hydration as essential.\(^4^1\) |
| Enabling characteristics – the "means" individuals and families have available to them for the use of services (e.g. income, insurance coverage) and attributes of the community (e.g. rural-urban character, region) | Need -  
- Small significant differences exist in the presence of pain among NH residents, suggesting urban residents are least likely to experience any pain or have severe pain.\(^3^0,3^1\)  
- In one study among NH residents, prevalences of cancer and CHF increase with rurality. No significant differences were found with other diagnoses.\(^3^1\) |
<p>| Need – describe illness level, the most immediate cause of health service use. May be perceived by the individual or evaluated by the delivery system. | |</p>
<table>
<thead>
<tr>
<th>Utilization of Health services</th>
<th>Hospice use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level and pattern of the population's actual utilization of the system</strong></td>
<td><strong>Rurality was negatively associated with hospice use near EOL among Medicare decedents, lung cancer patients, colorectal cancer, breast/prostate, and in NH residents.</strong></td>
</tr>
<tr>
<td>Type - kind of service received and who provided it (e.g. hospital, physician, dentist, pharmacist, etc.)</td>
<td><strong>The likelihood of dying in hospice decreased with rurality among all Medicare decedents, those with lung cancer, and NH residents.</strong></td>
</tr>
<tr>
<td>Site - place where the care was received (e.g. physician's office, hospital outpatient department, emergency room, etc.)</td>
<td><strong>Over time, rates of hospice use among nursing home residents are growing, but more slowly in rural areas.</strong></td>
</tr>
<tr>
<td>Purpose of a visit - whether it was for preventive, illness-related, or custodial care</td>
<td><strong>Hospice use was lower among rural residents among Medicare decedents, lung cancer patients, colorectal cancer, breast/prostate, and in NH residents.</strong></td>
</tr>
<tr>
<td>Time interval for a visit - contact, volume, or continuity measures</td>
<td></td>
</tr>
<tr>
<td>Contact - whether or not a person entered the medical care system in a given period of time</td>
<td><strong>In cognitively impaired NH residents, rurality associated with higher odds of hospitalization, but lower odds of more than 10 days hospitalization within last 90 days.</strong></td>
</tr>
<tr>
<td>Volume - number of contacts and revisits in a given time interval</td>
<td><strong>Median inpatient expenditures were significantly lower for rural residents with breast, prostate, lung, or colorectal cancer.</strong></td>
</tr>
<tr>
<td>Continuity - degree of linkage and coordination of medical services associated with a particular illness experience or episode</td>
<td><strong>In decedents with lung cancer, the number of hospitalizations decreases with rurality.</strong></td>
</tr>
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<td></td>
<td><strong>Among all Medicare decedents, there were no significant differences in in-hospital deaths with respect to rurality. However, there were small but significant differences in in-hospital death among NH residents, with lowest rates lowest in urban facilities.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Likelihood of ICU use overall was associated with rurality in cognitively impaired NH residents.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Rural residents with breast, prostate, lung, or colorectal cancer are less likely to have outpatient or home health expenditures compared to urban residents.</strong></td>
</tr>
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</table>

- Proportions of NH residents near EOL with wound care or decubitus treatment needs decreased with rurality. Differences were insignificant, small, or non-linear for other treatment and medication need examined.
- Rates of feeding tube among cognitively impaired NH residents decreases with rurality.
ones. Rural residents with these cancers also have lower median physician expenditures than urban ones.  

<table>
<thead>
<tr>
<th>Consumer satisfaction</th>
<th></th>
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<tbody>
<tr>
<td>Attitudes toward the medical care system of those who have experienced contact with it. Convenience, Costs, Coordination, Courtesy, Information, Quality</td>
<td>• The few studies that examined consumer satisfaction were limited in site, but suggested that rural families of cognitively impaired NH residents and hospice patients may be slightly more satisfied with care.</td>
</tr>
</tbody>
</table>
CHAPTER 3:

RURALITY

Does Quality of End-of-Life Care Differ by Urban-Rural Location? A Comparison of
Processes and Family Evaluations of Care in the VA

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Abstract

Purpose: Several studies have identified differences in end-of-life (EOL) care between urban and rural areas, yet little is known about potential differences in care processes or family evaluations of care. The purpose of this study is to examine the relationship between rurality of residence and quality of EOL care within the Veterans Affairs healthcare system.

Methods: This study was a retrospective, cross-sectional analysis of 126,475 Veterans who died from October 2009 through September 2016 in inpatient settings across 151 facilities. Using unadjusted and adjusted logistic regression, we compared quality of EOL care between urban and rural Veterans using family evaluations of care and four quality of care indicators for receipt of (1) palliative care consult (2) a chaplain visit (3) death in an inpatient hospice unit, and (4) bereavement support.

Findings: Veterans from rural areas had lower odds of dying in an inpatient hospice unit compared to Veterans from urban areas, before and after adjustment (large rural OR 0.73, 95% CI: 0.70-0.77; \( P < .001 \), small rural OR 0.81, 95% CI: 0.77-0.86; \( P < .001 \), isolated rural OR 0.87, 95% CI: 0.81-0.93; \( P < .001 \)). Differences in comparisons of other quality of care indicators were small and of mixed significance. No significant differences were found in family ratings of care in fully adjusted models.

Conclusion: Receipt of some EOL quality indicators differed with urban-rural residence for some comparisons. However, family ratings of care did not. Our findings call for further investigation into unmeasured individual characteristics and facility processes related to rurality.
Introduction

High quality end-of-life (EOL) care includes managing pain and other symptoms, attending to the emotional, spiritual, and social needs of both patients and families, and referring to specialist palliative or hospice care as needed.¹ Like other healthcare services,²,³ care received at EOL may be influenced by a person’s geographic location. Several studies have shown that important differences exist in service utilization at EOL between urban and rural residents. Compared to urban decedents, rural decedents use hospice at lower rates.⁴–⁸ Research in nursing home residents and individuals with certain cancers has shown that rural decedents experienced higher rates of in-hospital death,⁹ more ICU days, and emergency room visits near EOL⁵ compared to their urban counterparts. Rural residents also differ by other general health measures, such as lower life expectancy, higher prevalence of health-related risky behaviors, and higher proportions of uninsured, which could have an impact on EOL care.¹⁰

Despite a growing interest in rural EOL care research, the body of literature is sparse and many gaps remain. Of the few comparative studies in the U.S., most focused on narrowly-defined study populations,⁵–⁷ specific clinical settings,⁸ or limited geographic areas.⁹,¹¹–¹⁵ Broader studies of rural/urban differences relied mainly on Medicare utilization and Minimum Data Set assessments,⁴,¹⁶ and as a result, other important EOL care processes besides hospice use remain understudied. In one study of EOL care in nursing homes,⁸ facility-specific factors, such as size and staffing, have been shown to be associated with both quality and rurality, but are understudied in other clinical settings. Another notable shortcoming is the lack of patient and family reported outcomes. Such feedback is essential when evaluating EOL care, where eliciting
individual and family goals of care, honoring their preferences, and managing any physical, spiritual, and emotional distress, are crucial. As the recipients of care, patients and families are in the best position to evaluate these interventions. Furthermore, urban and rural residents may differ in their preferences and expectations of healthcare professionals. Therefore, asking families whether they are satisfied with care could provide a more complete measure of quality than examining receipt of care alone.

As the largest nationally integrated healthcare system in the U.S., the VA is an ideal setting to study potential urban-rural differences in the processes and outcomes of EOL care due to its clinically and geographically diverse patient population and its capability to uniformly evaluate care. Increasing access to care for rural Veterans and improving the standard of EOL care for all Veterans are both explicit priorities of the Veterans Health Administration (VA). Prior research has shown that rural Veterans have a higher prevalence of physical comorbidities, lower health-related quality of life, and that older rural Veterans are more dependent on the VA for healthcare. With three million older Veterans living in rural areas, identifying possible rural-urban disparities in the quality of EOL care in the VA is urgently needed. Since 2009, the Veteran Experience Center (formerly known as the Performance Reporting and Outcomes Measurement to Improve the Standard of care at End-of-life [PROMISE] Center) has overseen the collection and reporting of EOL care processes and family-reported outcomes across all inpatient settings in the VA.

To date, little is known about urban-rural differences in care processes or family evaluations of EOL care. Therefore, the purpose of this study is to examine the relationship between rurality and the quality of EOL care in the VA. We operationalized
high quality EOL care using bereaved family members’ overall ratings of care in the Veteran’s last month of life and four quality of care indicators.

Methods

Study Design and Data Sources

This study was a retrospective, cross-sectional analysis of data collected by the Veteran Experience Center. The VA uses the Bereaved Family Survey (BFS) to solicit post-death evaluations of EOL care from the next of kin (NOK) of nearly every Veteran who dies in a VA inpatient facility nationwide.23 Adapted from the Family Assessment of Treatment at EOL-Short Form (FATE-S),23 the BFS is a valid and reliable measure endorsed by the National Quality Forum.24 Originally administered as a telephone survey, the BFS transitioned to a predominantly mail survey in October 2012, although NOK can also respond by phone or online. The survey has been validated for both phone and mail methods of administration,25 and is offered in English and Spanish. BFS response rates during the study period averaged 53.6%. Additional data were derived primarily from the VA’s Corporate Data Warehouse (CDW), a national, integrated repository of clinical and administrative data.

Sample

Our sample included Veterans who died from October 1, 2009 through September 30, 2016 in inpatient settings across 151 VA facilities (see Figure 3-1). Inpatient settings include acute care hospitals, nursing home units called community living centers (CLCs), and specialized hospice/palliative units that are generally located in CLCs.
Administrative data were used to identify decedents using a process that captures 99% of inpatient deaths within the VA. Exclusion criteria were Veterans who died in non-VA facilities, had missing data for age or residence, or resided in Puerto Rico or other island territories. Additionally, Veterans who died less than 24 hours after admission were excluded, since a short stay limits staff opportunities to initiate care processes and interact with family.

We also analyzed a subsample of Veterans whose NOK provided responses on the BFS (subsequently referred to as the BFS subsample). VEC attempted to survey the NOK of each Veteran in the total sample, when contact information was available. If NOK stated they were unable to evaluate the care the Veteran received, they were asked to refer to someone who could, who was then asked to complete the survey. Veterans were excluded from the BFS subsample if the NOK was unable/unwilling to participate or because they did not speak English or Spanish.

**Dependent Variables**

**EOL quality of care indicators.** We examined four EOL care processes, chosen for their association with better outcomes in previous studies, or for their alignment with EOL quality guidelines. The four quality of care indicators were (1) receipt of a palliative care consult during the last 90 days of life, (2) a chaplain visit within the last month of life, (3) death in an inpatient hospice unit, and (4) receipt of bereavement support from VA staff within one month after the Veteran’s death. Quality of care indicators were derived by algorithmic searches of clinical notes and admission information, and were treated as binary outcomes.
**Bereaved Family Survey Performance Measure (BFS-PM).** Our primary study outcome was the BFS performance measure (BFS-PM), derived from the respondent’s overall rating of care during the Veteran’s last month of life. Consistent with previous analyses, we treated responses as a dichotomous outcome of an “excellent” rating versus all lesser ratings — “very good,” “good,” “fair,” or “poor.”

**Independent Variable: Rurality of Veteran’s Residence**

We categorized each Veteran as belonging to an urban area, large rural town, small rural town, or isolated small rural town, based on his or her residential ZIP code. Using a publicly available crosswalk file, we linked Veteran ZIP codes to one of 33 Rural-Urban Commuting Areas (RUCA) codes, which classify areas based on population density, urbanization, and daily commuting. We further aggregated Veterans into one of 4 tiers using RUCA Categorization A, which accounts for commuting patterns and was recommended by recent VA research. This categorization has the additional benefit of approximating the Office of Management and Budget urban-rural partition, which is used by many other federal programs. Veterans who resided in ZIP codes without a RUCA classification (2.7% of total sample) were assigned to the urban-rural category of a numerically adjacent ZIP code.

**Covariates**

To account for possible confounding and competing explanations, we considered several Veteran- and facility-level covariates that were associated with outcomes in previous VEC analyses, including sex, relationship of the BFS respondent (spouse, child, sibling, other family, other), and race/ethnicity (non-Hispanic White, non-
Hispanic Black, Hispanic, and other). Veteran race/ethnicity was based on self-report as recorded in CDW, and supplemented by Medicare data for missing cases. Since clinical complexity may influence family expectations and evaluations of care, we also accounted for the Veteran’s age, prior hospitalization, prior ICU stay, and Elixhauser comorbidity score.\textsuperscript{35,36} The Elixhauser comorbidity score counts International Classification of Disease (ICD) diagnosis codes belonging to 31 disease groups. Utilization data and ICD diagnosis codes were based on inpatient and outpatient VA encounters during the year prior to the Veteran’s last admission. Finally, we considered the median household income of the Veteran’s ZIP code, based on 2013 American Community Survey estimates.\textsuperscript{37} We imputed missing data for race/ethnicity (8\% of total sample) and Elixhauser comorbidity scores (5.7\%) using hot-deck imputation.\textsuperscript{38} We chose this method because it imputes only plausible values and requires fewer distributional assumptions compared to other methods.

Facility characteristics included geographic region, facility complexity level, and availability of an inpatient hospice unit to account for local variation in capacity, demand, and processes.\textsuperscript{39} Facilities were categorized into one of four census regions (Northeast, Midwest, South, and West).\textsuperscript{40} Facility complexity level is a VA-designation that accounts for factors such as patient volume and risk, availability of clinical services, and intensity of research, training, and teaching activities. We simplified complexity level as high (ie, high volume, medium and high risk patients, among other factors) or low (ie, medium volume, low risk patients), based on each facility’s designation at the time of the Veteran’s death.
Analysis

We described the sample using means and standard deviations for continuous variables and proportions and frequencies for categorical variables. We compared the characteristics of urban, large-, small-, and isolated-rural subgroups of Veterans using \( \chi^2 \) tests for categorical variables and analysis of variance for continuous variables.

For each of the four quality of care indicators, we used a series of logit models on the total sample, comparing the three rural categories to the urban category as the reference group. First, we conducted unadjusted analyses using the Veteran’s urban-rural categorization as the sole predictor. We then constructed additional sets of models, each adjusted for facility and Veteran covariates separately, and lastly a fully-adjusted model using both Veteran and facility covariates. For the BFS-PM, we fit an analogous series of models on the BFS subsample, addressing non-response bias using inverse probability weights based on Veterans’ demographic and clinical characteristics.\(^{41}\) We also added a model that included the four quality of care indicators as binary covariates, in addition to the Veteran and facility covariates.

In all models for all outcomes, we accounted for clustering by the facility of death by using sandwich estimators\(^{42,43}\) and calculated confidence intervals based on a statistical significance level of \( \alpha = 0.05 \). We transformed results from log odds to odds ratios for ease of interpretation. We conducted all analyses using R language and environment for statistical computing.\(^{44}\)
Results

Characteristics of the Sample

Descriptive statistics of the total sample (N = 126,475) and the BFS subsample (N = 66,958) are shown in Table 3-1. Our total sample was majority male (97.7%) and non-Hispanic White (71.7%). On average, Veterans in the total sample were 74.2 years old and had 6.2 comorbid conditions. Most Veterans received care at high complexity facilities (77.6%) or facilities with a specialized hospice unit (84.7%). A plurality of Veterans received care in the South (43.9%). Veterans in the BFS subsample were comparable to those in the total sample on most covariates. One exception was that Veterans in the BFS subsample were more likely to have a spouse as the listed NOK (36.8% in total sample versus 43.8% in BFS subsample).

In the total sample, the majority of Veterans came from urban areas (83.4%) followed by large rural towns (6.7%), small rural towns (5.9%), and isolated rural towns (4.0%). Veterans by urban-rural category varied significantly on many covariates. The proportion of non-Hispanic Whites increased with the degree of rurality in the total sample (urban 69.3%, large rural 82.3%, small rural 83.2%, and isolated rural 86.1%; \( P < .001 \)). Urban Veterans were more likely to be treated at high complexity facilities (urban 81.6%, large rural 55.8%, small rural 60.2%, and isolated rural 56.4%; \( P < .001 \)) and at facilities with a specialized inpatient hospice unit (urban 85.5%, large rural 82.9%, small rural 81.8%, and isolated rural 76.1%; \( P < .001 \)). Compared to urban areas, rural areas had a higher proportion of Veterans treated in Midwestern facilities (urban 19.7%, large rural 31.5%, small rural 36.9%, and isolated rural 39.1%; \( P < .001 \)).
Urban-rural comparison for process quality of care indicators

Unadjusted percentages and frequencies of Veterans who received each EOL quality of care indicator by urban-rural categories are shown in Table 3-2. Urban-rural differences for each indicator were generally small in magnitude and non-significant, with the exception of death in an inpatient hospice unit. A majority of Veterans received a palliative care consult (66.5% of total sample), chaplain visit (80.7%), or bereavement support (62.8%). Among the total sample, 36.0% of Veterans died in an inpatient hospice unit, and differences by urban-rural groups were observed. Proportions of Veterans who died in a hospice unit were highest among those from urban areas (36.9%), followed by small rural (32.3%), isolated rural (31.0%), and large rural towns (30.5%; \( P < .001 \)).

Results from the series of logit models predicting quality of care indicators are shown in Table 3-3. In unadjusted models with urban-rural category as the sole predictor variable, Veterans from all three rural subgroups were substantially less likely than urban Veterans to die in an inpatient hospice unit. Veterans from large rural towns were the least likely of all to receive such care (OR 0.75, 95% CI: 0.72-0.79; \( P < .001 \)), followed by isolated rural (OR 0.77, 95% CI: 0.72-0.82; \( P < .001 \)), and small rural towns (OR 0.82, 95% CI: 0.78-0.86; \( P < .001 \)). For the remaining quality of care indicators, most unadjusted comparisons between urban and rural Veterans were not significantly different, and the two significant differences were small in magnitude. Compared to the reference group, Veterans from small rural towns appeared less likely to receive a palliative care consult (OR 0.95, 95% CI: 0.90-1.0; \( P = .03 \)), and Veterans from isolated rural towns were slightly less likely to have a chaplain contact (OR 0.93, 95% CI: 0.86-0.99; \( P = .03 \)).
In models that accounted for both facility and Veteran characteristics, death in an inpatient hospice unit was the only indicator by which all rural subgroups differed significantly from urban Veterans. After adjustment, Veterans in all rural subgroups continued to have lower odds of dying in an inpatient hospice unit compared to Veterans from urban areas. Veterans in large rural towns had the lowest odds (OR 0.73, 95% CI: 0.70-0.77; \( P < .001 \)), followed by those from small rural (OR 0.81, 95% CI: 0.77-0.86; \( P < .001 \)), and isolated rural towns (OR 0.87, 95% CI: 0.81-0.93; \( P < .001 \)). Residence was associated with lower odds of receiving a palliative care consult for Veterans from large rural (OR 0.91, 95% CI: 0.87-0.96; \( P < .001 \)) and small rural towns (OR 0.90, 95% CI 0.86-0.95; \( P < .001 \)), but not for Veterans from isolated rural areas. Veterans from small rural (OR 0.92, 95% CI: 0.87-0.98, \( P = .01 \)) and isolated rural areas (OR 0.87, 95% CI: 0.81-0.94; \( P < .001 \)) were less likely than those from urban areas to receive a chaplain visit, but Veterans from large rural areas did not differ significantly. Odds of receiving bereavement support differed significantly from the reference group only among Veterans from large rural towns (OR 0.94, 95% CI: 0.90-0.99; \( P = .01 \)).

Examining the results from models adjusting for facility characteristics alone and Veteran characteristics alone shows which variables account for these differences. Controlling for facility complexity and region, Veterans across all rural groups were significantly less likely to receive each of the studied care processes compared to urban Veterans. The sole exception was that Veterans in large rural towns were just as likely to have a contact with a chaplain (OR 0.96, 95% CI: 0.91-1.02; \( P = .21 \)). In models adjusting for Veteran characteristics alone, rurality was associated with a significantly lower likelihood of dying in an inpatient hospice unit; the effect of rurality was not
significantly associated with palliative care consultation, chaplain visit, and bereavement contact.

Urban-Rural Comparison for BFS-PM

As shown in Table 3-2, over half of the NOK of Veterans in the BFS subsample rated care received in the last month of life as excellent (58.9% weighted for non-response bias). Between urban-rural categories, the proportions of NOK who gave excellent ratings were similar (ranging from 58.6% for Veterans in urban areas to 61.4% of Veterans in isolated rural towns), but differed significantly (P = .003).

Table 3-4 shows the odds ratios for the overall rating of EOL care in the last month of life (BFS-PM) by urban-rural category. In unadjusted models, the odds of receiving an overall excellent rating of care by NOK was significantly higher for Veterans from large rural (OR 1.08, 95% CI: 1.01-1.15, P = .02) and isolated rural areas (OR 1.12, 95% CI: 1.03-1.22; P = .01) compared to Veterans from urban areas. In all adjusted models, we found no significant differences in the BFS-PM between Veterans from urban areas and those in any rural subgroup. This finding persisted even after controlling for care processes, in addition to facility and Veteran characteristics.

Discussion

This study is the first urban-rural comparison of the quality of EOL care across settings for a clinically diverse national sample. Unlike many previous urban-rural studies of EOL care, which were limited to utilization data, our study investigated several specific indicators of EOL care quality, such as palliative care consults, spiritual, and bereavement care, as well as family satisfaction with overall care. We found that quality
of EOL care appeared to differ with urban-rural residence for some indicators, but not all. Our strongest finding suggesting urban-rural differences in EOL care is that residence in any rural area was associated with lower inpatient hospice use, before and after adjusting for important factors. Our strongest finding suggesting similarity was that the likelihood of excellent ratings of care did not differ with urban-rural residence, in partly- and fully-adjusted models. Urban-rural comparisons of palliative care consultations, chaplain contacts, and bereavement support were mixed in significance and differences were small in magnitude.

Our finding that rural residents were less likely than urban residents to die in an inpatient hospice unit is similar to findings on overall hospice use outside of the VA. However, it is important to note that Veterans who received hospice care in non-VA settings—in homes, freestanding hospice units, other hospitals, or facilities—were not included in our study. Our study adds to previous research by identifying a similar trend in a clinically diverse population and examining death in an inpatient hospice unit as an indicator across multiple inpatient settings. Comparing odds ratios between rural categories, our findings depart from previous research outside the VA, which found that isolated and remote rural residents were the least likely of all to use the service. Based on adjusted odds relative to urban areas, Veterans in isolated rural areas died in inpatient hospice units at a level slightly higher than those of large and small rural towns.

Furthermore, death in an inpatient hospice unit was the only quality of care indicator for which the rural effect persisted when adjusting for Veteran characteristics alone. This suggests that there may be unmeasured individual characteristics associated with both rural residence and lower hospice use. For example, one aspect we were unable
to account for was attitudes toward hospice and individual preferences. We know of only one qualitative study to date that compares urban and rural attitudes toward EOL care.\textsuperscript{12} This study, which was limited to caregivers of cognitively impaired nursing home residents in Minnesota, showed that rural caregivers generally expressed more acceptance of death and lower acceptance of life-sustaining treatments. In contrast, urban caregivers’ views were more mixed. Based on this finding, one would expect rural caregivers’ perspectives to be conducive to electing comfort-focused hospice care. However, this conflicts with our results. Perhaps differences in inpatient hospice use could be attributed to rural attitudes captured in studies outside of EOL care. Rural values that may influence utilization include self-reliance, reluctance to seek outside help, and stoicism in the face of suffering\textsuperscript{17,46,47} These attitudes could contribute to lower inpatient hospice use through delayed diagnoses of terminal conditions, or viewing hospice as unnecessary additional care.

Based on our sequential model analysis of palliative care consultations, chaplain contact, and bereavement support, we found some small yet significant differences between some groups of rural and urban Veterans. We caution against interpreting these results as clear urban-rural differences. First, the magnitudes of difference in odds ratios in receipt of palliative care, chaplain contact, and bereavement support were small and may not be clinically significant. Second, a majority of Veterans across all urban and rural groups received these quality of care indicators near EOL and in similar proportions, based on crude unadjusted proportions. Third, easily summarized patterns were not observed in fully-adjusted analyses. With the exception of inpatient hospice use, none of the remaining quality indicators showed a significant deficit across all rural
categories. Similarly, by examining the adjusted odds ratios for each rural subcategory—large, small, or isolated—we see that no subcategory differed significantly across all quality of care indicators.

One pattern that did emerge, however, was the importance of accounting for facility characteristics in examining quality of care indicators. Adjusting for facility characteristics brought the odds of inpatient hospice use among isolated rural Veterans closer to that of urban Veterans. This departs from findings from previous research outside the VA that found that hospice use decreased with the degree of rurality, with isolated and remote rural residents the least likely of all to use the service.\textsuperscript{4-7} We found that urban-rural differences in hospice service availability is partly explained by service availability, agreeing with one study in the Medicare population.\textsuperscript{48} For the remaining quality of care indicators, our analysis revealed that significant differences between urban and rural Veterans in fully-adjusted models, when present, were attributable to facility characteristics. For example, urban and rural Veterans had similar odds of receiving palliative care consultations in unadjusted models, but the odds for all rural Veterans decreased relative to urban Veterans after controlling for facility characteristics. These findings suggest that differences among individual facilities and how rural and urban Veterans arrive at these facilities may matter more than rurality of residence alone.

We also found no significant differences in bereaved family members’ evaluations of EOL care between urban-rural groups, despite differences in some quality of care indicators. This finding is consistent with the only other published study we could identify in the literature, one that was limited to a small number of patients at one regional hospice organization.\textsuperscript{49} Collectively, these findings suggest that, although the
rurality of a Veteran may be associated with a lower likelihood of receiving certain components of high quality EOL care, families’ experiences of care are similar across the rural-urban continuum.

This study had several limitations. Our study included only Veterans who died at inpatient VA facilities, and thus did not capture care for Veterans who may have been referred from an inpatient VA facility to community care prior to death. Most of our covariates related to utilization and complexity were based on VA encounters alone; Veterans in our sample may have utilized healthcare outside the VA prior to his or her last admission. It is possible that Veterans categorized as not receiving care processes did in fact receive them, but this care was not documented in the chart. Family evaluation of care through follow-up surveys is an established method of measuring outcomes in EOL care, but it is subject to recall bias.\textsuperscript{50} Also, there may have been discrepancies in expectations and preferences of care between Veterans, the BFS respondent, and other family members.\textsuperscript{51} Finally, our choice of definition of rurality may have impacted our results. Although an analysis of these outcomes using another definition of rurality previously recommended by the VA\textsuperscript{52} showed similar trends (data not shown), several other definitions of rurality exist and were not tested.\textsuperscript{53,54}

These findings point to directions for future research. While rurality appeared to play an important role, it is still unclear whether it is a proxy for differences in allocation to facilities, individual preferences, or access. The relative importance of facility characteristics in achievement of quality of care indicators calls for further investigation into how both urban and rural Veterans might be allocated to facilities in the first place. Although we did control for a few important facility characteristics, our results show that
future analyses should investigate additional structural factors of care, such as availability of inpatient hospice beds or capacity of local palliative care teams. Similarly, potential urban-rural differences in individual preferences remain unmeasured. While our chosen urban-rural classification of Veterans is based on the general population’s commuting patterns to centers of influence, we did not account for allocation patterns of rural Veterans to the actual facilities in which they received care. Future research could account for more patient-centered measures of access to care.

This study compared the quality of EOL care between urban and rural decedents across inpatient settings within a large national health system. We built upon prior research of EOL care by examining several specific care processes and family ratings of care. We identified lower inpatient hospice use among rural Veterans compared to urban Veterans, as well as similar family ratings of care for Veterans across urban-rural categories. Our findings indicated that future research should investigate unmeasured factors, such as individual preferences and differences in individual facilities, which may be related to rurality of residence.
References


Figures and Tables

Figure 3-1 Study population inclusion and exclusion criteria

134,618 Veteran deaths in 151 facilities from October 1, 2009 to September 30, 2016

- Excluded (n = 8,143)
  - Less than 24 hours inpatient (5,454)
  - ZIP code or urban/rural status unknown (2,547)
  - Resided in Puerto Rico or island territories (63)
  - Accidental death or suicide (41)
  - Age unknown (38)

126,475 Veterans in total sample and eligible for BFS

- Nonresponses (n = 59,517)
  - No response to phone calls or reminders (40,791)
  - Mail survey returned or wrong number (10,452)
  - NOK refused to participate (4,539)
  - Incomplete responses (1,991)
  - NOK did not speak English or Spanish, unable to complete survey, or no NOK listed (657)
  - NOK reluctant to discuss death (207)
  - NOK had inadequate knowledge of care (880)

66,958 Veterans whose NOK evaluated overall care (BFS subsample)

NOK = Next of kin; BFS = Bereaved Family Survey; BFS-PM = Bereaved Family Survey Performance Measure
## Table 3-1 Characteristics of Total Sample and BFS Subsample

<table>
<thead>
<tr>
<th></th>
<th>Total sample (N = 126,475)</th>
<th>BFS Subsample (N = 66,958)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall</td>
<td>Urban</td>
</tr>
<tr>
<td></td>
<td>(N = 126,475)</td>
<td>(4,801)</td>
</tr>
<tr>
<td>% (N) of total</td>
<td>97.9 (123,745)</td>
<td>97.6 (103,172)</td>
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<td></td>
<td>98.3 (7,353)</td>
<td>97.8 (7,471)</td>
</tr>
<tr>
<td></td>
<td>97.9 (4,917)</td>
<td>98.1 (4,278)</td>
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<tr>
<td><strong>Veteran characteristics</strong></td>
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<td></td>
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<tr>
<td>Sex Male % (N)</td>
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<td>74.2 (12.1)</td>
</tr>
<tr>
<td></td>
<td>74.1 (11.3)</td>
<td>74.1 (11.1)</td>
</tr>
<tr>
<td>Race / ethnicity % (N)</td>
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<td></td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>71.7 (90,785)</td>
<td>71.7 (37,825)</td>
</tr>
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<td>Non-Hispanic Black</td>
<td>15.8 (19,951)</td>
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</tr>
<tr>
<td>Hispanic</td>
<td>3.2 (4,101)</td>
<td>3.6 (3,803)</td>
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<td>1.3 (1,391)</td>
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<td>spouse</td>
<td>36.8 (46,601)</td>
<td>35.8 (37,825)</td>
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<td>6.2 (3.1)</td>
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<td>Median income of ZIP Mean (SD)</td>
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<td>41.2 (8,885)</td>
<td>41.7 (11,107)</td>
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<td>18.1 (22,950)</td>
<td>18.6 (19,650)</td>
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<tr>
<td>High facility complexity % (N)</td>
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<td>81.6 (86,211)</td>
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<tr>
<td>Specialized inpatient hospice unit present</td>
<td>84.7 (107,148)</td>
<td>85.5 (90,187)</td>
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<td>Region % (N)</td>
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<td>Northeast</td>
<td>18.1 (22,950)</td>
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<td>South</td>
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<td>% (N) of total</td>
<td>- (66,958)</td>
<td>82.4 (55,155)</td>
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<td>% (N) of total</td>
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<td><strong>Veteran characteristics</strong></td>
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<td>98.5 (4,148)</td>
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<td>Age Mean (SD)</td>
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<td>Region % (N)</td>
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<td>Midwest</td>
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<td>West</td>
<td>14.7 (9,842)</td>
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Comparisons across groups was performed using χ² test for categorical variables, anova for continuous variables.
Differences were significant with P < .001 for all tests except for sex in the BFS sample (P = .02)
Table 3-2 Proportions and frequencies of EOL quality of care indicators by Veteran residence

<table>
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<tr>
<th>Total sample</th>
<th>Overall</th>
<th>Urban</th>
<th>Large rural</th>
<th>Small rural</th>
<th>Isolated rural</th>
<th>P value</th>
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<td>.08</td>
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<td>Received % (N)</td>
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<td>66.6 (70,272)</td>
<td>66.0 (5,600)</td>
<td>65.4 (4,886)</td>
<td>67.3 (3,373)</td>
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<tr>
<td>Chaplain visit</td>
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<td></td>
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<td>.05</td>
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<td>Received % (N)</td>
<td>80.7 (102,054)</td>
<td>80.8 (85,225)</td>
<td>81.0 (6,871)</td>
<td>79.9 (5,972)</td>
<td>79.5 (3,986)</td>
<td></td>
</tr>
<tr>
<td>Inpatient hospice unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Received % (N)</td>
<td>36.0 (45,503)</td>
<td>36.9 (38,948)</td>
<td>30.5 (2,587)</td>
<td>32.3 (2,415)</td>
<td>31.0 (1,553)</td>
<td></td>
</tr>
<tr>
<td>Bereavement Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.14</td>
</tr>
<tr>
<td>Received % (N)</td>
<td>62.8 (79,416)</td>
<td>62.8 (66,256)</td>
<td>62.1 (5,262)</td>
<td>63.8 (4,767)</td>
<td>62.5 (3,131)</td>
<td></td>
</tr>
<tr>
<td>BFS Subsample</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BFS-PM (unweighted)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.02</td>
</tr>
<tr>
<td>Excellent rating % (N)</td>
<td>60.2 (40,323)</td>
<td>60.0 (33,085)</td>
<td>61.7 (2,990)</td>
<td>60.5 (2,513)</td>
<td>62.0 (1,735)</td>
<td></td>
</tr>
<tr>
<td>BFS-PM (weighted for non-response bias)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.003</td>
</tr>
<tr>
<td>Excellent rating % (N)</td>
<td>58.9 (73,999)</td>
<td>58.6 (60,961)</td>
<td>60.4 (5,390)</td>
<td>59.6 (4,542)</td>
<td>61.4 (3,106)</td>
<td></td>
</tr>
</tbody>
</table>

BFS-PM = Bereaved Family Survey Performance Measure. χ² test was used for comparisons across groups.
### Table 3-3 Odds Ratios of End-of-Life Quality of Care Indicators by Veteran residence

<table>
<thead>
<tr>
<th>Quality of care Indicator</th>
<th>Unadjusted (facility characteristics only)</th>
<th>Adjusted (Veteran characteristics only)</th>
<th>Fully Adjusted (facility and Veteran characteristics)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (CI)</td>
<td>P value</td>
<td>OR (CI)</td>
</tr>
<tr>
<td>Palliative care consultation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban reference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large rural</td>
<td>0.98 (0.93-1.02)</td>
<td>.30</td>
<td>0.88 (0.84-0.92)</td>
</tr>
<tr>
<td>Small rural</td>
<td>0.95 (0.90-1.00)</td>
<td>.03</td>
<td>0.87 (0.83-0.92)</td>
</tr>
<tr>
<td>Isolated rural</td>
<td>1.03 (0.97-1.10)</td>
<td>.30</td>
<td>0.94 (0.88-1.00)</td>
</tr>
<tr>
<td>Chaplain contact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban reference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large rural</td>
<td>1.02 (0.96-1.08)</td>
<td>.55</td>
<td>0.96 (0.91-1.02)</td>
</tr>
<tr>
<td>Small rural</td>
<td>0.95 (0.89-1.01)</td>
<td>.08</td>
<td>0.90 (0.85-0.96)</td>
</tr>
<tr>
<td>Isolated rural</td>
<td>0.93 (0.86-0.99)</td>
<td>.03</td>
<td>0.86 (0.80-0.92)</td>
</tr>
<tr>
<td>Death in inpatient hospice unit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban reference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large rural</td>
<td>0.75 (0.72-0.79)</td>
<td>&lt;.001</td>
<td>0.71 (0.68-0.75)</td>
</tr>
<tr>
<td>Small rural</td>
<td>0.82 (0.78-0.86)</td>
<td>&lt;.001</td>
<td>0.79 (0.74-0.83)</td>
</tr>
<tr>
<td>Isolated rural</td>
<td>0.77 (0.72-0.82)</td>
<td>&lt;.001</td>
<td>0.83 (0.78-0.89)</td>
</tr>
<tr>
<td>Bereavement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban reference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large rural</td>
<td>0.97 (0.93-1.01)</td>
<td>.18</td>
<td>0.92 (0.88-0.96)</td>
</tr>
<tr>
<td>Small rural</td>
<td>1.04 (0.99-1.10)</td>
<td>.08</td>
<td>0.97 (0.92-1.02)</td>
</tr>
<tr>
<td>Isolated rural</td>
<td>0.99 (0.93-1.05)</td>
<td>.66</td>
<td>0.94 (0.89-1)</td>
</tr>
</tbody>
</table>

Facility characteristics include complexity level, Census region, and availability of an inpatient hospice unit. Veteran characteristics include sex, age, race/ethnicity, NOK relationship, Elixhauser comorbidity score, whether Veteran had a hospital admission in year prior to last admission, whether Veteran had an ICU stay in year prior to last admission, median household income of Veteran's ZIP code.
Table 3-4 Odds Ratios of BFS-PM by Veteran residence

<table>
<thead>
<tr>
<th></th>
<th>Unadjusted</th>
<th>Adjusted (facility characteristics only)</th>
<th>Adjusted (Veteran characteristics only)</th>
<th>Adjusted (facility and Veteran characteristics)</th>
<th>Adjusted (facility and Veteran characteristics, quality indicators)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (CI)</td>
<td>P value</td>
<td>OR (CI)</td>
<td>P value</td>
<td>OR (CI)</td>
</tr>
<tr>
<td>Urban reference</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large rural</td>
<td>1.08 (1.01-1.15)</td>
<td>.02</td>
<td>0.99 (0.93-1.06)</td>
<td>.86</td>
<td>1.06 (0.99-1.13)</td>
</tr>
<tr>
<td>Small rural</td>
<td>1.04 (0.97-1.12)</td>
<td>.25</td>
<td>0.99 (0.93-1.07)</td>
<td>.87</td>
<td>1.03 (0.96-1.10)</td>
</tr>
<tr>
<td>Isolated rural</td>
<td>1.12 (1.03-1.22)</td>
<td>.01</td>
<td>1.04 (0.95-1.13)</td>
<td>.39</td>
<td>1.07 (0.99-1.17)</td>
</tr>
</tbody>
</table>

Analyses performed on BFS subsample and weighted for non-response bias. Facility characteristics include complexity level and Census region Veteran characteristics include sex, age, race/ethnicity, NOK relationship, Elixhauser comorbidity score, whether Veteran had a hospital admission in year prior to last admission, whether Veteran had an ICU stay in year prior to last admission, median household income of Veteran's ZIP code Quality of care indicators include the four process measures (receipt of palliative care consultation, chaplain contact, death in an inpatient hospice unit, bereavement support)
CHAPTER 4:

DISTANCE

The Effect of Distance To Healthcare Facility on End-of-Life Care Quality in the VA

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Short title: Effect of distance on end-of-life care in the VA
Abstract

Context: Rural EOL care providers and family caregivers cite geographic distance as a barrier to service delivery, but its effect on quality has yet to be measured. Driving time to facility has been shown to be associated with healthcare service use in other studies in the Veterans Affairs system.

Objective: The purpose of this study was to investigate the relationships between distance from the Veteran’s residence to facility of death and receipt of high quality EOL care.

Methods: This study was a retrospective, cross-sectional analysis of Veterans who died in inpatient VA settings from October 2009 to September 2016. We fit a series of logit models for quality indicators representing palliative care consultation, chaplain contact, death in an inpatient hospice unit, and bereavement support, as well as an “excellent” family evaluation of care.

Results: In fully adjusted models, Veterans who lived 0-5 minutes from the facility of death (OR 0.77, 95% CI: 0.73-0.80; P < .001) and those who lived 60-360 minutes (OR 0.76, 95% CI: 0.73-0.79; P < .001) had lower odds of death in an inpatient hospice unit compared to Veterans who lived 5-60 minutes away. Veterans who resided 60-360 minutes from the facility had lower odds of receiving a palliative care consultation (OR 0.78, 95% CI 0.75-0.81; P < .001). Family members of Veterans in all distance categories were equally likely to rate overall care as excellent.

Conclusion: In a national sample of Veterans, distance to facility of death is associated with receiving a set of EOL care processes, but not family evaluations of care.
Introduction

Rurality, access, and distance are important and intertwined concepts in healthcare, including end-of-life (EOL) care. While the trend of concentrating healthcare services in urban areas—placing high cost technology and specialist training near demand—is efficient for many specialized fields, it could be detrimental to seriously ill rural residents who prefer to stay closer to home. High-quality EOL care engages families through goals of care discussions, facilitating transitions, and providing emotional, spiritual, and bereavement support. These interactions are provided largely in face-to-face encounters. Therefore, distance to services can influence access to and utilization of such care. Rural EOL care providers and family caregivers cite geographic distance as a barrier to service delivery,\(^1\)\(^-\)\(^3\) but its effect on quality has yet to be measured.

Distance to care is a mainstay in models predicting healthcare utilization,\(^4\)\(^-\)\(^6\) and could offer a more informative measure of access than researcher-defined classifications of rurality. Studies of EOL care have shown that rural residents use hospice less,\(^7\)\(^-\)\(^9\) visit emergency rooms more,\(^9\) and are more likely to be hospitalized,\(^10\) compared to their urban counterparts. However, many of these studies do not account for accessibility of services, instead relying on urban-rural categories as a proxy for degree of isolation.

In an effort to evaluate access to care, the Veterans Affairs (VA) healthcare system estimates driving time from the Veteran’s residence to the nearest VA primary care clinics and acute hospitals for each of its enrollees. Wide variation exists among both urban and rural Veterans in driving time to the nearest primary and acute care
sites, and a growing number of studies have shown that these differences are associated with healthcare service use. Distance to nearest VA facility has been shown to be a significant factor in utilization of inpatient medical-surgical care, outpatient service use by elderly Veterans, general attrition among women Veterans, and both inpatient and outpatient utilization among Veterans with spinal cord injuries. In addition, two VA studies of infectious disease clinics and echocardiograms found significant negative associations between rurality and utilization, which were ultimately invalidated or reversed after accounting for distance.

These findings suggest that examining distance as driving time, in addition to rurality, may provide insight into the relationships among access, utilization, and quality of care during the final days of life. The purpose of this national study of Veterans was to investigate the relationships between distance from the Veteran’s residence to facility of death and the quality of care received near EOL. We measured quality care using indicators for care processes such as receipt of a palliative care consultation, contact with a chaplain, death in an inpatient hospice unit, and bereavement support, as well as family evaluations of care.

Methods

Overview and data sources

This study was a retrospective, cross-sectional analysis of Veterans who died in inpatient VA settings from October 2009 to September 2016. Survey responses of
bereaved family members were linked to clinical and administrative data obtained from the VA Corporate Data Warehouse (CDW), a national, integrated data repository.

Family evaluations of care were solicited through the Bereaved Family Survey (BFS), a National Quality Forum-endorsed measure. As part of its quality improvement activities, the VA solicits post-death evaluations of EOL care from the next-of-kin (NOK) of every Veteran who dies in a VA facility using the BFS. The BFS has been used to evaluate EOL care and to support quality improvement efforts for the care of seriously ill Veterans in inpatient settings across all VA facilities since 2009. Originally administered by telephone, the survey transitioned to a predominantly mail survey in October 2012. The instrument has been validated in mail and phone methods of administration.

Distance data were provided by the Planning Systems Support Group (PSSG) field unit. PSSG maintains a file containing distances to the nearest primary care facilities, secondary acute care hospitals, and tertiary acute care hospitals within the VA, along with geo-coded enrollee residences. Distances were measured in minutes of driving time and estimated using advanced geographic information system tools. The file is updated quarterly using the U.S. Postal Service change of address dataset.

Sample

Our total sample included 123,566 Veterans (see Figure 4-1). We identified decedents through the CDW using a process that captures 99% of inpatient deaths in 151 VA facilities. VA facilities may include acute care hospitals, nursing home units called
community living centers (CLCs), and specialized hospice/palliative care units that are generally located in CLCs. Veterans who died less than 24 hours after admission were excluded from the study, since a short stay limits staff opportunities to initiate EOL care processes and interact with family. For this analysis, we also excluded Veterans who died or resided in Puerto Rico or other U.S. Territories, had missing residential data (ie, ZIP code or urban-rural category of ZIP), or for whom we were unable to estimate driving time from residence to facility of death. Lastly, we also excluded a relatively small number of Veterans who had estimated driving times of 6 hours or greater from the facility of death (N = 2,796, or 2.2% of eligible Veterans). Because these Veterans had exceptionally large driving times, they may have travelled by means other than driving, travelled further for specialty care, or simply relocated and their addresses were not updated in the data. We chose this limit because all but 14 Veterans lived within 6 hours of at least one secondary care VA facility.

A subset of Veterans whose NOK completed the BFS (N = 66,027, or 53.4% of total sample) comprised the sample for our analyses of BFS responses.

Outcomes

We examined four EOL quality indicators, chosen for their association with positive outcomes in prior research or by consensus guidelines. These include (1) palliative care consultation during the last 90 days of life, (2) a chaplain note within the last month of life, (3) death in an inpatient hospice unit, and (4) bereavement support
within one month of death. Data for the four quality indicators were derived by algorithmic searches of clinical notes and admission information in CDW.

In addition, we examined the BFS performance measure (BFS-PM) which asks NOK to rate the overall care the Veteran received during the last month of life. Consistent with previous analyses, we treated the response dichotomously as “excellent” versus all lesser ratings—“very good,” “good,” “fair,” or “poor.”

**Independent variable: Distance from Veteran's residence to facility of death**

Distance was operationalized as driving time in minutes from the Veteran’s residential address to the facility of death. For Veterans who died in the nearest secondary or tertiary care facilities, distance was equated with the corresponding driving time estimated by PSSG. For Veterans who died in another facility, distance was determined following the method used by PSSG. Using ArcGIS Network Analyst tools and road condition data from Esri StreetMap, driving time was calculated between geo-coded residence of each Veteran and the facility of death. For some Veterans, we were unable to determine the exact facility of death, because the data of certain facilities are aggregated with that of a nearby parent VA facility. For these Veterans, we approximated driving time to facility of death by substituting driving time to the nearby parent facility.

We further categorized Veterans’ driving time using classification and regression trees (CART) to identify appropriate cut points. CART is a simple algorithm that recursively splits the sample based on predictor values, so that an outcome is either
maximized or minimized in the resulting subsamples. We generated a tree for each of the outcomes using driving time as the sole predictor. Based on the cut points that were common and important across trees, we classified Veterans into three categories based on driving time from residence to facility of death: (1) 0 to 5 minutes, (2) greater than 5 to 60 minutes, and (3) greater than 60 minutes up to 360 minutes.

Covariates

We accounted for several Veteran- and facility-level covariates that were associated with outcomes in previous analyses. Veteran-level covariates included race/ethnicity, sex, and relationship of the listed NOK or BFS respondent (spouse, child, sibling, other family, other). Race/ethnicity data were based on self-report as recorded in CDW, and supplemented by Medicare data. Since clinical complexity may influence family expectations, we also considered Veterans’ age, prior hospitalization, ICU stay, and Elixhauser comorbidity score. The Elixhauser comorbidity score is an integer ranging from 0 through 31, counting a Veteran’s ICD-9 or 10 codes that fall into one of 31 groups, and is discriminative of death in hospital. We also accounted for the urban-rural category and median household income of the Veteran’s ZIP code. Urban-rural category was defined as urban, large rural, small rural, or isolated rural based on the Rural-Urban Commuting Areas Categorization A. These categories were determined by linking each Veteran’s ZIP code with a publicly available crosswalk file. Median household income estimates were based on the 2013 American Community Survey estimates. Hot deck imputation was used for missing covariate data.
Facility-level characteristics included Census geographic region (Northeast, South, Midwest, and West), facility complexity (low and high), and whether the facility had a dedicated inpatient hospice unit. Facility complexity is a VA administrative category that accounts for factors such as patient volume and risk, availability of clinical services, and activities related to research, teaching, and training.

Analysis

Means, medians, and ranges for continuous variables and frequencies of categorical variables were calculated to describe the total sample and the BFS subsample. The BFS-PM outcome was weighted for nonresponse.

To examine associations between distance to care and EOL service use and quality, we fit a series of logit models for each of four EOL quality indicators and the BFS-PM. First, we conducted bivariate unadjusted analyses using distance category as the sole predictor. Next, we adjusted separately for facility and Veteran characteristics, and then fit a fully adjusted model. The fully adjusted model for the BFS-PM included the EOL quality indicators as additional covariates. We accounted for clustering by the facility of death using Huber-White sandwich estimators to calculate standard errors, and evaluated statistical significance at the $\alpha = .05$ level. Results were transformed from log odds to odds ratios for ease of interpretation. All statistical analyses were conducted using R language and environment for statistical computing.
Results

Summary statistics of the total sample and BFS subsample are displayed in Table 4-2. The majority of Veterans in the sample were male (97.7%), Non-Hispanic White (77.9%), and from urban areas (83.6%). Most died in facilities that had a specialized inpatient hospice unit (84.7%), and nearly half received care in the South (43.9%). Characteristics of the BFS subsample were largely similar to the total sample.

The largest category of Veterans lived 5-60 minutes from their facility of death (71.2% of total sample, 71.5% of BFS sample), followed by Veterans who lived 60 minutes or more away (20.6% of total sample, 20.6% of BFS subsample), and lastly Veterans who lived less than 5 minutes from the facility of death (8.1% of total sample, 7.9% of BFS subsample). Veterans in these categories differed significantly at the \( P < .001 \) level for all Veteran and facility-level characteristics in both the total sample and the BFS subsample. Notably, Veterans who lived farthest away were younger on average and more likely to be Non-Hispanic White, and were less likely to be from urban areas. Veterans who lived more than 60 minutes away had a higher proportion who received care in the South, compared to Veterans in other categories. The proportions of Veterans who were seen in facilities with inpatient hospice units were statistically different across distance categories, but the range was very small (84.1—85.7%).

Table 4-2 shows the unadjusted proportions of Veterans receiving each EOL quality indicator overall and by distance category. While the majority of Veterans in the total sample received a palliative care consult (66.6%), chaplain visit (80.7%), or
bereavement support (62.8%), about one-third (36.0%) of Veterans died in an inpatient hospice unit. For Veterans in the BFS subsample, 58.5% of bereaved family members rated the quality of care received in the last month of life as excellent.

Examining EOL quality indicators by distance categories revealed small, but significant differences between groups. For each of the four quality indicators, Veterans who lived 5-60 minutes away had the highest proportion to receive such care. Veterans who lived greater than 60 minutes away had the lowest proportion, with the exception of bereavement support. Veterans who lived 0-5 minutes from the facility of death had the highest proportion of excellent ratings on the BFS-PM. (60.8% of Veterans 0-5 minutes, 58.6% of Veterans 5-60 minutes, and 58.1% of Veterans 60+ minutes; \( P = .003 \)).

Odds ratios estimating associations between distance and receipt of EOL quality indicators are shown in Table 4-3. In unadjusted and fully adjusted models, the odds of receiving each of these indicators were significantly lower for both Veterans who lived 0-5 minutes and more than 60 minutes away as compared to Veterans who lived 5-60 minutes away. However, differences were small for most comparisons with the few following exceptions. Veterans who lived more than 60 minutes away from the facility of death had lower odds of receiving palliative care (fully adjusted OR 0.78, 95% CI 0.75-0.81; \( P < .001 \)) compared to the reference group. Lower odds of death in an inpatient hospice unit persisted in fully adjusted models for Veterans who lived 0-5 minutes away (fully adjusted OR 0.77, 95% CI: 0.73-0.80; \( P < .001 \)), and those who lived more than 60 minutes away (fully adjusted OR 0.75, 95% CI: 0.73-0.77; \( P < .001 \)).
Table 4-4 shows the odds ratios estimating the likelihood of an excellent rating on BFS-PM by distance category. In the model adjusted for Veteran characteristics only, decedents in the 0-5 minute group were significantly more likely than those who lived 5-60 minutes away to have NOK rate care as excellent in the unadjusted model (OR 1.09, 95% CI: 1.02-1.16, P = .01). In all other models, including the fully adjusted model accounting for receipt of EOL quality indicators, these Veterans did not differ significantly from the reference group. Veterans who lived 60+ minutes away from facility of death did not differ from the 5-60 minute group in any of the models.

Discussion

Our study examined differences in the quality and family evaluations of EOL care in relation to distance to facility of death among Veterans who died in inpatient VA settings. Our strongest finding was that Veterans who lived more than 60 minutes from the facility of death were less likely to receive a palliative care consultation and to receive care in a specialized inpatient hospice unit, compared to Veterans who lived 5-60 minutes away. We also found that Veterans who lived 0-5 minutes and more than 60 minutes away had significantly lower odds of having a chaplain contact or bereavement support for family, although these differences were small and may not be clinically significant. Despite these differences, family members of Veterans in all distance categories were equally likely to report that the Veteran received excellent overall care in the last month of life.
Interestingly, we found that Veterans who lived 0-5 minutes from the facility of death were also less likely than Veterans 5-60 minutes away to receive all four of the EOL quality indicators, before and after adjustment. This appears to contradict the oft-observed theory of distance decay, or that people nearer to sites of care are more likely to use services.\textsuperscript{5,45} However, it is worth noting that we departed from traditional approaches of studying distance and utilization. Prior research examined the relationship between distance and utilization as a choice to seek care at a particular site, while we examined receipt of specific services among individuals who were already admitted to a facility. One factor to consider is that many Veterans resided a minute or less from the facility (N = 2,749, or 23.7% in the 0-5 minute group), and may have been long-term residents in a CLC or in one of several residential programs for those at-risk for homelessness or with complex medical needs.\textsuperscript{46,47} Although care in these settings may affect the likelihood of receiving specific EOL services such as a palliative care consult,\textsuperscript{27} families’ evaluations of EOL care are similar to those of families whose Veteran lived farther from the facility. Furthermore, the relationship between distance and health service use may not be strictly linear. Some studies have found that distance has a differential effect on utilization based on social class,\textsuperscript{48} age,\textsuperscript{13} or functional impairment,\textsuperscript{49} which may be salient to this group. Others have posited that distance becomes less of a factor when multiple competing options are available,\textsuperscript{12,50} which is often the case in urban areas.

Our approach to measuring the effect of distance improves upon traditional methods in several ways. Applying CART to form data-driven distance cut-points
identified Veteran categories with significantly different outcomes. This association between distance and outcomes may have gone undetected had we applied *a priori* researcher-defined categories. Additionally, we found that a substantial number (13% of our total sample) died in VA facilities that were not among the nearest acute hospital sites. This suggests studies based on individuals’ distance to nearest potential sites, as opposed to actual sites, could result in different findings. This discrepancy also suggests there are other factors besides proximity to the facility that influence where people receive care, such individual perceptions of distance,\(^{33}\) mobility, or accessibility of transportation for family members. Finally, distance to facility of death proved to be a stronger predictor of receiving care than rurality. In our fully-adjusted models, we found that rural category was not negatively associated with processes of care, with the exception of death in an inpatient hospice unit for Veterans from large and small rural towns, and chaplain visit for Veterans from isolated rural towns.

This study had several limitations. It is possible that Veterans categorized as not receiving care processes did in fact receive care, but this was not reflected in the chart and thus not captured in the chart review process. Also, we were unable to capture Veterans’ evaluations of care, although assessment of family evaluations of care is an established method of measuring EOL care outcomes.\(^{51}\) We are unable to generalize to Veterans who lived more than 6 hours away from the facility of death, or those who sought care outside of the VA. Eligible Veterans may elect to receive hospice care in non-VA facilities, either through Medicare or purchased by the VA.\(^{52}\) Notably, 71% of
our study population lived within an hour of the facility of death, whereas 43-59% of all VA enrollees live within an hour of the nearest secondary or tertiary care hospital. This difference suggests that VA enrollees who live more than an hour away may have elected to receive care at non-VA facilities, which may be closer to their homes.

Conclusion

To our knowledge, this is the largest study on the association between distance and quality of EOL care in a clinically and geographically diverse population. Using a novel approach to operationalizing distance, we found that living less than 5 and more than 60 minutes from the facility of death were negatively associated with receiving some aspects of care, but that family evaluations of care were similar across distance categories. Directions for future research include exploring additional factors of access besides driving time, interactions between distance and other variables such as age or urban-rural category, and the effect of distance on choice between VA and non-VA settings for EOL care.
References


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Figures and Tables

Figure 4-1 Study population inclusion and exclusion criteria

134,618 Veteran deaths in 151 facilities from October 1, 2009 to September 30, 2016

Excluded (n = 11,052)
- Less than 24 hours inpatient (5,454)
- ZIP code or urban/rural status unknown (2,547)
- Resided in Puerto Rico or island territories (63)
- Accidental death or suicide (41)
- Age unknown (38)
- Distance to facility of death unattainable (113)
- Distance to facility of death ≥ 6 hours (2,796)

123,566 Veterans in total sample and eligible for BFS

Nonresponses (n = 57,539)
- No response to phone calls or reminders (39,771)
- Mail survey returned or wrong number (10,133)
- NOK refused to participate (4,432)
- Incomplete responses (1,499)
- NOK had inadequate knowledge of care (851)
- NOK did not speak English or Spanish, unable to complete survey, or no NOK listed (649)
- NOK reluctant to discuss death (204)

66,027 Veterans whose NOK evaluated overall care (BFS subsample)
<table>
<thead>
<tr>
<th>Study Population Characteristics of Total and BFS samples and Comparison of Veterans categorized by distance to facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=123,566 N=10,063 N=88,009 N=25,494</td>
</tr>
<tr>
<td>% of total</td>
</tr>
<tr>
<td>Veteran characteristics</td>
</tr>
<tr>
<td>Male % (N)</td>
</tr>
<tr>
<td>Age Mean (SD)</td>
</tr>
<tr>
<td>Race / ethnicity % (N)</td>
</tr>
<tr>
<td>Non-Hispanic White</td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
</tr>
<tr>
<td>Hispanic</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>NOK relationship % (N)</td>
</tr>
<tr>
<td>spouse</td>
</tr>
<tr>
<td>child</td>
</tr>
<tr>
<td>sibling</td>
</tr>
<tr>
<td>family</td>
</tr>
<tr>
<td>other</td>
</tr>
<tr>
<td>Elixhauser comorbidity index Mean (SD)</td>
</tr>
<tr>
<td>Median household income of Veteran ZIP Mean (SD)</td>
</tr>
<tr>
<td>Urban-rural category</td>
</tr>
<tr>
<td>Urban</td>
</tr>
<tr>
<td>Large rural</td>
</tr>
<tr>
<td>Small rural</td>
</tr>
<tr>
<td>Isolated rural</td>
</tr>
<tr>
<td>Previous hospital admission % (N)</td>
</tr>
<tr>
<td>ICU admission in previous year % (N)</td>
</tr>
<tr>
<td>Facility characteristics</td>
</tr>
<tr>
<td>High complexity facility % (N)</td>
</tr>
<tr>
<td>Region % (N)</td>
</tr>
<tr>
<td>Midwest</td>
</tr>
<tr>
<td>Region</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>2022</td>
</tr>
<tr>
<td>2021</td>
</tr>
<tr>
<td>2020</td>
</tr>
<tr>
<td>% of total</td>
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</table>

<table>
<thead>
<tr>
<th>BFS subsample</th>
<th>0-5 minutes</th>
<th>5-60 minutes</th>
<th>60+ minutes</th>
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</thead>
<tbody>
<tr>
<td>% of total</td>
<td>7.9</td>
<td>71.5</td>
<td>20.6</td>
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</table>

**Veteran characteristics**

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<th>Characteristic</th>
<th>2022</th>
<th>2021</th>
<th>2020</th>
<th>2019</th>
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</thead>
<tbody>
<tr>
<td>Male % (N)</td>
<td>97.9 (64,623)</td>
<td>97.1 (5,091)</td>
<td>97.9 (46,205)</td>
<td>98.1 (13,327)</td>
</tr>
<tr>
<td>Age Mean (SD)</td>
<td>75.7 (11.7)</td>
<td>77.8 (12.1)</td>
<td>76.2 (11.6)</td>
<td>72.9 (11.4)</td>
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<tr>
<td>Race / ethnicity % (N)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>80.9 (53,426)</td>
<td>77.2 (4,048)</td>
<td>79.5 (37,534)</td>
<td>87.1 (11,844)</td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>14.7 (9,696)</td>
<td>18.2 (956)</td>
<td>15.7 (7,420)</td>
<td>9.7 (1,320)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>3.1 (2,072)</td>
<td>3.1 (160)</td>
<td>3.5 (1,629)</td>
<td>2.1 (283)</td>
</tr>
<tr>
<td>Other</td>
<td>1.3 (833)</td>
<td>1.5 (77)</td>
<td>1.3 (612)</td>
<td>1.1 (144)</td>
</tr>
<tr>
<td>NOK relationship % (N)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>spouse</td>
<td>43.9 (29,004)</td>
<td>32.6 (1,708)</td>
<td>44.4 (20,963)</td>
<td>46.6 (6,333)</td>
</tr>
<tr>
<td>child</td>
<td>29.6 (19,514)</td>
<td>32.1 (1,682)</td>
<td>30.1 (14,193)</td>
<td>26.8 (3,639)</td>
</tr>
<tr>
<td>sibling</td>
<td>13.0 (8,599)</td>
<td>17.3 (909)</td>
<td>12.3 (5,823)</td>
<td>13.7 (1,867)</td>
</tr>
<tr>
<td>family</td>
<td>8.0 (5,293)</td>
<td>10.7 (563)</td>
<td>7.8 (3,658)</td>
<td>7.9 (1,072)</td>
</tr>
<tr>
<td>other</td>
<td>5.5 (3,817)</td>
<td>7.2 (379)</td>
<td>5.4 (2,558)</td>
<td>5.0 (680)</td>
</tr>
<tr>
<td>Elixhauser comorbidity index Mean (SD)</td>
<td>6.2 (3.1)</td>
<td>6 (3.1)</td>
<td>6.3 (3.1)</td>
<td>5.9 (3)</td>
</tr>
<tr>
<td>Median household income of Veteran ZIP Mean (SD)</td>
<td>51,422 (19,922)</td>
<td>49,605 (24,339)</td>
<td>53,591 (20,291)</td>
<td>44,590 (14,346)</td>
</tr>
</tbody>
</table>

**Urban-rural category**

<table>
<thead>
<tr>
<th>Category</th>
<th>2022</th>
<th>2021</th>
<th>2020</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>82.5 (54,494)</td>
<td>90.5 (4,742)</td>
<td>91.5 (43,172)</td>
<td>48.4 (6,580)</td>
</tr>
<tr>
<td>Large rural</td>
<td>7.2 (4,742)</td>
<td>5.2 (270)</td>
<td>4.1 (1,939)</td>
<td>18.6 (2,533)</td>
</tr>
<tr>
<td>Small rural</td>
<td>6.2 (4,069)</td>
<td>4.2 (218)</td>
<td>2.8 (1,334)</td>
<td>18.5 (2,517)</td>
</tr>
<tr>
<td>Isolated rural</td>
<td>4.1 (2,722)</td>
<td>0.2 (11)</td>
<td>1.6 (750)</td>
<td>14.4 (1,961)</td>
</tr>
<tr>
<td>Previous hospital admission % (N)</td>
<td>59.6 (39,359)</td>
<td>58.6 (3,071)</td>
<td>60.4 (28,509)</td>
<td>57.2 (7,779)</td>
</tr>
<tr>
<td>ICU admission in previous year % (N)</td>
<td>17.1 (11,268)</td>
<td>16.1 (846)</td>
<td>17.5 (8,269)</td>
<td>15.8 (2,153)</td>
</tr>
<tr>
<td>Facility characteristics</td>
<td>74.4 (49,157)</td>
<td>59.9 (3,140)</td>
<td>76.0 (35,890)</td>
<td>74.5 (10,127)</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>---------------</td>
<td>--------------</td>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Region % (N)</td>
<td>23.2 (15,328)</td>
<td>24 (1,259)</td>
<td>21.7 (10,236)</td>
<td>28.2 (3,833)</td>
</tr>
<tr>
<td>Midwest</td>
<td>19.4 (12,789)</td>
<td>28.3 (1,481)</td>
<td>20.9 (9,848)</td>
<td>10.7 (1,460)</td>
</tr>
<tr>
<td>Northeast</td>
<td>43.0 (28,360)</td>
<td>34.4 (1,805)</td>
<td>42.1 (19,876)</td>
<td>49.1 (6,679)</td>
</tr>
<tr>
<td>South</td>
<td>14.5 (9,550)</td>
<td>13.3 (696)</td>
<td>15.3 (7,235)</td>
<td>11.9 (1,619)</td>
</tr>
<tr>
<td>West</td>
<td>84.9 (56,028)</td>
<td>84.9 (4,451)</td>
<td>84.7 (39,968)</td>
<td>85.4 (11,609)</td>
</tr>
</tbody>
</table>

Chi-square test is used for comparisons of sex, race/ethnicity, missing race/ethnicity, NOK (next-of-kin) relationship, hospital admission in previous year, ICU admission in previous year, facility complexity, region, and urban-rural category. Analysis of variance is used for comparisons of age, Elixhauser comorbidity index, median household income of Veteran’s ZI.
<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>0-5 min</th>
<th>5-60 min</th>
<th>60+ min</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Palliative care consult</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes % (N)</td>
<td>66.6 (82,260)</td>
<td>66.5 (6,696)</td>
<td>67.9 (59,794)</td>
<td>61.9 (15,770)</td>
<td>&lt; .001</td>
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<tr>
<td><strong>Chaplain visit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes % (N)</td>
<td>80.7 (99,768)</td>
<td>80.1 (8,060)</td>
<td>81.2 (71,454)</td>
<td>79.4 (20,254)</td>
<td>&lt; .001</td>
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<tr>
<td><strong>Inpatient hospice unit</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Yes % (N)</td>
<td>36.0 (44,515)</td>
<td>33.4 (3,357)</td>
<td>37.7 (33,206)</td>
<td>31.2 (7,952)</td>
<td>&lt; .001</td>
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<tr>
<td><strong>Bereavement Support</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Yes % (N)</td>
<td>62.8 (77,622)</td>
<td>60.5 (6,092)</td>
<td>63.4 (55,785)</td>
<td>61.8 (15,745)</td>
<td>&lt; .001</td>
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<tr>
<td><strong>BFS-PM (unweighted)</strong></td>
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</tr>
<tr>
<td>Excellent % (N)</td>
<td>59.9 (36,387)</td>
<td>62.0 (3,252)</td>
<td>60.1 (28,356)</td>
<td>59.1 (8,031)</td>
<td>.02</td>
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<tr>
<td><strong>BFS-PM (weighted for non-response bias)</strong></td>
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<td></td>
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</tr>
<tr>
<td>Excellent % (N)</td>
<td>58.5 (66,645)</td>
<td>60.8 (5,972)</td>
<td>58.6 (51,631)</td>
<td>58.1 (15,014)</td>
<td>.003</td>
</tr>
</tbody>
</table>

BFS-PM = Bereaved Family Survey Performance Measure. P-value generated from chi-square test.
<table>
<thead>
<tr>
<th></th>
<th>Unadjusted</th>
<th>P value</th>
<th>Adjusted (facility characteristics only)</th>
<th>P value</th>
<th>Adjusted (Veteran characteristics only)</th>
<th>P value</th>
<th>Fully-Adjusted (facility and Veteran characteristics)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OR (CI)</strong></td>
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<td></td>
<td></td>
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<tr>
<td><strong>Palliative care consult</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-5 minutes</td>
<td>0.94 (0.90-0.98)</td>
<td>.004</td>
<td>0.87 (0.83-0.91)</td>
<td>&lt;.001</td>
<td>0.91 (0.87-0.96)</td>
<td>&lt;.001</td>
<td>0.85 (0.82-0.89)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>5-60 minutes (reference)</td>
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</tr>
<tr>
<td>60+ minutes</td>
<td>0.77 (0.74-0.79)</td>
<td>&lt;.001</td>
<td>0.76 (0.73-0.78)</td>
<td>&lt;.001</td>
<td>0.75 (0.73-0.78)</td>
<td>&lt;.001</td>
<td>0.78 (0.75-0.81)</td>
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<tr>
<td><strong>Chaplain contact</strong></td>
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</tr>
<tr>
<td>0-5 minutes</td>
<td>0.93 (0.89-0.98)</td>
<td>.008</td>
<td>0.89 (0.85-0.94)</td>
<td>&lt;.001</td>
<td>0.96 (0.91-1.01)</td>
<td>.13</td>
<td>0.91 (0.86-0.96)</td>
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<td>5-60 minutes (reference)</td>
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<td></td>
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</tr>
<tr>
<td>60+ minutes</td>
<td>0.90 (0.86-0.93)</td>
<td>&lt;.001</td>
<td>0.90 (0.87-0.93)</td>
<td>&lt;.001</td>
<td>0.90 (0.87-0.94)</td>
<td>&lt;.001</td>
<td>0.94 (0.90-0.98)</td>
<td>.002</td>
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<tr>
<td><strong>Death in a hospice unit</strong></td>
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<td></td>
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</tr>
<tr>
<td>0-5 minutes</td>
<td>0.83 (0.79-0.86)</td>
<td>&lt;.001</td>
<td>0.79 (0.75-0.83)</td>
<td>&lt;.001</td>
<td>0.80 (0.77-0.84)</td>
<td>&lt;.001</td>
<td>0.77 (0.73-0.80)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>5-60 minutes (reference)</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>60+ minutes</td>
<td>0.75 (0.73-0.77)</td>
<td>&lt;.001</td>
<td>0.69 (0.67-0.72)</td>
<td>&lt;.001</td>
<td>0.82 (0.79-0.85)</td>
<td>&lt;.001</td>
<td>0.76 (0.73-0.79)</td>
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<tr>
<td><strong>Bereavement</strong></td>
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</tr>
<tr>
<td>0-5 minutes</td>
<td>0.89 (0.85-0.92)</td>
<td>&lt;.001</td>
<td>0.87 (0.83-0.91)</td>
<td>&lt;.001</td>
<td>0.90 (0.86-0.94)</td>
<td>&lt;.001</td>
<td>0.89 (0.85-0.93)</td>
<td>&lt;.001</td>
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<tr>
<td>5-60 minutes (reference)</td>
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<tr>
<td>60+ minutes</td>
<td>0.93 (0.91-0.96)</td>
<td>&lt;.001</td>
<td>0.90 (0.87-0.92)</td>
<td>&lt;.001</td>
<td>0.93 (0.90-0.96)</td>
<td>&lt;.001</td>
<td>0.93 (0.90-0.96)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Facility characteristics include complexity level, Census region, whether facility had specialized inpatient hospice unit.
Veteran characteristics include sex, age, race/ethnicity, NOK (next-of-kin) relationship, Elixhauser comorbidity score, whether Veteran had a hospital admission in year prior to last admission, whether Veteran had an ICU stay in year prior to last admission, median household income of Veteran's ZIP code.
### Table 4-4 Odds Ratios of BFS-PM Quality of Care Indicator by Veteran's distance to facility

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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<tbody>
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<td>P value</td>
<td>OR (CI)</td>
<td>P value</td>
<td>OR (CI)</td>
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<td>Adjusted</td>
<td>Adjusted</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(facility</td>
<td>(Veteran</td>
<td>(Veteran</td>
<td>(facility and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>characteristics only)</td>
<td>characteristics only)</td>
<td>characteristics)</td>
<td>Veteran characteristics, quality of care indicators)</td>
</tr>
<tr>
<td>0-5 min.</td>
<td>1.09 (1.02-1.16)</td>
<td>.008</td>
<td>1.01 (0.95-1.08)</td>
<td>.67</td>
<td>1.08 (1.02-1.16)</td>
<td>.01</td>
</tr>
<tr>
<td>5-60 min. (reference)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-360 min.</td>
<td>0.98 (0.94-1.02)</td>
<td>.27</td>
<td>0.99 (0.95-1.03)</td>
<td>.58</td>
<td>0.97 (0.92-1.01)</td>
<td>.17</td>
</tr>
</tbody>
</table>

Facility characteristics include complexity level, Census region, whether facility had specialized inpatient hospice unit.

Veteran characteristics include sex, age, race/ethnicity, NOK (next-of-kin) relationship, Elixhauser comorbidity score, whether Veteran had a hospital admission in year prior to last admission, whether Veteran had an ICU stay in year prior to last admission, median household income of Veteran's ZIP code.

Quality of care indicators include palliative care consultation, chaplain contact, death in an inpatient hospice unit, and bereavement support.
CHAPTER 5:
CONCLUSION

We examined patterns in end-of-life (EOL) care in urban and rural areas, in existing research based in the U.S. and in an original study within the Veterans Affairs (VA) healthcare system. Additionally, we explored the extent to which observed differences could be explained by distance between Veterans’ residences and where they ultimately receive care. Our integrative review described the current state of literature comparing urban and rural EOL care, and identified gaps in research that our data-based studies could address. Both of our original studies are distinguished in the approach of measuring quality of EOL care broadly, incorporating family evaluations of care and indicators related to palliative, spiritual, and bereavement care. Although we found prior urban-rural comparisons of hospice care with similar findings, we contributed additional insight through studying this outcome and others in a geographically and clinically broad population while accounting for important facility-level characteristics. To our knowledge, our analysis based on driving time to facility is the first study of the relationship between distance and provision of EOL care on a national scale.

In our integrative review, we identified 21 studies that compared urban and rural EOL care in the U.S., which covered a variety of clinical settings, populations, and outcomes. Examining results organized by variables of Aday and Andersen’s framework for the study of access, we found that some variables were more frequently studied than others. Several studies devoted to utilization found that rural residents use hospice at lower rates and incur fewer costs near EOL, compared to urban residents. Only a few
studies examined Characteristics of the Healthcare Delivery System or Consumer Satisfaction with care. Studies of nursing homes showed urban-rural differences in the organization of care could be related to quality and outcomes of care.\textsuperscript{5,7,8} One study found similar levels of satisfaction with hospice between rural and urban patients and families,\textsuperscript{9} and another found that rural caregivers’ aversion to aggressive life-prolonging care at EOL to be aligned with that of comfort-focused hospice care.\textsuperscript{10} These findings highlighted the necessity of further investigating these variables in order to understand access to EOL care overall.

In Chapter 3, our comparison of quality of EOL care between urban and rural Veterans, we identified a similar trend of lower inpatient hospice use among rural Veterans within the VA system in unadjusted and fully adjusted models. However, despite this difference, we found no association between urban-rural residence and family evaluations of care in the fully adjusted model. We also discovered some small but significant associations between rurality and other quality indicators of palliative care consultation, chaplain contact, and bereavement support. Our findings from descriptive statistics and adjusted models supported the idea that facility-level characteristics played an important role in the observed differences. Observing Veterans by urban-rural category, we found that residence was strongly associated with facility complexity, region, and availability of a specialized inpatient hospice unit. Comparing results from partially adjusted models, we found that accounting for facility characteristics contributed to the differences in processes of care observed in fully adjusted models.

Examining the quality of EOL care by distance to facility in Chapter 4, we found that Veterans across distance categories had similar odds of “excellent” family
evaluations of care. Our hypothesis that Veterans who resided further from the facility of death would have poorer family evaluations of care was not supported. We did find, however, that distance was a significant factor influencing the types of care a Veteran received. In particular, residing more than an hour away from the facility of death was associated with lower odds of dying in an inpatient hospice unit and receiving palliative care, compared to Veterans who lived 5-60 minutes away. Unexpectedly, we found that Veterans who lived 0-5 minutes from the facility of death, also faced lower odds of receiving such care. We also found small but significantly lower odds of receiving chaplain contact and bereavement care for Veterans who lived 0-5 minutes away and more than 60 minutes away from facility of death, compared to the reference group.

Our research stresses the importance of soliciting patient and family feedback in research in both rural and EOL care. Measuring satisfaction is necessary for studying access to see whether people experienced differential treatment. While the lower use of VA inpatient hospice care among rural residents in our study and others appears alarming, our findings show that families of Veterans from all urban-rural categories rated care similarly. To inform observed differences in hospice in the general population, we recommend replicating our approach for decedents in non-VA settings, as the VA may be unique in its provision of EOL care. Family-reported outcomes are growing in importance in EOL care, especially for hospice. This study also speaks to the importance of evaluating EOL care across settings, including non-hospice settings where rural residents may be more likely to receive care. Excellence in EOL care is a worthy and achievable goal in settings outside of hospice. Despite rapid growth in use, less than half of our sample and American decedents overall die in hospice care. Ultimately, we
are still limited in our understanding of why rural populations use hospice less, even with our inclusion of survey feedback. One area that remains understudied is urban and rural residents’ perceived need for EOL care, which was addressed by only one study in our review.\textsuperscript{10} Understanding both urban and rural residents’ attitudes toward and perceptions of EOL care could be a direction for future research.

Together, the inconsistency of associations with rurality and the consistency of our findings with distance, imply that distance better explains differences in quality of EOL care. Rural residence is often taken as a proxy for poor access to care, but does not account for residents’ proximity to care, which varies widely within rural and urban categories. Our descriptive table in Chapter 4 shows that, although Veterans who lived under 60 minutes from the facility of death were mainly from urban areas, those who lived more than an hour away were mixed in residence (50.0% urban, 18.1% large rural, 18.1% small rural, and 13.8% isolated rural, in total sample). Conversely, inspecting driving times within categories reveals a substantial fraction of rural Veterans lived within 60 minutes of the facility of death (43.8% of Veterans from large rural areas, 36.3% small rural, 26.8% of isolated rural, in total sample). After accounting for distance in addition to urban-rural residence, associations between rurality and quality indicators changed. Specifically, the formerly significant, negative associations between receipt of palliative care and residence in large and small rural areas became nonsignificant, and the formerly nonsignificant association of being from an isolated rural area became significant and \textit{positive}. For death in an inpatient hospice, the association between this indicator and residence in large and small rural areas lessened in magnitude, and became nonsignificant for Veterans from isolated rural areas. Our finding that even Veterans who
lived very near facilities experienced lower odds of receiving all quality indicators, imply that access is not solely a rural issue, but is also a concern for those proximal to sites of care.

Given the observed association between distance and receipt of care, a logical implication is to expand the use of telehealth and home-based care for Veterans near EOL. New advances in technology and simple telephone calls could bridge geographic distances, especially in EOL care where many interventions are non-physical in nature. The VA has pioneered and expanded the telehealth for enrollees with a variety of numerous conditions and services, including phone-based palliative care for those with cancer,\textsuperscript{15} collaborative care for post-traumatic stress disorder,\textsuperscript{16} pain management,\textsuperscript{17} and chaplaincy.\textsuperscript{18} With 12\% of enrollees receiving some element of care through telehealth,\textsuperscript{19} it is possible that many Veterans and families in our study may have already benefited from such services, and we did not account for receipt of such care. Similarly, advances in technology and alternative models of care could narrow distance by bringing care into homes and communities. The VA has pioneered many community-based models of care for Veterans with severe functional limitations, including home-based primary care,\textsuperscript{20} hospital in the home,\textsuperscript{21} medical foster homes,\textsuperscript{22} and outpatient palliative care.\textsuperscript{23} Again, it is possible that Veterans who benefited from these models died in inpatient VA facilities and were included in our study, but those who died elsewhere were not. Although we were limited in our ability to account for alternative models and modes of delivering EOL care in our sample and analyses, our results show that there is much opportunity for growth.
This dissertation explored the relationships between urban and rural residence, geographic distance, and quality of EOL care. Our findings of differences among Veterans in EOL quality indicators, especially for hospice and palliative care, show a need for continued research in structural factors related to geography, including facility-level factors and distribution of sites of care. Rurality is a multidimensional concept, and its association to quality of EOL care deserves attention in and out of the VA. Nevertheless, our study showed that isolating one aspect correlated with rurality—distance to facility—could better explain urban-rural differences, and thus better identify populations at risk of missing important processes of care. Ultimately, our finding of similarities in evaluations of care across groups of Veterans underscores the importance of listening to families in order to contextualize these differences.
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