



Published in final edited form as:

Arch Intern Med. 2012 April 23; 172(8): 661–664. doi:10.1001/archinternmed.2012.268.

## Treatment Intensity at the End of Life in Older Adults Receiving Long-term Dialysis

**Susan P. Y. Wong, MD,**

Department of Medicine, Seattle, Washington

**William Kreuter, MPA,**

Center for Cost and Outcomes Research, Seattle, Washington

**Ann M. O'Hare, MD, MA**

Department of Medicine; University of Washington, and Veterans Affairs Puget Sound Healthcare System, Seattle, Washington

---

Life expectancy after the initiation of long-term dialysis is often severely limited in the elderly,<sup>1</sup> and it is becoming increasingly clear that many older patients who are receiving dialysis experience a significant burden of concomitant illness,<sup>2</sup> functional limitation,<sup>3</sup> and symptoms.<sup>4</sup> Such considerations have fostered a growing interest in end-of-life care and advanced care planning in this population.

Relatively little is known about the contemporary patterns and determinants of end-of-life care among older patients who are receiving long-term dialysis. Available data indicate that hospice referral is infrequent in this population and that rates of hospice referral and dialysis discontinuation vary substantially across regions.<sup>5</sup> To our knowledge, detailed information on other aspects of health care utilization at the end of life, including hospitalization, intensive care unit (ICU) admission, and use of intensive procedures, has not been reported for this population. Herein, we present the results of a retrospective mortality study to characterize the end-of-life care practices among older Medicare beneficiaries who are receiving long-term dialysis.

### Methods.

Using data from the United States Renal Data System (USRDS), a comprehensive registry for end-stage renal disease (ESRD), we identified 99 329 fee-for-service Medicare patients aged 65 years and older who initiated long-term dialysis between January 1, 2004, and

---

**Correspondence:** Dr Wong, Department of Medicine, University of Washington, 1959 Pacific St NE, PO Box 359945, Seattle, WA 98195 (spywong@uw.edu).

**Author Contributions:** All authors had full access to all the data in the study and take responsibility for the integrity of the data and accuracy of the data analysis. *Study concept and design:* Wong and O'Hare. *Acquisition of data:* Wong, Kreuter, and O'Hare. *Analysis and interpretation of data:* Wong and O'Hare. *Drafting of the manuscript:* Wong. *Critical revision of the manuscript for important intellectual content:* Wong, Kreuter, and O'Hare. *Statistical analysis:* Wong. *Obtained funding:* O'Hare. *Administrative, technical, and material support:* Kreuter and O'Hare. *Study supervision:* O'Hare.

**Additional Contributions:** The *Dartmouth Atlas of Health Care* supplied the EOL-EI on hospital referral regions.

**Publisher's Disclaimer: Disclaimer:** This work was conducted at the University of Washington and does not represent the opinion of the USRDS.

**Financial Disclosure:** None reported.

December 31, 2007, and died before January 1, 2009. Information regarding their sociodemographic background, coexisting illnesses at onset of dialysis, primary cause of ESRD, primary cause of death, and whether they were referred to hospice before death was extracted from USRDS files. This study was approved by the institutional review board at the University of Washington, Seattle.

Using inpatient and outpatient Medicare claims supplied by the USRDS, we ascertained information on hospitalization, ICU admission, and use of the following intensive procedures during the final month of life: mechanical ventilation, feeding tube placement, and cardiopulmonary resuscitation. Patients were assigned to a hospital referral region based on their zip code at the onset of ESRD. We used an end-of-life care expenditure index (EOL-EI) based on deaths between 2000 and 2003 from the *Dartmouth Atlas of Health Care* (<http://www.dartmouthatlas.org/>) to characterize each region's level of health care spending among older Medicare beneficiaries during the last 6 months of life.<sup>6</sup> Regions were categorized into quintiles of EOL-EI, with the first quintile representing regions with the lowest EOL-EI; and the fifth quintile, regions with the highest. Using multivariate logistic regression, we measured the association of individual patient characteristics and quintile of EOL-EI with hospitalization, ICU admission, and use of intensive procedures during the final month of life.

## Results.

Altogether, 76.0% of patients were hospitalized, 48.9% were admitted to an ICU, and 29.0% received at least 1 intensive procedure during the final month of life. The most common procedure was mechanical ventilation (22.2%), followed by cardiopulmonary resuscitation (11.9%) and feeding tube placement (3.9%).

In adjusted analyses, use of intensive procedures was more common among patients who were black (40.9% vs 35.6%; odds ratio [OR], 1.68; 95% CI, 1.61–1.76), who were 75 years or younger (34.7% vs 24.8%; OR, 1.48; 95% CI, 1.43–1.54), and who died of cardiovascular causes (35.4% vs 25.2%; OR, 1.39; 95% CI, 1.34–1.44). Use of intensive procedures did not differ greatly by sex, cause of ESRD, comorbid illness, or duration on long-term dialysis (data available on request). After differences in patient characteristics were adjusted for, patients living in regions in the highest quintile of EOL-EI as compared with the lowest quintile of EOL-EI were more likely to be hospitalized (79.7% vs 69.0%; OR, 1.60; 95% CI, 1.50–1.71), to be admitted to an ICU (55.5% vs 40.9%; OR, 1.62; 95% CI, 1.54–1.71), and to undergo an intensive procedure (36.4% vs 20.1%; OR, 1.61; 95% CI, 1.51–1.71) during the final month of life.

## Comment.

Older Medicare beneficiaries who are receiving long-term dialysis experience very high rates of hospitalization, ICU admission, and use of intensive procedures during the final month of life. Intensity of care at the end of life in this population is substantially higher than that reported for other Medicare beneficiaries with life-limiting illnesses (Table).<sup>7–9</sup> Receipt of intensive procedures was more strongly and consistently associated with level of

regional health care spending than with individual patient characteristics. While patterns of end-of-life care should ideally reflect patient values and preferences, these findings appear to suggest that end-of-life care among older patients who are receiving dialysis may be driven more by practice-related factors.

## Funding/Support:

**Dr O'Hare was supported by a Beeson Career Development Award from the National Institute of Aging (5K23AG028980) and by an interagency agreement between the Veterans Affairs Puget Sound Healthcare System and the Centers for Disease Control.**

Dr O'Hare was supported by a Beeson Career Development Award from the National Institute of Aging (5K23AG028980) and by an interagency agreement between the Veterans Affairs Puget Sound Healthcare System and the Centers for Disease Control.

## References

1. Kurella M, Covinsky KE, Collins AJ, Chertow GM. Octogenarians and nonagenarians starting dialysis in the United States. *Ann Intern Med.* 2007;146 (3):177–183. [PubMed: 17283348]
2. US Renal Data System. *USRDS 2010 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the United States* Bethesda, MD: National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases; 2010.
3. Kurella Tamura M, Covinsky KE, Chertow GM, Yaffe K, Landefeld CS, McCulloch CE. Functional status of elderly adults before and after initiation of dialysis. *N Engl J Med.* 2009;361(16):1539–1547. [PubMed: 19828531]
4. Murtagh FE, Addington-Hall J, Higginson IJ. The prevalence of symptoms in end-stage renal disease: a systematic review. *Adv Chronic Kidney Dis.* 2007;14(1):82–99. [PubMed: 17200048]
5. O'Hare AM, Rodriguez RA, Hailpern SM, Larson EB, Kurella Tamura M. Regional variation in health care intensity and treatment practices for end-stage renal disease in older adults. *JAMA.* 2010;304(2):180–186. [PubMed: 20628131]
6. Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, Pinder EL. The implications of regional variations in Medicare spending, I: the content, quality, and accessibility of care. *Ann Intern Med.* 2003;138(4):273–287. [PubMed: 12585825]
7. Unroe KT, Greiner MA, Hernandez AF, et al. Resource use in the last 6 months of life among medicare beneficiaries with heart failure, 2000–2007. *Arch Intern Med.* 2011;171(3):196–203. [PubMed: 20937916]
8. Setoguchi S, Glynn RJ, Stedman M, Flavell CM, Levin R, Stevenson LW. Hospice, opiates, and acute care service use among the elderly before death from heart failure or cancer. *Am Heart J.* 2010;160(1):139–144. [PubMed: 20598984]
9. Goodman DC, Esty AR, Fisher ES, Chang CH. *Trends and Variation in End-of-Life Care for Medicare Beneficiaries With Severe Chronic Illness: A Report of the Dartmouth Atlas Project.* Lebanon, NH: Dartmouth Institute for Health Policy & Clinical Practice; 2011.:

**Table**

## Intensity of Care During the Final Month of Life

Intensity of Care	Medicare Beneficiaries		
	Dialysis (Present Study)	Cancer <sup>7</sup>	Heart Failure <sup>8,9</sup>
Hospitalization, %	76.0	61.3	64.2
Days hospitalized, mean	9.8	5.1	NA
Intensive care unit admission, %	48.9	24.0	19.0
Days in an intensive care unit, mean	3.5	1.3	NA
Any intensive procedure, %	29.0	9.0	NA
Hospice use, %	20.0	55.0	39.1
Death in a hospital, %	44.8	29.0	35.2

Abbreviation: NA, not available.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript