HHS Public Access

Author manuscript

J Gerontol Nurs. Author manuscript; available in PMC 2019 January 24.

Published in final edited form as:

J Gerontol Nurs. 2016 April ; 42(4): 34–41. doi:10.3928/00989134-20151124-02.

Prevalence of Advance Directives among Older Adults Admitted to Intensive Care Units and Requiring Mechanical Ventilation

Elise M. Gamertsfelder, BSN, RN, Staff RN,
Emergency Department, Northwest Memorial Hospital, Chicago, IL

Jennifer Burgher Seaman, PhD, RN [Postdoctoral Critical Care Research Fellow],
University of Pittsburgh, School of Medicine, Department of Critical Care Medicine, Pittsburgh, PA

Judith Tate, PhD, RN [Assistant Professor],
Ohio State University, College of Nursing, Columbus, OH

Praewpannarai Buddadhumaruk, MS Biostatistics, RN, Statistician, and
University of Pittsburgh, School of Medicine, Department of Critical Care Medicine, Pittsburgh, PA

Mary Beth Happ, PhD, RN, FGSA, FAAN [Distinguished Professor of Critical Care Research; Director]
Center of Excellence in Critical and Complex Care, Ohio State University, College of Nursing, Columbus, OH

Abstract

Advance directives (ADs) promote patient autonomy in the event of decisional incapacity and are associated with greater likelihood of treatment decisions and endpoints consistent with patient preferences and values. Older adults (OAs) are at high risk for serious illness involving hospitalization and potential decisional incapacity. We describe the prevalence of pre-hospital AD completion in a sample of 450 critically-ill OAs experiencing ≥2 days of mechanical ventilation and compare those with and without ADs on demographic and clinical characteristics. The overall AD completion rate was 42.4%, with the oldest old (85+years) and those with greater pre-hospital functional disability more likely to have completed an AD. No differences on AD completion were noted by sex, racial category, or admitting diagnosis. The relatively low prevalence of ADs among OAs who experienced critical illness and a relatively high mortality rate (24%) suggests a need for greater awareness and education around AD completion.

Keywords

older adults; critical care; advance directives; advance care planning

All correspondence should be directed to: Jennifer B. Seaman, PhD RN, Postdoctoral Critical Care Research Fellow, University of Pittsburgh, School of Medicine, Department of Critical Care Medicine, CRISMA Center, 607 Scaife Hall, 3550 Terrace St., Pittsburgh, PA 15261, jbs31@pitt.edu, 412 352 6545.

Background

Recent public awareness campaigns about end of life care and the inclusion of advance care planning provisions in the Patient Protection and Affordable Care Act have brought the topic of preparing for the end of life into the public arena. Since the Patient Self-Determination Act was passed in 1990, all Medicare-certified institutions are required to offer patients information about advance directives ("Omnibus Budget Reconciliation Act of 1990," 1990). Advance directives are widely viewed as the cornerstone of advance care planning, and can include both instructions about what kind of care should be provided (living wills) and who makes the decisions (proxy decision-making) in the event that the patient cannot (Gillick, 2004). Advance care planning (ACP) is an ongoing process in which a patient and their family members discuss their goals, values and beliefs with his or her healthcare provider. These goals are then documented in accordance with the patient's wishes, though the primary intent of ACP is not to make the documents, but to make certain that the care the patient receives is consistent with his or her wishes. These documents that the patient and healthcare provider complete together are known as advance directives, either a living will or the appointment of a Durable Power of Attorney for Health Care (http://www.uptodate.com/contents/advance-care-planning-and-advance-directives). Controversy exists over their applicability across all potential disease processes, as even the most detailed directives cannot anticipate or address all possible future health situations (Gillick, 2004). However, advance directives have long been endorsed as a means of providing patients with the ability to influence treatment decisions after losing decision-making capacity (Hopp, 2000).

Advance directives were originally designed as a means of protecting patient autonomy. In health care, autonomy is interpreted as the right to choose or refuse different types of treatment (Beauchamp & Childress, 2013). Evidence shows that advance directives have a significant effect on the outcomes of decision-making, and patients who have completed an advance directive are more likely to receive treatment consistent with their wishes (Silveira, Kim, & Langa, 2010). Despite their potential limitations, advance directives may represent the best option for facilitating and preserving autonomy in the event a patient experiences decisional incapacity.

Like other means of prevention, advance directives are underutilized. Despite being low-cost, low-tech, and having the potential to influence treatment decisions (Gillick, 2004), a nationwide survey conducted in 2009–2010 showed the prevalence of advance directive completion to be only 26% (Rao, Anderson, Lin, & Laux, 2014). However, advance directive completion appears to vary with age; the percentage of advance directive completion is estimated to be as high as 70% among community-dwelling older adults (Teno, Gruneir, Schwartz, Nanda, & Wetle, 2007). This is not surprising, given that older adults are at greatest risk for serious illness, loss of decision-making capacity and receipt of care inconsistent with their wishes. In addition, those who have been admitted to the emergency department or acute care have likely been asked on intake about ADs, which may serve to prompt those individuals to consider them.

As the prevalence of multiple chronic conditions rises (Ward & Schiller, 2013), a growing number of older adults are at risk for episodes of acute and critical illnesses. This higher

likelihood of serious illness results in an increased risk for admission to the ICU and concomitant receipt of mechanical ventilation (Wunsch et al., 2010). During this time, critically ill older adults may be unable to participate fully in treatment decision making. Longer duration of mechanical ventilation is associated with an increased risk for long-term functional impairment (Chelluri et al., 2004), which may result in treatment endpoints such as tracheostomy, long term mechanical ventilation, feeding tube placement, and the need for long term care—endpoints which may be inconsistent with patients' wishes. Thus, quality improvement strategies such as completion of advance directives, are warranted to ensure that treatment decisions are consistent with patient's preferences, values, and prior expressed wishes.

Although there is a considerable volume of research on the importance and value of completing advance directives, little data exists on their prevalence among older adults who require acute care. The existing research on advance directive completion rates has been conducted primarily with community-dwelling older adults, those in long term care settings (Kossman, 2014) or with narrowly-defined patient populations in various acute care settings (Sessanna & Jezewski, 2008). A review by Kossman of the prevalence of advance directives among older adults found that in general, rates of advance directive completion were highest among Caucasians, women and those who were older (2014). Specifically, data are lacking on advance directive completion among critically ill older adults and the demographic characteristics associated with advance directive completion within this population. This study aims to determine advance directive prevalence among a sample of critically ill older adults and compare those with and without advanced directives by category of age, sex, racial category, ICU unit, admission diagnosis, and pre-hospital functional dependence.

Methods

Participants

The data used for this report originate from a parent study involving 960 randomly selected mechanically ventilated patients admitted to one of four ICUs within two hospitals in a large Mid-Atlantic academic health system over a 24-month period. Patients were adults (≥ 18 years of age), received mechanical ventilation for 2 or more days in the ICU, and met basic communication criteria (alert, awake, responding to commands) for at least one 12-hour shift (Happ et al., 2015). The sample was part of a larger trial of a multi-component intervention to improve nurse-patient communication among mechanically ventilated patients and a companion study which explored communication between mechanically ventilated patients and clinicians regarding decisions about life-sustaining treatment. Patients were sampled equally from each ICU, 30 per quarter (3-month intervals) for a period of 8 quarters (n=240 patient/ICU). We excluded neurology and neurotrauma ICU's from the sampling pool.

Of the 960 patients in the sample, 450 (46.9%) were older adults, defined as ≥ 65 years of age. A retrospective chart review was completed to assess for patient-reported presence of an advance directive on admission, as well as basic as well as basic demographic information including age, race, gender, severity of illness, ICU unit type, admitting diagnoses, pre-admission functional status, and disposition. Severity of illness was scored using the APACHE III scale (Knaus et al., 1991). Preadmission functional status was measured using

a methodology developed by Finch (Finch, Kane, & Philp, 1995) and adapted for survivors of mechanical ventilation by Barnato and colleagues (2011) that employs admission assessment data pertaining to activities of daily living (ADL) and instrumental activities of daily living (IADL) to a weighted, scaled score, 0–100 (where zero indicates no functional disability and 100 indicates total functional disability) for each measure. The patients were categorized based on age as follows: young old (65–74), middle old (75–84), and oldest old (85+) ("National Health Interview Survey," 2013; Seccombe & Ishii-Kuntz, 1991). In this study, an advance directive was defined as a living will, durable power of attorney for health care, or other medical directive signed by the patient. The presence of an advance directive was determined by evaluating the documented response to the question, "Does the patient have advance directives?"—which is found in the electronic medical record (EMR) admission assessment. The patient was considered to have an advance directive if the response selected was "yes"; or there was a scanned copy of the document in the EMR, predating the date of admission. Approval for this study was obtained from the University of Pittsburgh, Institutional Review Board.

Statistical Analyses

Data were scanned using Teleform version 6.2 (Cardiff software) and analyzed using SPSS, version 20. Descriptive statistics were calculated for the total sample and by major grouping variables: age, sex, and racial category, severity of illness on admission, admitting diagnosis, ICU unit type, pre-hospital functional dependence and disposition. The presence of an advance directive on admission was described using the mode, frequency, and distribution of the respective categories. Age categories (young old, middle old, and oldest old) were compared to determine if advance directive presence differed significantly using chi-square contingency table analysis. Comparisons for advance directive prevalence were also be made for sex, racial category, ICU unit type, admitting diagnosis, and pre-hospital functional dependence using t-tests for the continuous type variables and chi-square contingency table analysis for the categorical type variables. The level of significance was set at 0.05.

Results

The demographic and clinical characteristics of the sample are shown in Table 1. Although the patients were sampled equally from 4 different ICUs (240 from each), the majority of those 65 years and older were from either the Medical Intensive Care Unit (MICU) or Cardiovascular Intensive Care Unit (CVICU). As shown in Table 1, the mean age was 76 years and respiratory conditions were the primary cause of admission. Most were able to function independently prior to admission to the hospital; although pre-hospital functional dependence scores ranged from zero to 100 and the mean scores for ADL and IADL disability were 18.9 and 20.2 respectively, the median for both was zero. Twenty-four percent of subjects in this sample did not survive the hospitalization, which is consistent with the high acuity of disease.

Rates of advance directive completion are reported in Table 2, comparing those with and without advance directives by age category, sex, racial category, ICU unit type, admitting diagnosis, and pre-hospital functional dependence. The overall rate of advance directive

completion was less than half (42.4%) for the total sample. There were significant differences between age groups in the rate of advance directive completion among categories of age with the rate of advance directive completion lowest among the young old (32.8%) and highest among the oldest old (53.6%), (χ2=13.76, df=2, p=.001). Although the rates of advance directive completion were slightly less for males and non-whites, the differences were not statistically significant. There were no significant differences in advance directive completion by admission diagnosis (χ2=13.89, df=9, p=.126); however, there were differences by ICU type and pre-hospital function. Those in the trauma and transplant ICUs had higher rates of advance directive completion (58.8% and 45.5%, respectively) while those in the medical and cardiovascular ICUs had lower rates (39.3% and 34.7%, respectively). Those with greater pre-hospital functional dependence (on both scales –ADL and IADL) had higher rates of advance directive completion (t=−1.98, df=361, p=.049; t= −2.35, df=353, p=.019). No differences in pre-hospital advance directive completion were seen by survival status. Analysis of differences between patient with and without advance directives, while adjusting for covariates, showed that membership in the middle and oldest old groups was associated with approximately double the odds of having an advance directive (Table 3). Neither sex nor pre-hospital functional dependence were independently associated with higher odds of having an advanced directive, and although not significant (p= 0.133) the large effect size associated with being a racial minority (odds ratio [OR] = 0.55, 95% confidence interval [CI] = [0.25, 1.20]) suggests that in a larger sample, minority status may be associated with lower odds of having an advance directive (Table 3). Significant differences in advance directive completion by site were observed. Patients at Site A were half as likely to have an advance directive (OR = 0.54, 95% CI = [0.35, 0.85], p = 0.008) compared with those at Site B, after adjusting for age, sex race, and pre-hospital functional status (Table 3.)

Discussion

The current study presents unique findings regarding advance directive completion among older adults admitted to specialty ICUs and requiring mechanical ventilation.The relatively high mortality rate (24%) of adults with relatively good functional status prior to admission highlights the sudden and unexpected nature of critical illness. The findings reflect a higher rate than those of Beesley et al. (2015), who in a study of all adult patients admitted to the shock-trauma ICU of a Western United States academic referral center reported 13.9% of patients had an advance directive, and the mean age of those with advance directives was significantly higher than those without advance directives. However, the overall rate observed (42.4%) in the current study was lower than that seen in studies of older adults in long-term care, where 51.2% to 70% of patients completed advance directives (Rao et al., 2014).

Although many older adults who reside in long-term care facilities have already had conversations about advance care planning, and research shows that those with chronic conditions are more likely to have completed advance directives (Rao et al., 2014), many older adults in the current sample who experienced critical illness may not have participated in similar conversations or care planning and did not complete advance directives. Although it is possible patients did not anticipate ICU admission or mechanical ventilation, they were

at increased risk for both due to their age. For older adults who unexpectedly require critical care services, advance directives may help guide the use of life-sustaining treatment choices early and throughout the course of critical illness, and may ensure that those choices are consistent with their values and preferences.

It is not clear why we observed significantly different rates of advance directive completion among the different ICU types. The relatively high rate of completion among patients in the transplant unit (45.5%) is understandable given the chronic nature of both conditions that lead to transplantation and the post-transplantation course. However, the reason for the relatively high rate of advance directive completion (58.8%) seen among those older adults admitted to the trauma ICU, compared with rates for those in the medical and cardiovascular ICUs (39.3% and 34.7%, respectively), is not readily apparent. The possible confounding effect of ICU site was explored because medical and cardiovascular ICUs were located at Site A (an urban tertiary care teaching hospital in an inner-city neighborhood), whereas trauma and transplant ICUs were located at site B (a quaternary care, academic referral hospital that draws its patient population from a wider, more varied geographic area). In fact, analysis showed that patients from Site A were only half as likely than those from Site B to have completed an advance directive prior to ICU admission, suggesting that the demographic profile of the different hospital populations may be associated with different rates of advance directive completion.

In addition, although greater pre-hospital functional disability (ADLs and IADLs) was correlated with significantly higher rates of advance directive completion in the unadjusted analysis, its results did not show pre-hospital functional disability as an independent predictor of advance directive completion. One explanation for this finding is the potential confounding effect of age; once controlled for age group (which was positively correlated with functional disability) and other covariates (i.e., sex, race, and ICU site), no significant difference emerged.

Our findings underscore the need for a more widespread completion of advance directives, especially given the high mortality rate of the acutely ill older adults in our study. This sentiment is echoed in a recent report by Kossman (2014), which calls for evidence about when and how to increase rates of advance directive completion among older adults. Advance directives should be completed as part of advance care planning, a process of structured discussions that include eliciting individual values and goals for a range of scenarios, involving the health care proxy, and reviewing periodically (Emanuel, Danis, Pearlman, & Singer, 1995). Reimbursement for such advance care planning discussion during annual well-visits was originally included the Affordable Care Act (ACA); however, this provision was withdrawn shortly after the passage of the bill in 2010. Findings by Keary and Moorman from 2011 survey data demonstrate persistently low incidence (< 1%) of advance care planning conversations between Medicare beneficiaries and their primary care physicians despite the evidence for benefit (2015). Without mechanisms in place to provide structured opportunities for advance care planning conversations, the rate of advance directive completion among older adults, especially those who are younger and without existing health problems is likely to remain low. Furthermore, these individuals may be more likely to complete advance directives through the assistance of legal professionals, as

opposed to health care professionals. A lack of advance directives, or directives that are not situated in ongoing advance care planning conversations with a health care professional (and optimally with decisional surrogates), may increase the likelihood of care not consistent with the patient's preferences and values.

Limitations

Because all subjects in this study came from within the same academically affiliated health system in Southwestern Pennsylvania and the sample is racially homogenous, the generalizability of these findings is limited. Additionally, the data were collected via retrospective electronic health record review, which may not accurately reflect the existence of an advance directive. Finally, there was a significant amount of missing data on pre-hospital functional disability, resulting in lower power to detect difference related to this variable.

Conclusion

Advance directives are low-cost, low-tech, and effective in influencing treatment decisions and protecting patient autonomy (Gillick, 2004), but are under-utilized in the acutely ill older adult population. With an overall completion rate of 42.4% in our sample, these findings illustrate an ongoing gap between what is recommended and what is executed for community dwelling older adults. Specifically the young old subgroup, those aged 65–74, might be targeted for advance directive completion during routine annual well-visits at a time when they have full decisional capacity, an ability to reflect and to discuss options and wishes with their care provider. Programs supporting advance directive completion are warranted and further research is needed to investigate barriers to advance directive completion in this age group.

Acknowledgments

We wish to acknowledge funding support from: Greenwall Foundation Kornfeld Program on Bioethics and Patient Care; Robert Wood Johnson Foundation INQRI program; John A. Hartford Foundation Patricia G. Archbold Scholarship; National Institute for Nursing Research; and The University of Pittsburgh, Undergraduate Research Mentorship Program

Funding: Greenwall Foundation Kornfeld Program on Bioethics and Patient Care; Robert Wood Johnson Foundation INQRI program; John A. Hartford Foundation Patricia G. Archbold Scholarship; National Institute for Nursing Research; and University of XXX Undergraduate Research Mentorship Program

References

Allegheny County PA QuickFacts. (2013). from United States Census Bureau.

Barnato AE, Albert SM, Angus DC, Lave JR, & Degenholtz HB (2011). Disability among elderly survivors of mechanical ventilation. Am J Respir Crit Care Med, 183(8), 1037–1042. doi: 10.1164/rccm.201002-0301OC [PubMed: 21057004]

Beauchamp TL, & Childress JF (2013). Principles of biomedical ethics (Vol. 7th ed.). NYC.

Chelluri L, Im KA, Belle SH, Schulz R, Rotondi AJ, Donahoe MP,Pinsky MR (2004). Long-term mortality and quality of life after prolonged mechanical ventilation. Crit Care Med, 32(1), 61–69. doi: 10.1097/01.ccm.0000098029.65347.f9 [PubMed: 14707560]

Emanuel LL, Danis M, Pearlman RA, & Singer PA (1995). Advance care planning as a process: structuring the discussions in practice. J Am Geriatr Soc, 43(4), 440–446. [PubMed: 7706637]

Finch M, Kane RL, & Philp I (1995). Developing a new metric for ADLs. J Am Geriatr Soc, 43(8), 877–884. [PubMed: 7636095]

Gillick MR (2004). Advance care planning. N Engl J Med, 350(1), 7–8. doi: 10.1056/NEJMp038202 [PubMed: 14702421]

Happ MB, Seaman JB, Nilsen ML, Sciulli A, Tate JA, Saul M, & Barnato AE (2015). The number of mechanically ventilated ICU patients meeting communication criteria. Heart Lung, 44(1), 45–49. doi: 10.1016/j.hrtlng.2014.08.010 [PubMed: 25261939]

Hopp FP (2000). Preferences for surrogate decision makers, informal communication, and advance directives among community-dwelling elders: results from a national study. Gerontologist, 40(4), 449–457. [PubMed: 10961034]

Keary S, & Moorman SM (2015). Patient-Physician End-of-Life Discussions in the Routine Care of Medicare Beneficiaries. J Aging Health. doi: 10.1177/0898264315569458

Knaus WA, Wagner DP, Draper EA, Zimmerman JE, Bergner M, Bastos PG, Damiano A (1991). The APACHE III prognostic system. Risk prediction of hospital mortality for critically ill hospitalized adults. Chest, 100(6), 1619–1636. doi: 10.1378/chest.100.6.1619 [PubMed: 1959406]

Kossman DA (2014). Prevalence, views, and impact of advance directives among older adults. J Gerontol Nurs, 40(7), 44–50. doi: 10.3928/00989134-20140310-01

Kwak J, & Haley WE (2005). Current research findings on end-of-life decision making among racially or ethnically diverse groups. Gerontologist, 45(5), 634–641. [PubMed: 16199398]

McCormick WC (2015). New CPT Codes for Advance Care Planning: Communicating Future Health Choices. J Gerontol Nurs, 41(3), 59–60. doi: 10.3928/00989134-20150211-01

National Health Interview Survey. (2013). In Prevention C. f. D. C. a (Ed.), cdc.gov (Vol. http://www.cdc.gov/nchs/data/nhis/earlyrelease/earlyrelease201303_12.pdf).

Omnibus Budget Reconciliation Act of 1990, (1990).

Rao JK, Anderson LA, Lin FC, & Laux JP (2014). Completion of advance directives among U.S. consumers. Am J Prev Med, 46(1), 65–70. doi: 10.1016/j.amepre.2013.09.008 [PubMed: 24355673]

Seccombe K, & Ishii-Kuntz M (1991). Perceptions of problems associated with aging: comparisons among four older age cohorts. Gerontologist, 31(4), 527–533. [PubMed: 1894157]

Sessanna L, & Jezewski MA (2008). Advance Directive Decision Making Among Independent Community-Dwelling Older Adults: A Systematic Review of Health Science Literature. Journal of Applied Gerontology, 27(4), 486–510. doi: 10.1177/0733464808315286

Silveira MJ, Kim SY, & Langa KM (2010). Advance directives and outcomes of surrogate decision making before death. N Engl J Med, 362(13), 1211–1218. doi: 10.1056/NEJMsa0907901 [PubMed: 20357283]

Teno JM, Gruneir A, Schwartz Z, Nanda A, & Wetle T (2007). Association between advance directives and quality of end-of-life care: a national study. J Am Geriatr Soc, 55(2), 189–194. doi: 10.1111/j.1532-5415.2007.01045.x [PubMed: 17302654]

Ward BW, & Schiller JS (2013). Prevalence of multiple chronic conditions among US adults: estimates from the National Health Interview Survey, 2010. Prev Chronic Dis, 10, E65. doi: 10.5888/pcd10.120203 [PubMed: 23618545]

Wunsch H, Linde-Zwirble WT, Angus DC, Hartman ME, Milbrandt EB, & Kahn JM (2010). The epidemiology of mechanical ventilation use in the United States. Crit Care Med, 38(10), 1947–1953. doi: 10.1097/CCM.0b013e3181ef4460 [PubMed: 20639743]

Zaide GB, Pekmezaris R, Nouryan CN, Mir TP, Sison CP, Liberman T, Wolf-Klein GP (2013). Ethnicity, race, and advance directives in an inpatient palliative care consultation service. Palliat Support Care, 11(1), 5–11. doi: 10.1017/s1478951512000417 [PubMed: 22874132]

Key Points

1. Older adults are at risk for serious illness, which may result in ICU admission and the loss of capacity to participate in decision making about their care.
2. Advance directives, especially those formulated as part of advance care planning conversations, have been shown to increase the likelihood that patients who lose decisional capacity will receive care consistent with their preferences and values.
3. Older adults in the middle old (75–84) and oldest old (85+) groups had nearly double the odds of having an advance directive, compared with those in the young old subgroup.
4. Those in the young old subgroup (those aged 65–74) could benefit from targeted interventions aimed at AD completion during routine annual well-visits, at a time when they have full decisional capacity and the opportunity to reflect and discuss options and preferences with their care provider.

Table 1.

Demographic and Clinical Characteristics

Characteristic	N=450
Age, mean (SD)	76.2 (7.2)
Male sex, n (%)	208 (46.2)
Racial Category, n (%)	
Caucasian	400 (88.9)
African-American	43 (9.6)
Other/Unknown	7 (1.6)
APACHE-III score, mean (SD)	77.9 (24.9)
ICU Unit Type, n (%)	
Cardiovascular	147 (32.7)
Medical	140 (31.1)
Trauma	86 (19.1)
Transplant	77 (17.1)
Admission Diagnosis n (%)	
Respiratory	159 (35.3)
Cardiovascular†	76 (16.9)
Post-surgical	68 (15.1)
Gastrointestinal	45 (10.0)
Neurological	32 (7.1)
Sepsis	31 (6.9)
Trauma	24 (5.3)
Transplant	8 (1.8)
Renal-Liver	4 (0.9)
Other§	3 (0.7)
Pre-hospital functional dependence, mean ±SD(range)	
ADLs (n= 363) ∞	18.9±32.8(0–100)
IADLs (n=355) ∞	20.2±30.2(0–100)
Mortality*, n (%)	108 (24.0)

SD- standard deviation; APACHE-III – Acute Physiology Age and Chronic Health Evaluation (APACHE) III score

*Those not surviving the hospitalization during which the ICU admission took place.

†includes Cardio/thoracic/vascular surgery, cardiomyopathy, myocardial infarction, and arrhythmia

§includes hematology/oncology and endocrine

∞. The proportion reported is among patients with non-missing data; we report the number of subjects with non-missing data in parenthesis.

Table 2.

Comparison of those with and without Advance Directives by Demographic and Clinical Characteristics

Demographic/Clinical Characteristic	Total (n=450)	AD on admission (n=191)	No AD on admission (n=259)	χ^2	p-value
Age group					
Young old (65–74)	198 (**44.0%**)	65(34.0%)	133(51.4%)	13.76	.001
Middle old (75–84)	196 (**43.6%**)	96(50.3%)	100(38.6%)		
Oldest old (85+)	56 (**12.4%**)	30(15.7%)	26(10.0%)		
Sex					
Male	208 (**46.2%**)	86(45.0%)	122(47.1%)	0.19	.662
Female	242 (**53.8%**)	105(55.0%)	137(52.9%)		
Racial Category					
Caucasian	400 (**88.9%**)	176(92.1%)	224(86.5%)	3.57	.168
African American	43 (**9.6%**)	13(6.8%)	30(11.6%)		
Other/Unknown	7 (**1.6%**)	2(1.0%)	5(1.9%)		
ICU Unit Type					
Cardiovascular	147 (**32.7%**)	51(26.7%)	96(37.1%)	13.14	.004
Medical	140 (**31.1%**)	55(28.8%)	85(32.8%)		
Trauma	86 (**19.1%**)	50(26.2%)	36(13.9%)		
Transplant	77 (**17.1%**)	35(18.3%)	42(16.2%)		
Pre-hospital functional dependence, mean ±SD					
ADLs (n= 363) $^{\infty}$	18.9±32.8	22.6±34.6	15.8±31.0	t= −1.98	.049
IADLs (n=355) $^{\infty}$	20.2±30.2	24.4±33.2	16.7±27.2	t= −2.35	.019

$^{\infty}$The proportion reported is among patients with non-missing data; we report the number of subjects with non-missing data in parenthesis.

TABLE 3.

Multivariate Logistic Regression

Predictor Variable	Odds Ratio (95% CI)	p-value
Age group		0.021
Young old (65–74)	Reference	-
Middle old (75–84)	1.90 (1.18 – 3.06)	0.008
Oldest old (85+)	1.81 (0.91 – 3.60)	0.093
Female (vs. male)	0.99 (0.63 – 1.54)	0.956
Racial minority (vs. Caucasian)	0.55 (0.25 – 1.20)	0.133
UPMC Mercy (vs. UPMC Presbyterian)	0.54 (0.35 – 0.85)	0.008
ADL	1.00 (0.99 – 1.01)	0.690
IADL	1.01 (0.99 – 1.02)	0.440