

# Health Resource Utilization and Medical Care Cost of Acute Care Elderly Unit Patients

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## ABSTRACT

**Objective:** In this study we compared the readmissions, medical care cost, and health resource utilization (HRU) of acute care elderly (ACE) unit patients and usual medical care patients.

**Methods:** Retrospective case-control design was used. Patients admitted to ACE unit (n = 680) between 1999 and 2002 with primary admitting diagnosis of pneumonia, congestive heart failure, or urinary tract infection were randomly selected from the health-care system's administrative database. Equal number controls (n = 680) were selected from usual medical care services and were matched by DRG, age, ethnicity, and Charlson comorbidity score. Data on HRU, annual number of admissions before and after index admission, length of stay (LOS), and medical care cost were obtained. Bootstrap, *t*-test, and Wilcoxon test were used to compare cost, LOS, and number of readmissions between ACE and non-ACE unit. Multivariate log-

linear and Poisson regressions were used to assess the impact of ACE unit on incremental cost and number of readmissions, respectively.

**Results:** Mean LOS was 1 day shorter for ACE unit (4.9 vs. 5.9 *P* = 0.01). Mean cost of ACE unit was 9.7% lower than that of non-ACE unit (\$13,586 vs. \$15,040, *P* = 0.012). Both groups had similar costs of pharmacy, diagnostic and therapeutic procedures. Multiple log-linear and Poisson regression models indicated that ACE unit patients had 21% lower cost and 11% lower annual readmissions.

**Conclusions:** Our results confirm the hypotheses that ACE unit patients have lower medical care cost, shorter LOS, and fewer readmissions. Thus, ACE unit may be a beneficial model for improved inpatient care of elderly.

**Keywords:** acute care elderly unit, incremental cost, medical care cost, readmissions.

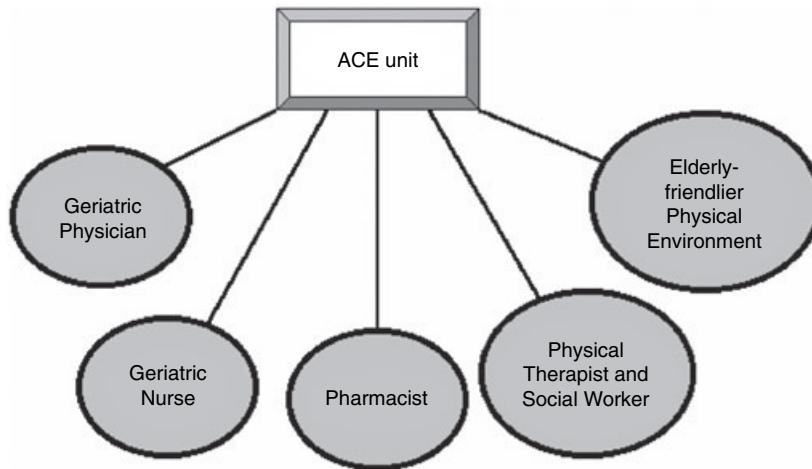
## Introduction

Of the total US population, 13% are elderly (65 years or older). Nevertheless, the elderly account for 31% of \$1.4 trillion spent on national health care [1,2] and are the major consumers of inpatient health care in the United States [1]. Because of a growing number of elderly, as well as the aging of the elderly population, hospitals must be prepared to treat their special needs in a more cost-effective way. As a result of failure to meet their multiple needs during hospitalization, elderly patients experience higher adverse outcomes and declining functional status [3–6]. At the same time, increased pressure on hospitals to restrain resource use and reduce length of stay (LOS) has led to an increase in readmissions of elderly patients [6,7]. The interaction of illness, declining functional status, hospitalization, and psychosocial factors may worsen a patient's physical impairment

and quality of life, leading to poor outcomes at discharge [3,6,8–10]. Readmission rate is an indicator that may reflect the quality of care provided in the acute setting and incidence of premature discharge [6,7]. Multiple readmissions lead to physical and functional decline [3–6] and have implications for long-term health resource utilization (HRU) and health-care cost associated with acute care illnesses. To minimize adverse outcomes, studies have addressed different types of interventions such as: 1) geriatric evaluation unit; 2) discharge planning and geriatric assessment; 3) nutrition interventions; 4) nurse interventions; and 5) geriatric consultation [11–21].

It is clear that contributors to the functional loss of the elderly during their hospitalization are interrelated and thus a multidimensional, patient-oriented interventional approach is needed. Such approach should encourage maximum contributions from team members to improve the functional status and quality of care and shorten the LOS and number of readmissions [8,10,14–25]. An acute care elderly (ACE) unit is one such attractive intervention model to address the particular needs of acutely ill hospitalized elderly [13,24,26–28]. An ACE unit is a defined medical unit

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**Figure 1** Interdisciplinary team of acute care elderly (ACE) unit.

where increased attention to a patient's level of functioning, improved treatments of geriatric illnesses and integrated discharge planning are combined with a thorough pharmaceutical review [8]. Its objective is to reduce iatrogenic illness and improve clinical outcomes of acutely ill elders [25].

#### *Acute Care for Elders Unit*

As shown in Figure 1, an ACE unit usually consists of a multidisciplinary team that includes geriatrics trained nurses, a doctoral level pharmacist, and a social worker. The interaction between elderly patients and their environment provides the basis for the ACE intervention. Hence, providing an environment (social and physical) that satisfies the needs of individual elderly patients is crucial. Some of the services that differentiate the ACE unit from other medical units include multidisciplinary rounds that occur 3 days a week and include house staff, a dietitian, an occupational therapist, a physical therapist, a pharmacist and a social worker. The nursing station is central and establishes an elderly-friendly environment. The attending or fellow rounds daily and with the pharmacist who notifies the team of contraindications and special dosing recommendations. Active early discharge planning is directed by social worker. Staff routinely limits restraints, adjusts the room to medium lighting, implements a sleeping regimen with orientation cues (clock, calendar, and night-light), encourages routine family visits, utilizes consistent care givers, and decreases environmental nocturnal stimulation. The aim of this study was to analyze and compare HRU, LOS, readmission rate, and direct medical care cost of ACE and non-ACE unit patients, with admitting diagnoses of congestive heart failure (CHF), urinary track infection, or pneumonia. We hypothesized that ACE unit would be associated with fewer readmissions, shorter LOS, lower HRU, and lower cost.

#### **Methods**

We used a retrospective case-control study design. From the health system-based administrative and research database, we identified elderly patients (65 years), admitted to the ACE unit of a large academic urban medical center between 1999 and 2000 with primary admitting diagnosis of CHF (DRG-127), pneumonia (DRG-79, 80, 89, and 90) or urinary tract infection (UTI) (DRG-320, 321). Those transferred from other hospitals or admitted to specialty units such as intensive care, coronary care, telemetry, and oncology were ineligible. From the pool of eligible ACE unit patients, we randomly selected 680 patients (CHF = 188, pneumonia = 304, UTI = 188). Equal number of non-ACE unit patients, matched by sex, age ( $\pm 5$  years), ethnicity, and Charlson comorbidity score were also selected. Non-ACE (or usual care) patients are admitted to general medical care and those transferred from other hospitals or admitted to specialty units such as intensive care, coronary care, telemetry, and oncology were excluded. All patients were followed retrospectively for a year preindex admission and for a year post discharge to obtain hospitalization data. The institutional review board approved the study.

#### *ACE Unit Description*

The ACE unit at the Presbyterian Hospital of the University of Pennsylvania Health System is a 36-bed unit, in operation since June 1994. Non-critical patients older than 65 years are eligible for treatment at this ACE Unit. The attending physician can choose to care for patients during the inpatient stay or refer them to the geriatric attending physician. All older patients presenting to the emergency department (ER) without a private physician are admitted to the ACE unit. Majority of the admissions are from the university's extended geriatric practices and ER. ACE unit patients

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