

# Rising Billing for Intermediate Intensive Care among Hospitalized Medicare Beneficiaries between 1996 and 2010

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## Abstract

**Rationale:** Intermediate care (i.e., step-down or progressive care) is an alternative to the intensive care unit (ICU) for patients with moderate severity of illness. The adoption and current use of intermediate care is unknown.

**Objectives:** To characterize trends in intermediate care use among U.S. hospitals.

**Methods:** We examined 135 million acute care hospitalizations among elderly individuals ( $\geq 65$  yr) enrolled in fee-for-service Medicare (U.S. federal health insurance program) from 1996 to 2010. We identified patients receiving intermediate care as those with intensive care or coronary care room and board charges labeled intermediate ICU.

**Measurements and Main Results:** In 1996, a total of 960 of the 3,425 hospitals providing critical care billed for intermediate care (28%), and this increased to 1,643 of 2,783 hospitals (59%) in 2010

( $P < 0.01$ ). Only 8.2% of Medicare hospitalizations in 1996 were billed for intermediate care, but billing steadily increased to 22.8% by 2010 ( $P < 0.01$ ), whereas the percentage billed for ICU care and ward-only care declined. Patients billed for intermediate care had more acute organ failures diagnoses codes compared with general ward patients (22.4% vs. 15.8%). When compared with patients billed for ICU care, those billed for intermediate care had fewer organ failures (22.4% vs. 43.4%), less mechanical ventilation (0.9% vs. 16.7%), lower mean Medicare spending (\$8,514 vs. \$18,150), and lower 30-day mortality (5.6% vs. 16.5%) ( $P < 0.01$  for all comparisons).

**Conclusions:** Intermediate care billing increased markedly between 1996 and 2010. These findings highlight the need to better define the value, specific practices, and effective use of intermediate care for patients and hospitals.

**Keywords:** intensive care unit; hospital costs; longitudinal studies; organization and administration; intermediate care facilities

As the U.S. population ages, the demand for critical care services is expected to increase (1), potentially straining existing intensive care unit (ICU) capacity. Since

their initial description in the 1980s, intermediate care units (i.e., step-down, transitional, or progressive care) have offered an alternative model for delivering

care to hospitalized patients—a less resource-intensive setting than the ICU that still provides a higher level of care than general hospital wards (2).

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## At a Glance Commentary

### Scientific Knowledge on the

**Subject:** Although intermediate care (i.e., step-down, transitional care, or progressive care) has been described as an alternative to care provided in the intensive care unit for patients with moderate severity of illness, current use of such care is poorly characterized.

### What This Study Adds to the

**Field:** Our study found a marked increase in the percentage of hospitals billing for intermediate care and patients receiving intermediate care between 1996 and 2010. The findings suggest there has been a large increase in the amount of care delivered in intermediate care settings despite a limited literature describing the impact of intermediate care on patient outcomes or cost savings to hospitals.

To maximize financial margins, hospitals may have substantial motivation to shift patients with more moderate illness severity to less costly alternatives to the ICU, such as intermediate care, provided these settings can deliver similar care with less resource use per day. In contrast, if intermediate care is predominantly used as step-up monitoring for ward patients, its emergence may raise costs without necessarily improving outcomes. Unfortunately, most studies to date examining the effect of intermediate care on patient outcomes and hospital costs are limited by single-center, pre-post, or retrospective designs, and have yielded mixed results (3–7).

The lack of national data on the epidemiology of intermediate care has hindered broader efforts to understand its impact on outcomes and costs. Although hospitals providing care to Medicare beneficiaries submit yearly data on their total hospital and ICU bed numbers, these data do not distinguish intermediate care units from ICU beds (8). Moreover, definitions of what constitutes intermediate care may vary among hospitals, ranging from simply providing telemetry and higher nursing ratios to the provision of life-support therapies including mechanical ventilation; unlike critical care, there is no standardized definition from the U.S.

Department of Health and Human Services (9). Together, these issues preclude a more comprehensive evaluation of how hospitals are using intermediate care, and evidence-based policies or organizational recommendations for intermediate care.

In the current study, we sought to characterize the use of intermediate care for patients at acute care hospitals using Medicare billing claims from 1996 through 2010. Beginning in 1996, unique billing codes for intermediate care (labeled “intermediate ICU”) have been available for reporting, and these codes were intended to capture care provided in a specific intermediate care setting, distinct from the ICU or general ward (10, 11). Additionally, we sought to characterize patients billed for intermediate care, to determine whether these patients seem distinct from ward and ICU patients with regard to severity of illness and outcomes. We hypothesized that there was a significant increase in use of intermediate care among Medicare beneficiaries over the study period and that patients billed for intermediate care have a distinct severity of illness and outcomes compared with ward and ICU patients. Some of the results in this study have been previously reported in the form of an abstract (12).

## Methods

We performed a retrospective cohort study of all acute care hospitalizations among elderly (age,  $\geq 65$ ) fee-for-service Medicare beneficiaries from 1996 to 2010. Medicare is a federal program that provides health insurance for adults aged 65 years and older and for those with disabilities or end-stage renal disease in the United States. Approximately 93% of people in the United States over 65 are Medicare beneficiaries (13), most of which are enrolled in fee-for-service plans.

### Definition of ICU and Intermediate Care

We identified patients billed for an intermediate care or an ICU care during their hospitalization using the Medicare Provider and Analysis Review (MedPAR) file revenue center codes. Room and board charges during hospital stays are captured in these codes for both intensive care and coronary care and include

separate codes for ICU and intermediate care stays. In 1996, the labels of revenue center codes 0206 and 0214 were changed from “post-ICU” to “intermediate ICU” and “post-CCU” (coronary care unit) to “intermediate CCU,” respectively, to better capture time spent in an intermediate care unit. The former names were frequently misunderstood by coders to mean any days in the hospital after an ICU stay rather than days spent specifically in intermediate care, distinct from the ICU or general ward (10).

MedPAR files contain a single ICU indicator field and coronary care indicator field. A patient charged for more than one type of ICU care or coronary care during a hospitalization is assigned the code with the higher aggregate charge. For example, if a patient received care in both an ICU and intermediate care unit, but spent more days and had a higher charge for the time spent in intermediate care, then intermediate care is recorded in MedPAR as the location where they received care. Because MedPAR ICU coding is mutually exclusive, patients were assigned to one of three categories (ICU care, intermediate care, or ward care) for the purposes of analysis (Table 1). Patients who were analyzed in the intermediate care category could have potentially been billed for ICU care as well, but the ICU charge would have been lower than the intermediate care charge. Patients assigned to the ward care category had neither an ICU nor intermediate care billing charge during their hospitalization.

We collapsed ICU and coronary care codes in MedPAR so that charges labeled “intermediate ICU” and “intermediate CCU” were defined as intermediate care, and all other ICU and coronary care unit charges were defined as ICU care. Throughout the manuscript, we use the term “critical care” broadly when referring to any patients who were billed for ICU or intermediate care, and the term “ward” for general hospital care, when referring to patients not billed for either ICU or intermediate care.

### Hospital Adoption of Intermediate Care

We used the Healthcare Cost Report Information System (HCRIS) records from 1996 through 2010 to identify acute care

**Table 1.** Assignment of Intermediate Care and ICU Care in Medicare and New York State Data

Categories	Medicare Data	New York State Data
Ward care	No ICU or coronary care revenue center codes	No ICU or coronary care revenue center codes
Intermediate care	Presence of an “intermediate ICU” or “intermediate CCU” revenue center code*	Presence of an “intermediate ICU” or “intermediate CCU” revenue center code
ICU care	Presence of an ICU or coronary care revenue center code not labeled “intermediate”*	Presence of any ICU or coronary care revenue center code not labeled “intermediate”
Intermediate and ICU care	Cannot identify	Presence of an “intermediate ICU” or “intermediate CCU” revenue center code AND any ICU or coronary care revenue center code not labeled “intermediate”

*Definition of abbreviations:* CCU = coronary care unit; ICU = intensive care unit.

\*In Medicare files, if patients are charged for both intermediate care and ICU care during a hospitalization, they are assigned the code with the higher aggregate charge.

hospitals capable of providing services to critically ill patients. Similar to previous work, we excluded hospitals reporting less than 2 months of fiscal information, less than 10 total inpatient days in a fiscal year, less than 10 general hospital beds, and hospitals without ICU beds (14–16). After linking these hospital files to patient billing records, we defined hospitals that provided intermediate care as those billing intermediate care in five or more patient records during a calendar year.

**Characteristics of Hospitals Providing Intermediate Care**

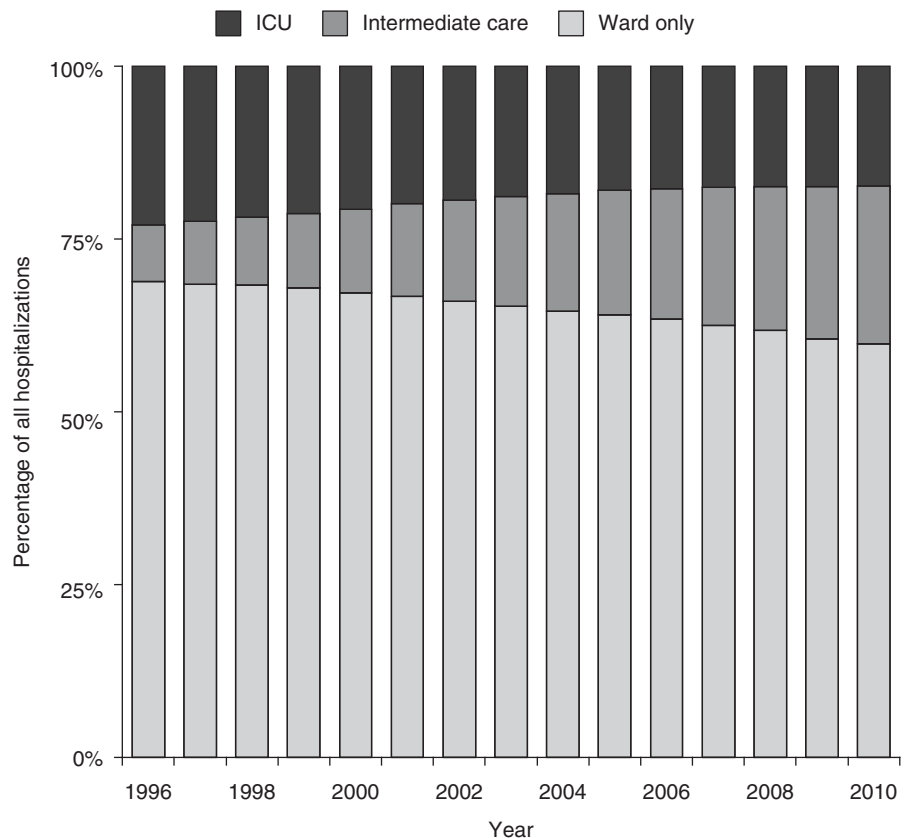
We used HCRIS files to compare characteristics of hospitals billing for intermediate care services in 2010 with those that did not bill for intermediate care. The hospital characteristics we examined included hospital ownership status (for-profit, nonprofit, and government), total number of hospital and ICU beds, whether the hospital had a graduate medical education accredited residency program, and hospital location (Northeast, Midwest, South, and West Coast).

**Characteristics of Patients Billed for Intermediate Care**

We compared characteristics of patients billed for intermediate care with patients billed for ICU care and patients who received only general medical ward care, including their age, sex, and race (black, white, and other), *International Classification of Diseases-9-CM* diagnosis and procedure codes, diagnosis-related group codes, length of stay, hospital

charges and Medicare payment amount, outcomes, and discharge destinations. Procedure use was identified using *International Classification of Diseases-9-CM* procedure codes, including invasive (96.7X) and noninvasive (93.90) mechanical ventilation, central venous catheterization (38.93), blood transfusion (99.0X), and hemodialysis (39.95).

We characterized comorbidity using secondary diagnosis codes (17). We characterized severity of illness using *International Classification of Diseases-9-CM* codes for organ failure as defined by Angus and colleagues (18). We defined hospitalizations as primarily medical or surgical using diagnosis-related group codes.



**Figure 1.** Trends in billing for intermediate care and intensive care unit (ICU) hospitalizations among Medicare beneficiaries, 1996–2010.

**Table 2.** Comparisons of Patients Billed for Intermediate Care, ICU Care, and General Ward-Only Care at Hospitals with Intermediate Care in 2010

Characteristics*	Ward Care	Intermediate Care	ICU Care
No. hospitalizations <sup>†</sup>	2,033,360	1,046,936	553,600
Sex, %			
Male	39.6	44.8	50.7
Female	60.4	55.2	49.3
Age, yr, mean	77.9	78.5	77.1
Age, %			
65–74 yr	38.9	34.8	41.2
75–84 yr	36.0	37.2	37.5
85+ yr	25.1	28.0	21.3
Race, %			
White	86.2	84.3	85.4
Black	9.4	9.8	9.3
Other	4.4	5.9	5.3
No. comorbidities, median (IQR)	2 (1–3)	3 (2–4)	2 (1–3)
Select comorbidities, %			
Congestive heart failure	11.4	21.7	20.8
Chronic pulmonary disease	16.3	18.6	18.3
Renal failure	11.0	14.5	11.9
Diabetes	22.7	24.5	20.0
Malignancy	6.8	5.2	6.3
Hospitalization type, %			
Medical	64.1	76.1	52.0
Surgical	35.9	23.9	48.0
Organ failure during stay, %	15.8	22.4	43.4
Organ failure type, %			
Cardiovascular	3.5	6.0	15.7
Pulmonary	0.2	0.9	16.7
Renal	10.0	14.5	23.7
Invasive procedure use, %			
Invasive mechanical ventilation	0.2	0.9	16.7
Noninvasive mechanical ventilation	0.5	1.53	3.86
Central venous catheter	3.0	4.3	16.1
Hemodialysis	1.5	2.2	3.2
Transfusion	9.3	9.0	16.8
Outcomes			
Length of stay, d, median (IQR)	3 (2–6)	4 (2–6)	6 (3–10)
Total hospital charges, \$, mean (SD)	31,479 (29,954)	43,350 (47,412)	88,064 (10,9575)
Total hospital costs, \$, mean (SD)	8,684 (7,414)	10,999 (11,212)	23,240 (26,086)
Medicare payment, \$, mean (SD)	7,746 (6,248)	8,514 (8,807)	18,150 (21,939)
In-hospital mortality, %	1.6	2.3	13.2
30-d mortality, %	4.5	5.6	16.5
Discharge destination, %			
Home	69.2	71.7	60.3
Skilled care facility	25.9	22.5	31.1
Other	4.9	5.8	8.6

Definition of abbreviations: ICU = intensive care unit; IQR = interquartile range.

\*All between-group comparisons were statistically significant with  $P < 0.01$ .

<sup>†</sup>To prevent patients with multiple hospitalizations from being analyzed in multiple categories, only the first admission was analyzed for patients with multiple hospitalizations in 2010.

### Analysis Using New York State Data

To determine the extent that MedPAR underrepresents or overrepresents intermediate care billing because of its mutually exclusive coding of ICU care, and to test the generalizability of the results to the nonelderly, we examined hospital discharge data in New York

State (19). Details of this analysis can be found in the METHODS section of the online supplement.

### Relative Costs of Ward Care, Intermediate Care, and ICU Care

To estimate the relative costs of ward care, intermediate care, and ICU care we used

room and board charges and the number of hospital days associated with each revenue center. For example, to estimate the daily cost of ICU care, we divided the total charge captured in the ICU room and board revenue center field by the number of days spent in an ICU. We then used HCRIS hospital-specific cost-to-charge ratios to estimate costs. We used a similar approach for intermediate care and ward care.

### Statistical Analysis

We counted the total numbers of acute care hospitalizations among fee-for-service Medicare beneficiaries for each year in the study period, and the number with an ICU or intermediate care billing code, stratified by age, sex, and race. Because the unit of analysis was hospitalizations, individual patients were counted multiple times if they had multiple hospitalizations in the same year. Because the sex, age, and racial distribution of hospitalized beneficiaries changed over the study period, we used Poisson regression to adjust for these changes when calculating rates of ICU or intermediate care billing per total number of hospitalizations each year. We present these yearly rates as a stacked bar graph. We plotted the yearly number of hospital's billing for intermediate care among all hospitals identified as capable of providing critical care.

We calculated hospital-specific, reliability-adjusted intermediate care billing rates in 2010 by fitting an empty multilevel logistic regression with intermediate care stay as the outcome and hospital as the random intercept (20, 21). The purpose of an empty multilevel model is to estimate hospital-specific differences in an outcome variable adjusting only for the reliability of outcome estimates derived from few cases. We displayed hospital-specific intermediate care billing rates in a histogram. To compare hospitals with lower and higher intermediate care billing, we grouped hospitals into quartiles based on their intermediate care billing rates, setting first quartile hospitals as those with the lowest rate.

We compared patients and hospital characteristics using chi-square or analysis of variance as appropriate. To prevent a patient from being included in multiple categories when comparing the characteristics of patients billed for ward-only care, intermediate care, and

ICU care in 2010, we analyzed the first admission if a patient was hospitalized multiple times. All data management and analysis was conducted using SAS 9.3 (SAS Institute, Cary, NC) and Stata 13 (StataCorp, College Station, TX). The institutional review board of the University of Michigan approved the study (HUM00053488).

## Results

Among 135 million eligible Medicare admissions between 1996 and 2010, a total of 19.2 million were billed for intermediate care (14.3% of admissions) and 25.6 million were billed for ICU care (19.0% of admissions). The percentage of patients billed for intermediate care increased markedly over the study period, whereas the percentage billed for ICU care and ward-only care decreased (Figure 1). In 1996, just 8.19% (95% confidence interval, 8.17–8.21%) of patients hospitalized were billed for intermediate care, whereas in 2010, a total of 22.83% (95% confidence interval, 22.80–22.87%) of patients hospitalized were billed for intermediate care.

Because Medicare files contain mutually exclusive billing records for critical care, if patients increasingly received both ICU and intermediate care, but were only recorded as receiving intermediate care, an apparent decline in ICU care and increase in intermediate care would be an artifact. However, this was not the case in New York State all-payer data from 1998 to 2010, where we identified only a small percentage of patients billed for both ICU and intermediate care, a rate that varied from less than 0.1% in 1998 to 4.6% in 2010 ( $P < 0.01$ ) but remained quite low. Similar to the trend in Medicare beneficiaries, the percentage of patients over 18 years of age in New York who were billed for intermediate care rose dramatically from 1998 to 2010 (see Figure E1 in the online supplement).

There were notable differences between Medicare beneficiaries billed for intermediate care, ICU care, or ward care alone at hospitals in 2010 (Table 2). Patients billed for intermediate care had higher rates of comorbid illness (mean number, 2.5 vs. 2.3;  $P < 0.01$ ), higher rates

of acute organ failures (22.4% vs. 15.8%;  $P < 0.01$ ), and slightly longer hospital stays compared with ward patients. However, compared with patients billed for ICU care, patients billed for intermediate care had lower severity of illness, including lower rates of acute organ failure (22.4% vs. 43.4%;  $P < 0.01$ ). They were also less likely to receive invasive procedures, such as invasive mechanical ventilation (0.9% vs. 16.7%;  $P < 0.01$ ). Patient's billed for intermediate care also had lower total mean hospital costs (\$10,999 vs. \$23,240;  $P < 0.01$ ), lower mean Medicare payment (\$9,016 vs. \$18,803;  $P < 0.01$ ), and lower 30-day mortality (5.8% vs. 16.5%;  $P < 0.01$ ) than patients billed for ICU care.

The average daily room and board costs were \$402 (SD, 243) for ward care, \$634 (SD, 375) for intermediate care, and \$867 (SD, 502) for ICU care ( $P < 0.01$  for all pairwise comparisons). Compared with daily ward care costs, this represented a relative cost increase of

58% for intermediate care and 116% for ICU care.

Among hospitals, there was a marked increase in intermediate care billing over the study period (Figure 2). In 1996, of the 3,425 hospitals providing critical care, 960 (28%) of hospitals billed for intermediate care. In 2010, of the 2,783 hospitals providing critical care, 1,643 (59%) billed for intermediate care. There was also a wide range of intermediate care billing rates at individual hospitals (Figure 3; see Figures E2 and E3). The median hospital billed intermediate care to 66.8% of patients receiving critical care (interquartile range, 47.5–77.1%).

Characteristics of hospitals that more often billed for intermediate care included for-profit status, larger size, located on the West Coast, and teaching hospitals (Table 3). ICU patients at hospitals that billed for intermediate care had a higher severity of illness, including a higher percentage with organ failure

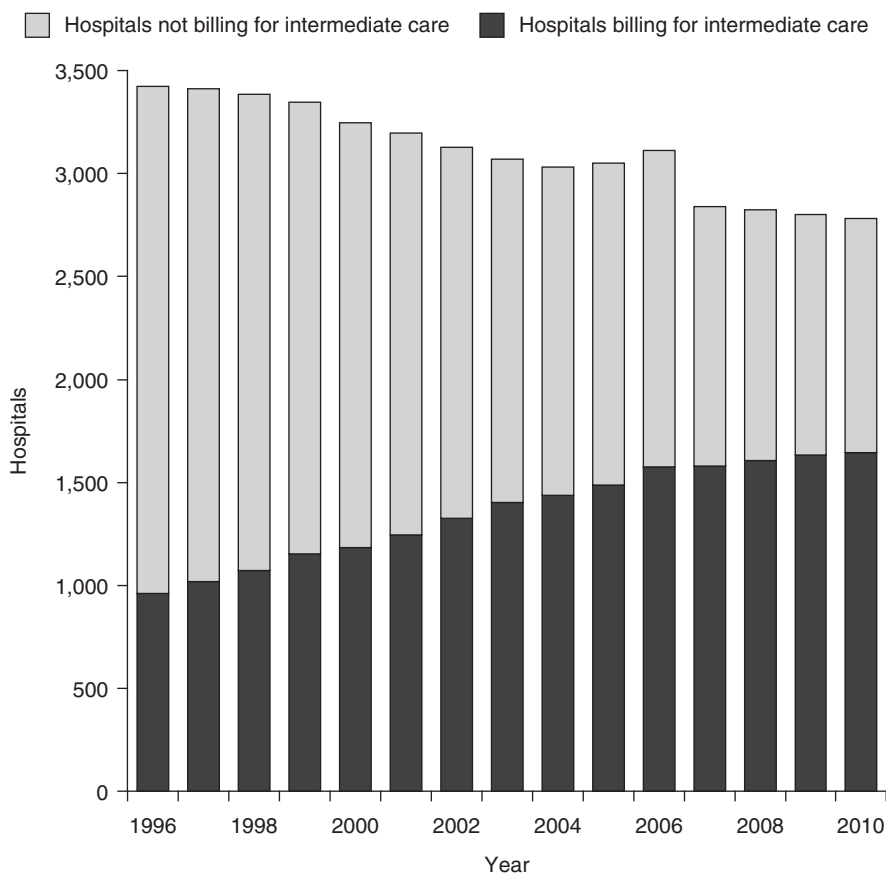
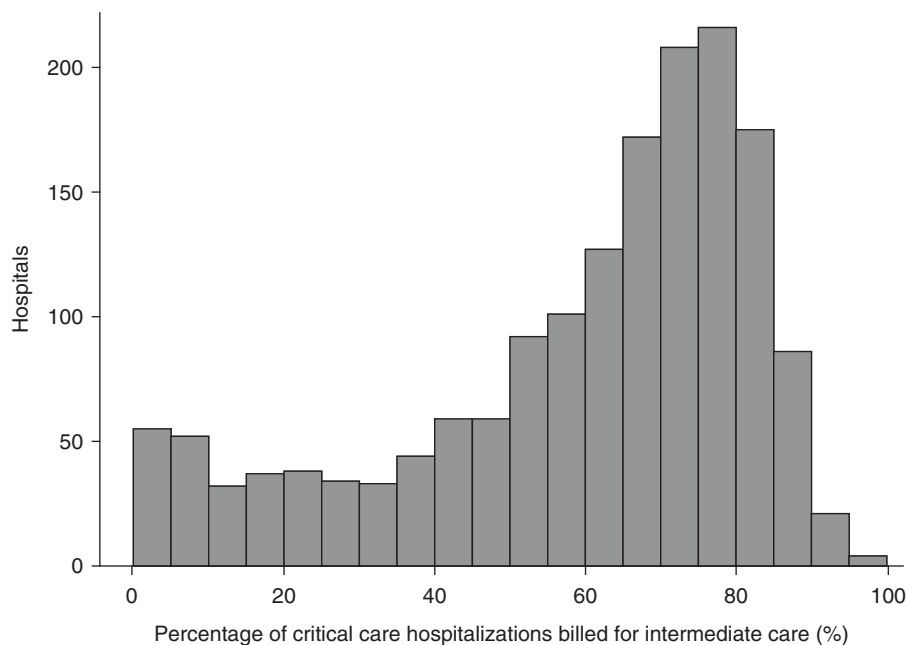


Figure 2. Trends in billing for intermediate care among hospitals providing critical care, 1996–2010.



**Figure 3.** Hospital-specific rates of intermediate care billing among Medicare hospitalizations billed for any critical care (intensive care unit or intermediate care) in 2010.

and a higher percentage requiring mechanical ventilation. Mortality rates and Medicare spending were also higher for ICU patients at hospitals that billed intermediate care. There were only minor differences in the characteristics of hospitals that billed for intermediate care at lower versus higher rates (see Table E1). However, ICU patients at hospitals with high rates of intermediate care billing had higher severity of illness compared with ICU patients at hospitals with lower rates of intermediate care billing.

## Discussion

Major increases in billing for intermediate care occurred among hospitalized Medicare beneficiaries between 1996 and 2010. The percentage of patients billed for ICU and ward care decreased over time, suggesting that intermediate care may be absorbing patients from both the ICU and general ward. In addition, our study goes against the conventional narrative of increasing ICU use among hospitals (14, 15, 22), and suggests that the rise is in intermediate care and not ICU care. Patients billed for intermediate care seemed distinct from typical ICU and ward patients, with greater severity of illness compared with patients who

received general ward care, but lower severity than those receiving ICU care. This suggests these patients are occupying beds aimed at caring for a differentiated population with a moderate degree of illness between patients on the ward or ICU. However, these beds could be located on the floor, ICU, or in a stand-alone intermediate care unit. At the hospital level, we found a significant increase of the percentage of hospitals billing for intermediate care during the study period, but also found substantial variation in rates of intermediate billing across hospitals.

Our study demonstrates a temporal increase in intermediate care use in U.S. hospitals. Among the 2,783 acute-care hospitals with critical care capabilities studied in 2010, we found that 59% were billing for intermediate care, an increase from 29% of hospitals in 1996. However, despite its clear rise, existing public health and administrative surveillance systems are inadequate to determine what constitutes intermediate care at individual hospitals or to determine the location within hospitals where this care is being delivered. Hospitals could be billing for intermediate care in a physically distinct intermediate care unit, within an ICU, or within a general hospital ward with enhanced resources.

Nevertheless, we found face and predictive validity to the claim that intermediate care represents an established and growing care model, because intermediate care patients lie between ICU and ward patients with respect to severity of illness, procedure use, and mortality.

Our study builds on previous investigations of intermediate care use among Medicare beneficiaries. In a study of ICU use among Medicare beneficiaries between 1995 and 2000, Halpern and coworkers (11) found that the cumulative number of days per year that Medicare beneficiaries spent in ICUs was 40–47% higher when MedPAR data were aggregated compared with HCRIS data. This discrepancy was caused by the additional counting of intermediate care as ICU days in MedPAR (11). In addition, a recent study examining intensive care use among patients with lung cancer found that rates of ICU use among this population were rising largely because of increasing use of intermediate care (23).

The growing use of intermediate care among hospitals is perhaps surprising given the uncertain clinical impact, safety, or economic benefit of intermediate care (4, 24). There are several plausible mechanisms in which intermediate care could drive down hospital costs. Medicare reimburses hospitals for care provided to Medicare beneficiaries based on patient diagnosis-related groupings, and the location where care was provided is not a part of this payment equation (25). In theory, if an intermediate care unit has lower fixed costs than a traditional ICU because of lower staff to patient ratios, hospitals could save money by shifting ICU patients to intermediate care. However, our findings suggest a substantial portion of patients receiving intermediate care are being shifted from the hospital ward, an area likely to have lower fixed costs than intermediate care.

Shifting patients from an ICU to intermediate care bed may also have more complex effects on overall hospital costs when ICU beds are made available for sicker and potentially more expensive patients. This occurred, for example, during a single-center study analyzing the effect of opening an intermediate care unit at a tertiary care hospital in the Netherlands (26). The study authors found that overall hospital costs increased

**Table 3.** Characteristics of Hospitals Billing for Intermediate Care and ICU Patients at Hospitals Billing for Intermediate Care in 2010

	Hospitals Billing for Intermediate Care*	
	No	Yes
Hospital characteristics		
No. hospitals	1,140	1,643
Hospital ownership, %		
Nonprofit	63.7	63.4
Profit	17.6	24.7
Government	18.8	12.0
Total hospital beds, %		
<100	47.5	16.3
100–399	46.7	66.5
400+	5.8	17.3
Total ICU beds, %		
<10	52.2	19.0
10–30	29.9	36.9
>30	17.9	44.1
Teaching hospital, %		
None	72.3	58.9
GME accredited residency	27.7	41.1
Region, %		
Northeast	21.7	13.6
Midwest	23.0	23.1
South	40.7	39.8
West	14.7	23.6
Characteristics of ICU patients		
No. patients <sup>†</sup>	287,228	553,984
Any organ failure, %	37.6	43.3
Invasive mechanical ventilation, %	12.3	16.7
Length of stay, d, median (IQR)	5 (3–8)	6 (3–10)
Medicare spending, \$, mean	14,675	18,145
30-d mortality, %	14.1	16.5

*Definition of abbreviations:* GME = graduate medical education; ICU = intensive care unit; IQR = interquartile range.

\*All comparisons were statistically significant with  $P < 0.01$ . Results are percentages unless otherwise specified.

<sup>†</sup>To prevent patients with multiple hospitalizations from being analyzed in multiple categories, only the first admission was analyzed for patients with multiple hospitalizations in 2010.

after the intermediate care unit opened, because the ICU was able to accept more patients with high acuity. Our study also revealed that ICU patients in hospitals billing for intermediate care had higher mortality and Medicare spending than ICU patients at hospitals without intermediate care. By improving access to the ICU for patients with a high risk of death through moving other patients to intermediate beds, hospitals may paradoxically harm their margins by prolonging care for patients who may have otherwise died without ICU care (27).

The growing use of intermediate care also highlights a need to further investigate when intermediate care is a safe alternative to ICU care. In general, studies have not found intermediate care to be associated with differences in

patient outcomes for certain surgical patients (28, 29), patients with acute myocardial infarction (30), or among patients recovering from general critical illnesses after an ICU stay (3, 5). However, one study examining organizational factors among hospitals caring for patients with sepsis found the presence of an intermediate care unit was associated with a 26% increase in the odds of hospital mortality (6), whereas another found the presence of an intermediate care unit was associated with 37% lower odds for hospital mortality among ICU patients (7). An important caveat when interpreting these studies is their high risk for bias from confounding by the indication for intermediate care that results when risk adjustment is inadequate (31). The

paucity of evidence and the mixed results of existing studies examining the use of intermediate care may explain why guidelines for intermediate care triage have not been updated since 1998 (32).

Our study should be interpreted in the context of several limitations. We cannot attribute intermediate care billing to care received in an administratively separate unit, nor has the intermediate care revenue center code been validated as a way to identify patients that received a distinctly intermediate level of care during their hospital stay. Because intermediate care is not well defined, there is likely variation in how hospitals use and bill for intermediate care. Future work validating intermediate care beds collected by the American Hospital Association annual survey (33), or novel assessments of intermediate care capacity, may be helpful for characterizing the growth of intermediate care beds. However, clear definitions of what constitutes an intermediate care unit would improve the interpretability of these results. We were unable to describe the timing of intermediate care use within a hospital stay; thus, we cannot say whether hospitals used intermediate care in a step-up (floor to intermediate care) or step-down (ICU to intermediate care) manner. Finally, our primary analysis relied on Medicare data, which are limited to patients older than 64. However, analysis of New York State inpatient data showed a similar rise in the use of intermediate care billing among all hospitalized adults.

In conclusion, we found a striking increase in the number of Medicare beneficiaries billed for intermediate care during hospitalizations between 1996 and 2010. Intermediate care may offer a lower cost and safe alternative to ICU care for certain hospitalized patients, but could also represent an expansion of low value services further driving up the costs of hospital care. Our findings emphasize a pressing need to better define intermediate care, and to better understand its value for hospitals and patients. As patients increasingly receive intermediate care, it is imperative to determine whether it is a cost-effective alternative to care delivered elsewhere in the hospital. ■

**Author disclosures** are available with the text of this article at [www.atsjournals.org](http://www.atsjournals.org).

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