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## Appropriateness of Long-Term Acute Care Hospital Transfer: A Multicenter Study of Medicare ACO Beneficiaries

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### Abstract

**Objectives:** There is wide variation in long-term acute care hospital (LTACH) use nationwide—the most intensive and expensive post-acute care setting—though appropriateness of use is uncertain. Therefore, we examined the appropriateness and reasons for transfer in a high-use region, and how Medicare criteria for LTACH payment identifies appropriate transfers.

**Design:** Multi-center retrospective observational cohort

**Setting and Participants:** Consecutive hospitalized Medicare beneficiaries transferred to an LTACH from 2017-2018 from an accountable care organization in Texas.

**Methods:** The primary outcome was clinical appropriateness of transfer ascertained by two physician reviewers. We abstracted patients' characteristics and primary reasons for transfer. We examined the positive predictive value (PPV) of meeting Medicare criteria for full LTACH payment (preceding intensive care unit (ICU) stay ≥ 3 days or prolonged mechanical ventilation) for identifying appropriate transfers, and how this differed if Medicare adopted an 8-day minimum ICU stay criterion recommended by the Medicare Payment Advisory Commission (MedPAC).

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**Conflicts of Interest:** One author (ANM) received travel expenses and a research grant from the National Association of Long Term Hospitals (NALTH). The authors otherwise declare that they have no competing interests, financial or otherwise.

**Results:** Of 105 LTACH transfers, 33 (31.4%) were clinically appropriate. The most common reason among appropriate transfers was respiratory care (58%), but 42% had other indications. Inappropriate transfers most commonly were for wound care (28%), intravenous medication infusions (28%), or patient (17%) and physician preference (26%). The PPV for meeting Medicare LTACH payment criteria was 55%. The PPV improved to 77% if Medicare adopted the 8-day minimum ICU stay criterion, with only a modest absolute increase in appropriate transfers not meeting the more stringent criteria (12% to 17%).

**Conclusions and Implications:** Two-thirds of LTACH transfers in a high LTACH-use region are clinically inappropriate, and are most commonly transferred for wound care, intravenous infusions, or patient and physician preference. Medicare payment criteria modestly distinguished between appropriate and inappropriate transfers. Adoption of MedPAC's recommended 8-day minimum ICU stay criterion could safely reduce inappropriate transfers. Though generalizability to low LTACH-use regions is uncertain.

### **Brief Summary:**

Two-thirds of LTACH transfers in a high-LTACH use region were clinically inappropriate. Reasons included simple wound care, patient and physician preference, and intravenous antibiotic infusions.

### **Keywords**

Long-Term Acute Care Hospitals; Post-Acute Care; Medicare; Accountable Care Organization; Health Policy

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### **INTRODUCTION:**

Every year, over a hundred thousand hospitalized Medicare beneficiaries are transferred to a long-term acute care hospital (LTACH) to recover.<sup>1</sup> LTACHs are unevenly distributed across the US, with considerable variation in use.<sup>2-4</sup> However, studies on LTACH variation lack sufficient information to assess appropriateness of transfers. Understanding the reasons and appropriateness of LTACH transfer is important because LTACHs are the most expensive post-acute care setting, and is needed to better align the intensity of care with patients' needs.

Given concerns about inappropriate LTACH use, the Centers for Medicare and Medicaid Services (CMS) implemented payment criteria to disincentivize use by less ill patients.<sup>5</sup> It is unclear to what extent these criteria distinguish between appropriate versus inappropriate LTACH transfers.

Therefore, we conducted a comprehensive review of patients transferred to LTACHs within an accountable care organization (ACO) in a high-LTACH-use region to examine the reasons and appropriateness for transfer, and whether Medicare payment criteria differentiated between appropriate and inappropriate transfers.

## METHODS

### Study Design, Setting, and Data Sources

We conducted a retrospective cohort study of consecutive hospitalizations by Medicare beneficiaries who were discharged to one of 17 regional LTACHs from January 2017 to May 2018 from one the largest Next Generation ACOs.<sup>6</sup> The ACO includes 29 hospitals located in Texas, consisting of a partnership between an academic medical center and a community hospital system, and manages the care for nearly 78,000 Medicare beneficiaries. The study was part of a quality improvement project to optimize post-acute care use.

We identified eligible patients transferred to an LTACH using the discharge destination field in Medicare claims data. Two physician investigators (R.C.S., A.N.M.) independently performed a structured EHR chart review of the index hospitalization preceding transfer. This included a detailed review of documentation by physicians, social workers, case managers, therapists, nutritionists, and nurses, as well as intensive care unit (ICU) summary data, medications, and time-stamped orders and vital signs.

### Clinical Appropriateness for LTACH Transfer

The primary outcome was clinical appropriateness of the LTACH transfer, which we defined as ‘possibly appropriate’ or ‘appropriate’ on a 3-level Likert scale. After independently rating each transfer, two physicians (R.C.S., A.N.M.) discussed each case to achieve consensus.

There are no validated criteria to define an appropriate LTACH transfer. Therefore, we considered a transfer to be clinically appropriate if the patient needed daily clinical management by a physician-led team that could not theoretically be provided in an alternative care setting, including a skilled nursing facility (SNF). Our framework is in accordance with screening criteria previously endorsed by the National Association of Long Term Hospitals, and was based on prior literature<sup>2,3,7</sup> and our team’s multidisciplinary expertise. Transfer for non-clinical reasons was not considered clinically appropriate, even if justified, including patient or physician preferences; denial from SNFs for financial reasons or lack of skilled care needs; or because clinical expertise was unavailable at the acute care hospital.

### Study Measures

We abstracted information on patients’ sociodemographic characteristics, selected events during the hospitalization, clinical status and needs upon transfer, and primary reasons for transfer. For a given hospitalization, a patient could have multiple primary reasons for transfer. We also abstracted whether a SNF referral was made prior to LTACH transfer, the status of the referral at time of transfer (denied, pending, or accepted), and the reason for denial, if applicable.

### Medicare Payment Criteria

Medicare stipulates reduced LTACH payment if patients either do not have a preceding ICU stay for 3 days or do not receive mechanical ventilation for 96 hours during the LTACH

stay.<sup>8</sup> Although Congress adopted a 3-day minimum ICU stay, the Medicare Advisory Payment Commission (MedPAC) originally recommended (and continues to recommend) an 8-day minimum ICU stay criterion to better define LTACH-appropriate patients.<sup>1</sup>

### Statistical Analyses

We used descriptive statistics to compare characteristics between clinically appropriate and inappropriate LTACH transfers. We used chi-square tests to compare the proportion of clinically appropriate transfers which met versus did not meet payment criteria. We repeated this comparison if applied an 8-day minimum ICU stay criterion.<sup>1</sup>

## RESULTS

Of 136 hospitalized Medicare beneficiaries transferred to an LTACH we excluded 31 because the patient was either admitted from an LTACH (n=14), not discharged to an LTACH upon further review (n=9), or because the patient's chart (n=4) or index hospitalization (n=4) were not identified within the EHR.

Of the 105 included LTACH transfers, 33 (31.4%) were considered clinically appropriate (10 possibly appropriate and 23 appropriate).

### Sociodemographic and Clinical Characteristics Prior to Transfer

Compared to clinically inappropriate LTACH transfers, patients appropriately transferred had similar age, prevalence of dementia, and functional impairment, but had considerably longer length-of-stays, greater use of mechanical ventilation and tracheostomy, and had diagnoses of much greater complexity and severity (Appendix Table 1).

### Clinical Status and Needs upon Transfer

Over 40% of appropriately transferred patients were transferred to an LTACH directly from the hospital's ICU versus just 4.2% of inappropriate transfers (Table 1). Appropriately transferred patients were more likely to require weaning from mechanical ventilation (39.4% vs. 1.4%), high-flow nasal cannula (12.1% vs. 1.4%), and frequent oropharyngeal suctioning (15.2% vs 0%). Appropriately transferred patients were also more likely to be bedbound (51.5% vs 9.7%), cognitively impaired (45.5% vs. 18.1%), receive enteral nutrition via a temporary (18.2% vs. 2.8%) or a permanent feeding tube (39.4% vs. 9.7%), and had an indwelling urinary catheter (42.4% vs. 15.3%). Appropriately transferred patients had numerically greater central venous catheter use, but this difference was not statistically significant (72.7% vs. 59.7%, p=0.20). Appropriately transferred patients otherwise had similar prevalence of severe decubitus ulcers, and use of negative pressure wound therapy (NPWT), dialysis, and intravenous therapy.

Blood product transfusions (n=1) and use of a patient-controlled analgesia infusion pump (n=1), thoracostomy tube (n=2), or left ventricular assist device (n=1) were rare. Four of these 5 patients were considered appropriately transferred. No patients required total parenteral nutrition or vasopressors upon transfer.

## Reasons for Transfer

The most common reason for LTACH transfer among appropriately transferred patients was respiratory care (57.6%), with 39.4% for mechanical ventilation, which was significantly greater than patients inappropriately transferred (Table 2). Six inappropriately transferred patients (8.3%) were transferred for inpatient pulmonary rehabilitation on only supplemental oxygen. Appropriately transferred patients were also more likely to be transferred for management of cognitive impairment (12.1% vs. 1.4%).

Transfer for wound care was similar between groups (24.2% vs 27.8%,  $p=0.70$ ). However, 19.4% of inappropriately transferred patients were transferred for an air-fluidized mattress to offload pressure ulcers post-operatively, contact ultrasound debridement, or hyperbaric oxygen therapy, versus 3.0% of appropriately transferred patients.

Patient and physician preference were commonly documented reasons for transfer only among inappropriately transferred patients (16.7% and 26.4%, respectively).

## SNF referrals before LTACH transfer

Approximately one-quarter (26.7%) of patients transferred had a documented SNF referral prior to LTACH transfer, and were evenly distributed among appropriate and inappropriate transfers (27.3% vs 26.4%). Of the 19 inappropriately transferred patients who had a SNF referral, 7 were accepted, 6 were pending upon transfer, and 6 were denied. The reasons for denial included being too sick ( $n=3$ ), financial ( $n=2$ ), and having no skilled care needs ( $n=1$ ) (Appendix Table 2 for case descriptions).

## Relationship between Medicare Payment Criteria and Appropriateness of Transfer

Patients who met criteria for full payment were more likely to be appropriately transferred than patients who did not meet criteria (Table 3). The positive predictive value (PPV) of meeting criteria for appropriate transfers was 55.3%. However, 12.1% of transfers not meeting criteria were considered appropriately transferred (Appendix Table 3 for case descriptions). When applying MedPAC's 8-day minimum ICU stay criterion, meeting criteria better identified appropriate transfers (PPV=76.9%) with only a slight absolute increase in patients not meeting criteria yet appropriate for transfer (16.5% from 12.1% under the current criteria; Appendix Table 4 for descriptions of additional cases). Six transfers (23.1%) that met these more stringent criteria were still considered inappropriate for transfer (Appendix Table 5).

## DISCUSSION

In this comprehensive structured review of consecutive LTACH transfers among hospitalized Medicare beneficiaries from one of the largest Next Generation ACOs in the US, about two-thirds of transfers in this high-LTACH-use region were considered clinically inappropriate. Meeting Medicare criteria for full payment modestly distinguished between appropriate and inappropriate transfers. However, adopting an 8-day minimum ICU stay criterion as recommended by MedPAC would better identify hospitalized patients who are appropriate for LTACH transfer.

Patients considered appropriate for LTACH transfer were sicker and more medically complex than inappropriately transferred patients. However, fewer than half of appropriately transferred patients required mechanical ventilation, but had other ongoing care needs that could not be safely managed in less intensive post-acute care settings, such as delirium, advanced dementia with behavioral disturbances, complex wound care, among other reasons. Thus, LTACHs should be considered in the spectrum of post-acute care for more than just prolonged mechanical ventilation.

We found two distinct patterns among patients who were inappropriately transferred. First, many inappropriately transferred patients received therapies that could alternatively be provided in less intensive post-acute care settings, especially given recent Medicare policy overhauls that increased payment to SNFs and home health agencies for non-rehabilitation therapy, including intravenous infusions and simple wound care, such as NPWT with thrice weekly dressing changes.<sup>9,10</sup> Nearly 1 in 5 inappropriately transferred patients were transferred for specialized wound care (air-fluidized mattress, contact ultrasound, hyperbaric oxygen) which could also be delivered in SNFs or in ambulatory settings should payers agree to reimburse these therapies with uncertain effectiveness.<sup>11-15</sup> Second, patient and physician preference were common reasons for inappropriate transfers. This was in part because of patients' poor experience with SNFs, as well as physicians' desire to provide ongoing medical care in LTACHs, as hospital-based physicians in this ACO did not care for patients in SNFs. To limit unnecessary LTACH use, ACOs and health systems should develop preferred networks with high-quality SNFs with better continuity with subspecialty physicians for patients with complex illness.<sup>16</sup>

Our findings also have implications regarding Medicare payment policy. Nearly half of patients who met current Medicare payment criteria were still considered inappropriate for LTACHs. If the US Congress adopted an 8-day minimum ICU criterion as recommended by MedPAC,<sup>8</sup> then fewer than one-quarter of patients who met the revised criteria would be considered inappropriate.

In the absence of validated objective criteria, we were conservative in ascertaining appropriateness in several ways. First, we considered potentially appropriate transfers as appropriate, which comprised about a third of all appropriate transfers in our cohort. Second, even if deemed clinically appropriate, an LTACH transfer may have been inappropriate if more intensive care was not aligned with patients' goals, which we were unable to assess in our review. Lastly, we considered LTACH transfers to be appropriate if patients required prolonged hospital-level care that could not be provided in an alternate post-acute care setting. However, these patients could also theoretically remain in the acute care hospital for the duration of their illness; although previous studies suggests that LTACHs are beneficial for patients requiring prolonged mechanical ventilation or have multi-organ failure.<sup>17,18</sup>

Our study has certain limitations. Generalizability to regions with fewer LTACHs and non-ACO settings is unclear. Regions with fewer LTACHs may have a higher rate of appropriately transferred patients since LTACH patients in these areas are somewhat sicker.<sup>1,3</sup> Since the study ACO did not have explicit criteria or oversight for post-acute care use during the study period, our findings are likely to be representative of non-ACO

settings. As this study was conducted retrospectively, we may not have ascertained all reasons for transfer. However, social workers and case managers routinely documented evolving discharge plans.

## CONCLUSIONS AND IMPLICATIONS

In this study of LTACH transfers among Medicare beneficiaries participating in a large ACO in a high LTACH use region, one-third of transfers were considered clinically appropriate. The most common reason among appropriate transfers was prolonged mechanical ventilation, but over half of patients appropriately transferred to LTACHs had other indications. Inappropriate transfers often were for wound care or intravenous medication infusions, which could be provided in less intensive care settings, or were driven by patient or clinician preference, in part due to poor experience in SNFs and desire for continuity of care in the LTACH. Lastly, meeting Medicare payment criteria modestly distinguished between appropriate and inappropriate transfers. A revised payment policy adopting MedPAC's recommended 8-day minimum ICU criterion would better exclude patients inappropriately transferred, although extrapolation to regions with fewer LTACHs is uncertain.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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**Table 1.**

## Clinical Status and Needs upon LTACH Transfer

	Clinical Appropriateness of Transfer		P-value
	Appropriate (n=33)	Inappropriate (n=72)	
Transferred from the ICU, n (%)	14 (42.4)	3 (4.2)	<0.001
<b>Respiratory</b>			
Mechanically ventilated, n (%)	13 (39.4)	1 (1.4) <sup>a</sup>	<0.001
Noninvasive positive pressure ventilation, n (%)	0	1 (1.4) <sup>b</sup>	0.50
Supplemental oxygen, n (%)	8 (24.2)	18 (25.0)	0.93
High flow nasal cannula, n (%)	4 (12.1)	1 (1.4)	0.02
<b>Mobility</b>			<0.001
Bed bound, n (%)	17 (51.5)	7 (9.7)	
Mobile with use of DME, n (%)	15 (45.5)	58 (80.6)	
Walker, n (%)	8 (24.2)	37 (51.4)	
Wheelchair, n (%)	4 (12.1)	19 (26.4)	
Independent	1 (3.03)	7 (9.7)	
Cognitive impairment, n (%) <sup>c</sup>	15 (45.5)	13 (18.1)	0.003
<b>Nutrition</b>			
Temporary feeding tube (NGT/NJT), n (%)	6 (18.2)	2 (2.8)	0.006
Permanent feeding tube (PEG), n (%)	13 (39.4)	7 (9.7)	<0.001
<b>Catheters</b>			
Urinary catheter, n (%)	14 (42.4)	11 (15.3)	0.002
Central venous catheter, n (%)	24 (72.7)	43 (59.7)	0.20
<b>Wound Care</b>			
Decubitus ulcer, stage 3 or 4, n (%)	5 (15.2)	6 (8.3)	0.29
Negative pressure wound therapy, n (%)	7 (21.2)	15 (20.8)	0.97
Air fluidized mattress to offload, n(%)	0	4 (5.6)	0.17
Contact ultrasound, n (%)	1 (3.0)	6 (8.3)	0.31
Hyperbaric oxygen, n (%)	0	4 (5.6)	0.17
<b>Nursing</b>			
Frequent suctioning of secretions, n (%)	5 (15.2)	0	0.001
<b>Treatments</b>			
Dialysis, n (%)	3 (9.1)	8 (11.1)	0.75
Intravenous therapy, any, n (%)	18 (54.6)	48 (66.7)	0.23
Intravenous antibiotics, n (%)	15 (45.5)	46 (63.9)	0.08

Abbreviations: LTACH, long-term acute care hospital; ICU, intensive care unit; DME, durable medical use; DHT, dobhoff tube; NGT, nasogastric tube; NJT, nasojejunal tube; PEG, percutaneous endoscopic gastrostomy

<sup>a</sup>Transferred to an LTACH from a small rural hospital for higher level of care for mechanical ventilation management and weaning after being intubated for 4 days for acute respiratory failure due to COPD exacerbation from influenza, without any attempts for spontaneous breathing trials, nor an evaluation by an intensivist physician.

<sup>b</sup>Transferred to LTACH for noninvasive positive pressure ventilation teaching for chronic respiratory failure due to amyotrophic lateral sclerosis

<sup>c</sup>Defined as dementia, delirium, sedation, or coma

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**Table 2.**Primary Reasons for LTACH Transfer <sup>a</sup>

	Appropriateness of Transfer		P-value
	Appropriate (n=33)	Inappropriate (n=72)	
Respiratory care	19 (57.6)	11 (15.3)	<0.001
Weaning from mechanical ventilation	13 (39.4)	1 (1.4)	<0.001
Pulmonary rehabilitation	0	6 (8.3)	0.09
Rehabilitation therapy	4 (12.1)	5 (6.9)	0.38
Intravenous infusions	7 (21.2)	20 (27.8)	0.48
Wound care	8 (24.2)	20 (27.8)	0.70
Air fluidized mattress for offloading, contact US debridement, or HBO	1 (3.0)	14 (19.4)	0.03
Cognitive impairment <sup>b</sup>	4 (12.1)	1 (1.4)	0.02
Patient preference	0	12 (16.7)	0.01
Unsatisfactory prior experience at SNF	0	3 (4.2)	0.23
Physician preference	0	19 (26.4)	0.001
Financial (insufficient Medicare days for SNF; delay in SNF authorization)	0	3 (4.2)	0.23
Other reason	6 (18.2) <sup>c</sup>	6 (8.3) <sup>d</sup>	0.14

Abbreviations: LTACH, long-term acute care hospital; ACO, accountable care organization

<sup>a</sup>Transfer may have included multiple primary reasons documented in the chart

<sup>b</sup>Included delirium with agitation requiring supervision and management, as well as chronic dementia with behavioral disturbances hindering other active care needs (i.e. removal of catheters necessary for intravenous infusion)

<sup>c</sup>Other reasons included: general clinical instability (n=1), high ostomy output (n=1), needing 24-hour total care with frequent suctioning of oropharyngeal secretions (n=1), nasogastric tube management (n=1), percutaneous nephrostomy tube management (n=1), and close monitoring for recurrent gastrointestinal bleeding (n=1).

<sup>d</sup>Other reasons included: post-pacemaker monitoring (n=1), administering peritoneal dialysis with patient's 24-hour private caregiver present (n=1), 4-6 weeks of hemodialysis for acute ESRD (n=1), no caregiver at home (n=1), monitoring renal function while receiving gentamycin (n=1).

**Table 3.**

Relationship between Appropriateness of LTACH Transfer and Medicare Payment Criteria

	Appropriateness of Transfer		P-value
	Appropriate	Inappropriate	
<b>Overall</b>	33 (31.4%)	72 (68.6%)	-
<b>Medicare payment criteria status <sup>a</sup></b>			<0.001
Does not meet criteria for full reimbursement	7 (12.1%)	51 (87.9%)	
Meets criteria for full reimbursement	26 (55.3%)	21 (44.7%)	
<b>Revised Medicare payment criteria using ICU length of stay 8 days</b>			<0.001
Does not meets criteria for full reimbursement	13 (16.5%)	66 (83.5%)	
Meets criteria for full reimbursement	20 (76.9%)	6 (23.1%)	

Abbreviations: LTACH, long-term acute care hospital; ICU, intensive care unit

<sup>a</sup>Site-neutral payment policy stipulates substantially reduced reimbursement if LTACH patients do not meet criteria of either receiving prolonged mechanical ventilation ( ≥ 96 hours) in the LTACH or spending 3 or more days in an intensive care unit during the hospital stay immediately preceding transfer, and were not transferred to an LTACH for a psychiatric or rehabilitation diagnosis.

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