Potentially Avoidable Hospitalizations of Nursing Home Residents: Frequency, Causes, and Costs

[See editorial comments by Drs. Jean F. Wyman and William R. Hazzard, pp 760–761]

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OBJECTIVES: To examine the frequency and reasons for potentially avoidable hospitalizations of nursing home (NH) residents.

DESIGN: Medical records were reviewed as a component of a project designed to develop and pilot test clinical practice tools for reducing potentially avoidable hospitalization.

SETTING: NHs in Georgia.

PARTICIPANTS: In 10 NHs with high and 10 with low hospitalization rates, 10 hospitalizations were randomly selected, including long- and short-stay residents.

MEASUREMENTS: Ratings using a structured review by expert NH clinicians.

RESULTS: Of the 200 hospitalizations, 134 (67.0%) were rated as potentially avoidable. Panel members cited lack of on-site availability of primary care clinicians, inability to obtain timely laboratory tests and intravenous fluids, problems with quality of care in assessing acute changes, and uncertain benefits of hospitalization as causes of these potentially avoidable hospitalizations.

CONCLUSION: In this sample of NH residents, experienced long-term care clinicians commonly rated hospitalizations as potentially avoidable. Support for NH infrastructure, clinical practice and communication tools for health professionals, increased attention to reducing the frequency of medically futile care, and financial and other incentives for NHs and their affiliated hospitals are needed to improve care, reduce avoidable hospitalizations, and avoid unnecessary healthcare expenditures in this population. **J Am Geriatr Soc 58:627–635, 2010.**

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Hospitalization of nursing home (NH) residents can cause discomfort for residents, anxiety for their loved ones, morbidity due to iatrogenic events, and excess healthcare costs. Many of these hospitalizations may be preventable through better care in the NH or inappropriate, because the transfer exposes NH residents to additional risks associated with hospitalization,[1] without substantial potential benefit for the residents' clinical course or quality of life. Previous in-depth research on the overall frequency and costs of potentially avoidable hospitalizations of nursing home residents is limited. One study found that, in 2004, 23% of the $972 million spent on hospitalizations of long-stay NH residents in the state of New York were for ambulatory care–sensitive diagnoses (ACSDs), a proxy measure for potentially unnecessary hospitalizations.[2] ACSDs include diagnoses such as angina pectoris, heart failure, chronic obstructive pulmonary disease, pneumonia, urinary tract infection, cellulitis, diabetes mellitus, and dehydration.[3] This is an underestimate of the overall costs of these hospitalizations, because short-stay residents, in whom hospitalizations are more common than long-stay residents, were excluded from this analysis. A study of hospital admissions from Canadian long-term care facilities found 55% to be due to a modified list of ACSD.[4] In an analysis of hospital transfers from eight Los Angeles NHs, experienced physicians using a structured implicit record

review rated 45% of 100 hospitalizations inappropriate, because the resident's needs could have been safely met at a lower level of care.[5]

Reducing potentially avoidable hospitalizations of NH residents presents an opportunity to improve care quality and avoid unnecessary healthcare expenditures. Some of the savings from reducing these avoidable hospitalizations could be used to support the infrastructure necessary for NHs to assess and manage sicker residents and invested to improve the quality of NH care through the Center for Medicare and Medicaid Services (CMS) "value based purchasing" or "pay for performance" initiatives.[6–8]

In preparation for the Medicare Quality Improvement Organization ninth scope of work related to care transitions, CMS supported a contract to examine variability in, and factors associated with, hospitalization of NH residents in the state of Georgia; to determine the proportion of these hospitalizations that were potentially avoidable and the reasons for these hospitalizations; and to develop and pilot test tools and strategies that might help reduce the frequency of avoidable hospitalizations. This article describes the results of the first phase of that project, in which the frequency and reasons for potentially avoidable hospitalizations of NH residents were examined.

METHODS

This project was conducted as a quality improvement initiative supported by a contract from CMS to the Georgia Medical Care Foundation, the Medicare Quality Improvement Organization (QIO) in Georgia. As such, Minimum Data Set (MDS) and Medicare data were available to the QIO, and review by a federally sanctioned institutional review board was not required. Data from the MDS, a comprehensive assessment mandated in all NHs that receive federal funds, were obtained for all Georgia NHs over a 15-month period, from May 1, 2005, to August 1, 2006. The MDS resident discharge disposition code was used to identify residents who were hospitalized. Ten facilities in the highest decile and 10 facilities in the lowest decile of hospitalization rates were identified for in-depth analysis. Hospital-based NHs were excluded because of concern that their proximity to the acute hospital could influence their tendency to transfer. The high-rate NHs were the 10 in the state with the highest rates of hospitalization. The 10 low-rate homes were among the 25 homes with the lowest hospitalization rates. NHs with fewer than 15 recorded hospitalizations during the 15-month review period were excluded because of anticipated difficulty locating a minimum of 10 hospitalizations for review.

A list derived from Medicare claims data of residents who were admitted to an acute care hospital under the Medicare Part A benefit from each of the 20 NHs was sorted according to first name, and each 20th name was selected. From this group of residents, 10 hospitalizations were identified. To include a sample of long- and short-stay residents, in whom rates of and reasons for hospitalization may differ, the following criteria were used to select records: (1) five long-stay residents (Medicaid or private pay) with nonelective hospital admission from May 1, 2005 to August 31, 2006; (2) five postacute residents (covered by Medicare Part A while in the NH) with nonelective hospital admission

during the same time period; (3) if criterion 2 could not be met, review was conducted on as many postacute records as were available and the remainder on long-stay residents; and (4) if the resident had multiple admissions within the time frame, the most recent admission that met the nonelective criteria was chosen.

A panel consisting of experts in nursing home care and experienced practicing long-term care clinicians (including physicians, advance practice nurses, and a physician assistant) was formed to conduct record reviews and provide input into the development of tools and strategies for the intervention phase of the study. (Panel members are listed in the Acknowledgments section.) Panel members used a structured implicit record review (SIR) to rate the acute hospital admissions as unavoidable or potentially avoidable, with identification of the reason(s) for the latter rating. The SIR was based on a refinement of the methods used in a prior study of "appropriateness" of hospitalization of NH residents.[5] The SIR led panel members through a series of questions about the resident and circumstances surrounding the hospitalization. Questions covered the residents' baseline health status, advance directives, potential benefits of acute transfer, and the care provided in the NH when the residents' status changed. After responding to these questions, the reviewer was asked: "Was this hospitalization avoidable?" Response categories included: definitely not avoidable, probably not avoidable, probably avoidable, and definitely avoidable. Hospitalizations rated as definitely or probably avoidable are reported as potentially avoidable in this analysis. Reviewers were asked "Was the hospital the lowest level of care where the resident's needs could be safely met?" Response categories for this question included definitely yes, probably yes, probably no, and definitely no. The panel was asked to rate the hospitalizations considering that the NHs had resources that are routinely available in typical community NHs, as opposed to hospital-based NHs or those affiliated with major academic medical centers. The raters were not made aware of whether the records were from high- or low-hospitalization-rate NHs.

The expert panel underwent training on use of the SIR tool, including review of a detailed procedure manual and two conference calls facilitated by the tool's developer (DS). The interrater reliability of the SIR tool was good in the earlier study, with 84% agreement for emergency department transfers (kappa 0.678) and 89% agreement for hospitalization (kappa 0.779).[5] Two panel members masked to the other members' ratings reviewed approximately 20% of the records in the current study.

For each hospitalization that panel members rated as potentially avoidable, they were also asked to rate a list of factors that could explain why they rated the hospitalization as avoidable and what could have prevented the hospitalization. To examine why the hospitalizations were rated as potentially avoidable, panel members were asked to rate a series of items on a 4-point scale from important to not at all important, with opportunities for open-ended comments. To describe what factors panel members thought would have enhanced the NHs' ability to prevent hospitalization and safely care for the residents without transfer, the panel was asked to rate a series of items on a 4-point scale (would have prevented transfer, very helpful, somewhat helpful, not helpful). Panel members also had the

Table 1. Characteristics of Georgia Nursing Homes (NHs) and Their Residents Selected for the High- and Low-Hospitalization-Rate Groups

Characteristic	All Georgia NHs (N = 377)	Low Hospitalization Rate (n = 10)*	High Hospitalization Rate (n = 10)*
Facility characteristics			
Certified beds, mean ± SD (range)	108 ± 52 (7–388)	132 ± 40 (78–200)	109 ± 49 (47–206)
Medicaid census, mean ± SD (range) %	76 ± 38 (0–245) 70	97 ± 34 (44–150) 73	83 ± 42 (31–165) 73
Medicare census, mean ± SD (range)	9 ± 8 (0–64)	7 ± 5 (2–15)	9 ± 7 (0–22)
Urban, n (%)[†]	182 (47)	6 (60)	5 (50)
Chain, n (%)[‡]	275 (70)	7 (70)	7 (70)
Resident characteristics, %[§]			
Male	32%	22%	31%
Caucasian	71%	86%	59%
Impaired decision-making	62%	65%	71%
Do not resuscitate order	41%	56%	33%
Selected quality measures[‖], mean % ± SD (range)			
Decline in activities of daily living	15.4 ± 9.5 (0–68.6)	12.4 ± 7.4 (5.1–31.8)	18.7 ± 9.6 (5.5–36.7)
Worsening mobility	12.4 ± 7.6 (0–54.6)	9.9 ± 7.4 (0–27.7)	11.7 ± 7.7 (2.2–27.0)
Bedfast	7.9 ± 6.9 (0–49.5)	6.2 ± 7.4 (0–21.6)	11.5 ± 6.5 (0–20.0)
Physical restraints	7.3 ± 5.8 (0–35.7)	8.1 ± 8.6 (0–30.0)	5.3 ± 3.9 (0–11.3)
Indwelling bladder catheter	4.2 ± 2.8 (0–15.3)	3.3 ± 2.9 (0–8.4)	6.3 ± 4.8 (0–15.3)
Urinary tract infection	8.3 ± 5.4 (0–42.1)	10.2 ± 7.5 (3.2–26.1)	8.6 ± 4.2 (3.4–16.1)
Low-risk residents with urinary incontinence	48.0 ± 14.8 (0–100)	45.2 ± 16.7 (19.2–65.0)	44.0 ± 7.6 (31.3–54.7)
Pressure ulcers in high-risk residents	14.3 ± 7.6 (0–40.0)	7.7 ± 6.1 (0–18.2)	18.9 ± 8.5 (5.4–30)
Weight loss	10.1 ± 5.8 (0–50)	9.3 ± 7.8 (0–26.1)	12.8 ± 4.1 (6.6–19.6)
Worsening symptoms of depression	16.2 ± 9.7 (0–51.0)	18.5 ± 8.9 (5.9–37.8)	15.9 ± 9.7 (3.9–34.9)
Moderate or severe pain	7.0 ± 7.8 (0–100)	8.2 ± 8.3 (0.9–29.8)	9.6 ± 7.0 (0.5–19.9)
Postacute residents—delirium	3.5 ± 5.0 (0–37.6)	6.5 ± 7.0 (0–17.4)	1.5 ± 1.5 (0–3.5)
Moderate or severe cognitive impairment	64%	66%	70%
Falls	38%	42%	39%
≥9 medications	61%	62%	64%
Antipsychotic use	27%	26%	32%

* Hospitalization rates were calculating using data from the Minimum Data Set (MDS) during a 15-month period in 2005/06. The high- and low-hospitalization-rate NHs were the 10 in the state with the highest rate of hospitalization and the 10 with the lowest rate of hospitalization; facilities with fewer than 15 recorded hospitalizations during the study period were excluded because of anticipated difficulty in locating a minimum of 10 hospitalizations to review. The 10 low-rate homes were among the 25 lowest-hospitalization-rate homes in the state. Facility characteristics were obtained from the administrators of each facility.

[†] Defined according to Centers for Medicare and Medicaid Services criteria.

[‡] Defined according to Georgia state nursing home database.

[§] Average percentage of residents; clinical characteristics based on MDS 2.0 definitions.

[‖] Defined using MDS data for the first quarter of federal fiscal year 2006. Definitions can be found at http://www.cms.hhs.gov/NursingHomeQualityInits/10_NHQIQualityMeasures.asp#TopOfPage (Accessed March 15, 2006).

SD = standard deviation.

opportunity to list other factors in these ratings. Hospital admitting diagnoses and Medicare payments for the hospitalizations were obtained through the Medicare Case Review Information System (CRIS) data base.

RESULTS

The average hospitalization rate during the 15-month study period for the 377 Georgia NHs for which complete data were available was $1.62 ± 0.78$ per 1,000 resident days, with a range from 0 to 4.81. The average number of hospitalizations over the 15-month period for all NHs in the state was 104, with a range from 0 to 386. In the 10 high-hospitalization-rate homes, the average rate per 1,000 resident days was $3.17 ± 0.40$ (range 2.81–4.21), with an average total number of hospitalizations of 196 (range 96–386); in the 10 low-hospitalization-rate homes, the average rate was $0.74 ± 0.12$ per 1,000 resident days (range 0.52–0.89), with an average total number of hospitalizations of 60 (range 32–93).

Table 1 illustrates the characteristics of the 10 high-rate and 10 low-rate NHs identified for further study. The 10 NHs in the high-rate group had on average fewer certified beds, a lower proportion of Caucasian residents, and fewer residents with do not resuscitate orders. Selected quality measures calculated from the MDS are also shown in Table 1. There was no significant relationship between any of these quality measures and hospitalization rates. Postacute residents of high-rate homes tended to have greater worsening of activities of daily living, a higher rate of being

bedbound and pressure ulcers, and lower rates of pain and delirium.

The availability of the medical director and primary care physicians and nurse practitioners (NPs) or physician assistants (PAs) was greater in the low-hospitalization-rate homes. For example, involvement of a NP or PA was 90% in the low-rate homes and 60% in the high-rate homes, and daily presence of a physician, NP, or PA in the facility during the week was 50% in the low-rate and 0% in the high-rate homes. Nursing hours per resident and case load of licensed practical nurses and certified nursing assistants were similar between the two groups of homes.

One hundred one records were reviewed from high-rate homes and 99 from low-rate homes. The purposive sampling procedure resulted in residents covered under Medicare Part A representing 47% of the 200 records reviewed. Overall, 134 (67%) of the 200 hospitalizations were rated as probably or definitely avoidable (Table 2). The proportion of hospitalizations rated as avoidable was higher in the high- than the low-rate homes (75% vs 59%), although the proportion rated as probably or definitely avoidable was similar in residents covered under a Medicare Part A benefit (69%) to the proportion so rated of long-stay residents (65%). For the question "Is the hospital the lowest level of care where the resident's needs could be safely met?" 68% were rated as probably or definitely not; 74% in the high-

Table 2. Expert Panel Ratings of Whether Hospitalizations Were Avoidable

Nursing Home Resident Group	Definitely or Probably Yes	Definitely or Probably No
	%	
On Medicare Part A skilled benefit at time of hospitalization (n = 94)	69	31
On other payment source (Medicaid, private pay, other) at time of hospitalization (n = 106)	65	35
Residents of high-hospitalization-rate nursing homes (n = 101)*	75	25
Residents of low-hospitalization-rate nursing homes (n = 99)	59	41
All residents (n = 200)	67	33

Ratings were based on a modification of a Structured Implicit Review process used in previous studies.[3] Panel members were asked to perform the structured review and then respond to the question: "Was this hospitalization avoidable?" Response categories included definitely avoidable, probably avoidable, probably not avoidable, and definitely not avoidable. Hospitalizations rated as definitely or probably avoidable are reported as potentially avoidable.

* The high- and low-hospitalization-rate nursing homes were the 10 in the state with the highest rate of hospitalization and the 10 with the lowest rate of hospitalization facilities with fewer than 15 recorded hospitalizations during the study period were excluded because of anticipated difficulty in locating a minimum of 10 hospitalizations to review. The 10 low-rate homes in the Table were among the 25 lowest hospitalization rate homes in the state.

Table 3. Causes of Potentially Avoidable Hospitalizations

Hospital Admitting Diagnoses for Hospitalizations Rated as Potentially Avoidable*	n (%) (N = 103)
Cardiovascular (mainly congestive heart failure and chest pain)	22 (21)
Respiratory (mainly pneumonia and bronchitis)	21 (20)
Mental status change or neurological symptom or sign	13 (12)
Urinary tract infection	11 (11)
Sepsis or fever	8 (8)
Skin (cellulitis, infected wound, or pressure ulcer)	8 (8)
Dehydration or metabolic disturbance	7 (7)
Gastrointestinal (bleeding, diarrhea)	7 (7)
Musculoskeletal pain or fall	3 (3)
Psychiatric	1 (1)
Other (adverse drug effect, surgical consult)	2 (2)

* Hospital primary admitting diagnoses were available for 161 of the 200 hospitalizations through the Medicare Case Review Information System database. Of these 161, 103 (64%) were rated as definitely or probably avoidable. When the primary admitting diagnoses were multiple, the diagnosis that most closely related to the nursing home resident's presenting symptoms (as determined by the principal investigator (JGO)) was selected as the admitting diagnosis.

rate and 62% in the low-rate homes. Forty-four of the 200 records (24%) were rated twice, with one rater assigned as the primary reviewer. (Data reported in Table 2 are those that the primary reviewers rated.) Of these 44, panel members were consistent in their response to the question "Was this hospitalization avoidable?" in 30 cases (68%) (both rating it as definitely or probably avoidable). In eight of the 14 in which there was inconsistency, the two raters considered the hospitalization probably avoidable versus probably not avoidable (as opposed to one reviewer rating it as definitely avoidable and one rating it as definitely not avoidable).

Table 3 lists the hospital diagnoses that were available from the Medicare CRIS database for 105 of the 134 hospitalizations that were rated as potentially avoidable. The most common causes were consistent with what has been published in other studies of hospitalization of NH residents, as well as with common ASCDs.[2–4,8–10] Cardiovascular conditions (mainly congestive heart failure and chest pain), respiratory conditions (mainly pneumonia and bronchitis), acute mental status changes, sepsis and fever, dehydration, skin conditions (mainly cellulitis), and gastrointestinal disorders (mainly diarrhea) accounted for 95% of the admitting diagnoses for hospitalizations rated as potentially avoidable.

Table 4 lists the reasons why panel members considered the hospitalizations potentially avoidable. The most common factors cited were that the resident could have been cared for at a lower level of care and that the NH should have been able to provide this care, availability of on-site physician evaluation, better advance care planning, quality of care issues in assessing the resident's change in status, and the resident's overall condition limiting their ability to benefit from hospitalization. Table 5 lists panel ratings of resources that would have enhanced the NHs' ability to care for the resident without transfer. The top-rated resources included availability of on-site evaluation by a physician,

Table 4. Expert Panel Ratings of Factors Associated with Potentially Avoidable Hospitalizations*

Factors Rated by Panel	Nursing Homes with High Hospitalization Rates (n = 10 Homes; 76 Potentially Avoidable Hospitalizations)		Nursing Homes with Low Hospitalization Rates (n = 10 Homes; 58 Potentially Avoidable Hospitalizations)		All Nursing Homes (N = 20 Homes; 134 Potentially Avoidable Hospitalizations)	
	Important	Somewhat Important	Important	Somewhat Important	Important	Somewhat Important
	n (%)					
The same benefits could have been achieved at a lower level of care.	50 (66)	20 (26)	35 (60)	19 (33)	85 (63)	39 (29)
The nursing home should have been able to do everything done by the hospital.	36 (47)	27 (36)	31 (54)	18 (31)	67 (50)	45 (34)
Better quality of care provided in the nursing home by the physician, nurse practitioner, or physician assistant may have prevented the transfer.	42 (55)	19 (25)	31 (54)	19 (33)	73 (55)	38 (28)
One physician visit could have avoided the transfer.	26 (34)	34 (45)	24 (41)	23 (40)	50 (37)	57 (43)
Better quality of care by nursing home staff may have prevented the transfer.	20 (26)	31 (41)	12 (21)	33 (57)	32 (24)	64 (48)
Better quality of care would have prevented or decreased severity of acute change.	28 (37)	25 (33)	16 (28)	23 (40)	44 (33)	48 (36)
Better advance care planning would have prevented the transfer.	31 (41)	15 (20)	20 (35)	17 (29)	51 (38)	32 (24)
Resident's overall condition limited his or her ability to benefit from the transfer.	15 (20)	21 (28)	10 (17)	17 (29)	25 (19)	38 (28)
Resident or family did not want hospitalization.	4 (5)	12 (16)	4 (7)	5 (9)	8 (6)	17 (13)
Family or proxy insisted on transfer.	5 (7)	6 (8)	5 (9)	5 (9)	10 (8)	11 (8)

* Expert panel members were asked to rate each item for each hospitalization they rated as avoidable on a 4-point scale from important to not at all important. Factors are listed in descending order according to rating of important or somewhat important for all nursing homes.
Row and column percentages do not total 100% because different panel members rated different numbers of hospitalizations as avoidable, and multiple items could have been rated as important or somewhat important for any given hospitalization.

NP or PA, care by a registered nurse, availability of laboratory results within 3 hours, and the ability of the NH to initiate and maintain intravenous hydration.

Data on diagnosis-related group (DRG) payments were available in the Medicare CRIS database for 101 hospitalizations. The average DRG payment was $6,796 (range $1,438–24,480). For the 68 hospitalizations rated as potentially avoidable for which data were available, the average DRG payment was $6,572 (with the same range noted above). The total of the Medicare DRG payments for these 68 hospitalizations was $446,896.

DISCUSSION

The findings of this study have important implications for strategies and health policies to improve the quality of NH care and to reduce the frequency, morbidity, and costs of potentially avoidable hospitalizations and rehospitalizations of NH residents. The 67% of hospitalizations rated as potentially avoidable in this study was higher than in the previous study using the SIR tool,[5] as well as in other studies that used ASCDs or other methods to define preventable hospitalizations.[3,9] The difference may reflect refinements in the SIR (which in the current study encompassed the ability to prevent the transfer and the appropriateness of the

transfer decision); differences in the characteristics, quality, and approaches to care in the NHs selected for this study (half of which had high hospitalization rates); differences in the raters (primary care physicians vs nursing home care experts); inclusion of more short-stay (postacute) residents, who tend to be transferred at higher rates; regional variations in approaches to hospitalizing NH residents; or some combination of these factors. These findings suggest that many NH residents with acute changes in condition could be safely managed in the NH, which would result in less physical and emotional trauma to the resident and less risk of a cascade of potential costly iatrogenic illnesses that can occur in hospitalized older adults (such as delirium, complications of immobility, injurious falls, indwelling bladder catheter–associated urinary tract infections, and polypharmacy and related adverse drug reactions[1]).

In addition to avoiding morbidity related to complications of hospitalizations, reducing the frequency of potentially avoidable hospitalizations could result in substantial cost savings for Medicare. The cost to Medicare of hospitalizations of long-stay NH residents for ACSDs in the state of New York in 2004 was close to $190 million.[2] In a study conducted in 59 NHs between 1992 and 1997, 256 cases of infection that resulted in hospitalization were compared with 256 matched cases managed in the NH. The mean

Table 5. Resources that Expert Panel Rated as Potentially Helpful or Not Helpful in Preventing Avoidable Hospitalizations*

Resources Rated	Nursing Homes with High Hospitalization Rates (N = 10 Homes; 76 Potentially Avoidable Hospitalizations)			Nursing Homes with Low Hospitalization Rates (N = 10 Homes; 58 Potentially Avoidable Hospitalizations)			All Nursing Homes (N = 20 Homes; 134 Potentially Avoidable Hospitalizations)		
	Prevent	Very or Somewhat Helpful	Not Helpful	Prevent	Very or Somewhat Helpful	Not Helpful	Prevent	Very or Somewhat Helpful	Not Helpful
Physician or physician extender present in nursing home at least 3 days per week	13 (17)	60 (79)	(4)	8 (14)	47 (81)	3 (5)	21 (16)	107 (80)	6 (4)
Nurse practitioner availability on a regular basis	5 (7)	68 (89)	3 (4)	5 (9)	50 (86)	3 (5)	10 (7)	118 (88)	6 (4)
Examination by physician, nurse practitioner, or physician assistant within 24 hours	34 (45)	35 (46)	7 (9)	20 (34)	35 (60)	3 (5)	54 (40)	70 (52)	10 (7)
Registered nurse providing care (vs a licensed practical nurse or nursing assistant)	3 (4)	68 (89)	5 (7)	5 (9)	46 (79)	7 (12)	8 (6)	114 (85)	12 (9)
Availability of laboratory tests within 3 hours	12 (16)	57 (75)	7 (9)	8 (14)	42 (72)	8 (14)	20 (15)	99 (74)	15 (11)
Intravenous therapy	16 (21)	45 (59)	15 (20)	14 (24)	33 (57)	11 (19)	30 (22)	78 (58)	26 (19)
Pulse oximetry	1 (1)	44 (58)	31 (41)	2 (3)	34 (59)	22 (38)	3 (2)	78 (58)	53 (40)
Respiratory therapy	1 (1)	28 (37)	47 (62)	7 (12)	24 (41)	27 (47)	8 (6)	52 (39)	74 (55)
Psychiatric consultation	0 (0)	9 (12)	67 (88)	0 (0)	8 (14)	50 (86)	0 (0)	17 (13)	117 (87)
Blood products	4 (5)	6 (8)	66 (87)	2 (3)	4 (7)	52 (90)	6 (4)	10 (7)	118 (88)
Total parenteral nutrition	0 (0)	7 (9)	69 (91)	0 (0)	2 (3)	56 (97)	0 (0)	9 (7)	125 (93)
Patient-controlled analgesic pumps	1 (1)	5 (7)	70 (92)	0 (0)	4 (7)	54 (93)	1 (1)	9 (7)	124 (93)

* Expert panel members were asked to rate each item for each hospitalization they rated as avoidable as to whether the item would have enhanced the nursing home's ability to prevent hospitalization and safely care for the resident without transfer on a 4-point scale (would have prevented transfer, very helpful, somewhat helpful, not helpful). Factors are listed in descending order according to rating of would have prevented transfer or very or somewhat helpful for all nursing homes.

Row and column percentages do not total 100% because different panel members rated different numbers of hospitalizations as avoidable, and multiple items could have been rated as important or somewhat important for any given hospitalization.

Medicare payments for the hospitalized cases were $5,202, compared with $996 for those managed in the NH (mean difference $4,206).[11]

Extrapolating potentially avoidable hospitalization rates from one state's experience or from a small sample of nursing homes has limitations, but estimates of the effect using data from one state may set useful parameters for considering the potential for prevention and cost savings at a national level. Using assumptions based on data from Georgia NHs in this study, a preliminary estimate of the cost of potentially avoidable hospitalizations in long-stay residents can be made. The average long-stay census in the 377 Georgia NHs was 99, which, using the average hospitalization rate, would have resulted in approximately 21,800 hospitalizations. Using $6,500 as the average DRG payment for these potentially avoidable hospitalizations, the cost to Medicare of these hospitalizations in 2006 would have been approximately $142 million. Assuming that one-third of these hospitalizations could be avoided, the potential savings to Medicare would be approximately $47 million; using half, which is slightly less than the potentially avoidable rate observed in the lowest-hospitalization-rate NHs, the savings would be approximately $71 million. Availability of an on-site NP or PA was among the most highly rated factors necessary to reduce avoidable hospitalizations, and their presence has been shown in multiple studies to be associated with lower hospitalization rates.[12–14] The lower estimate of $47 million in savings in Georgia would enable Medicare to support availability of an NP or PA in every NH in Georgia 5 days per week at an average cost of $100,000 in salary and benefits and have savings left over.

Achieving a sustained reduction in potentially avoidable hospitalizations of NH residents will be challenging for several reasons. Several previous studies have demonstrated that a variety of factors are associated with hospitalization of NH residents, ranging from state Medicaid bed-hold policies to availability of registered nurses and NPs to overall quality of care provided in the NH.[15–18] Examination of the factors rated by the expert panel in the current project provides insight into how potentially avoidable hospitalizations might be classified and the types of interventions that might be helpful in reducing these hospitalizations. Hospitalizations rated as potentially avoidable in this project highlight the need for better quality of care in identifying and assessing acute changes in resident condition with the availability and expertise of registered nurses and primary care clinicians for assessing acute changes in condition; better access to services such as laboratory, X-ray, and intravenous fluid administration; and greater focus on advance care planning as a strategy to reduce futile care, including education of residents and families, encouragement to complete a durable power of attorney for health care, and limits on the use of interventions such as hospitalization of residents who are unlikely to benefit. Thus, reducing avoidable hospitalizations will require investment in NH infrastructure to manage sicker residents in the NH without the need for hospitalization before dollar savings can be achieved.[8,19] Nevertheless, providing financial incentives for reducing hospitalization without the necessary infrastructure could worsen care quality if NHs are rewarded for managing sicker residents in the NH with inadequate capabilities to do so safely.[7,8,19–22]

The expert panel most commonly cited greater availability of physicians, NPs, and PAs for on-site assessment of acute changes in clinical status of NH residents, the need to improve overall care quality for residents with acute changes in condition, and the ability to obtain diagnostic tests and administer intravenous fluids as important in preventing avoidable hospitalizations. Involvement of NPs and PAs in collaboration with primary care physicians has repeatedly been shown to be associated with less hospitalization of NH residents.[12–14,23–25] Involving these health professionals in care transition interventions in which acute hospitals collaborate with NHs and home health agencies would build upon evolving models,[26,27] but the number of healthcare professionals with special training and interest in geriatrics and long-term care medicine is not increasing rapidly enough to meet this need.[28] Financial incentives to obtain certification in geriatrics or work in NHs, such as loan repayment programs, and the development of a specialty in NH medicine[29] may help in this regard.

An additional strategy for reducing avoidable hospitalizations is the use of practice guidelines, care paths, communication, and other tools that assist NH health professionals in recognizing, reporting, and managing conditions, which may be helpful in bolstering NHs' ability to manage sicker residents.[30–36] For example, in a randomized trial conducted in several Canadian NHs, implementation of a care path for pneumonia with the support of a trained nurse was shown to be effective in reducing hospitalizations and related costs without greater mortality.[36] Similar tools were created as part of the larger CMS project at the Georgia QIO and are available on-line.[37] A Medicare demonstration project that involved a payment to NHs to manage sicker residents without hospital transfer did not show a substantial increase in mortality when a variety of conditions were treated in the NHs.[20] Additional studies of care paths for conditions that commonly cause hospitalizations of NH residents are needed to demonstrate their feasibility, effectiveness, and costs relative to acute hospital care and would provide stronger evidence that many hospitalizations of NH residents are potentially avoidable. Other approaches, such as the more frequent use of hyperdermoclysis for short-term hydration,[38] may also assist NH staff in managing sicker residents when the capability for intravenous fluids is not available. Nevertheless, all of these strategies would require increasing the number, training, and expertise of NH staff, which, given the nursing shortage and cuts in NH reimbursement, will present a formidable challenge.

Another factor in preventing avoidable hospitalizations that the expert panel commonly cited is the need to reduce the amount of futile care and improve advance care planning in NHs. Improving the use of advance directives in NHs was shown to be associated with lower costs and greater family satisfaction in a randomized trial conducted in Canadian NHs.[39] Again, lack of physician involvement and trained nurses and social workers may be a barrier to achieving this goal.[40–43] Cultural and religious issues involved in agreeing on palliative or comfort care plans for NH residents and their families can also be challenging.[44–46]

The Medicare fee-for-service system currently provides financial incentives for physicians, NHs, and acute hospitals that favor hospitalization of NH residents. The unreimbursed costs, as well as the potential regulatory and legal liabilities of caring for sicker residents, are potent disincentives to managing residents with acute changes in status in the NH.[19–22] Managed care programs such as Evercare and others mitigate these financial incentives and have been shown to reduce hospitalization of NH residents when teams of physicians and NPs or PAs provide more care in the NH,[14,23,24] but the number of NH residents in these programs remains small.

Financial incentives to reduce avoidable hospitalizations of NH residents in a pay-for-performance model may be effective if the incentives are adequate to support the costs of providing safe, high-quality care in the NH. Medicare is beginning a demonstration of a value-based purchasing initiative that will reward NHs based in part on lower rates of potentially avoidable hospitalizations.[6] In addition, Medicare is exploring "bundling" payments for 30-day episodes of care for certain conditions. If skilled NH care is included in these bundled payments, hospitals and NHs would have a potent financial incentive to collaborate and communicate better to avoid hospitalization of NH residents whenever safe and feasible. Nevertheless, both strategies are fraught with pitfalls[47,48] and could be counterproductive if support for the infrastructure to manage sicker NH residents in the NH is not available.

The results of this study must be interpreted cautiously for several reasons. First, the study was conducted in one state. NHs probably vary in their existing capacity to manage acute and subacute illnesses, and this variability should be considered when viewing potential overall cost savings. Because only limited data were collected on the capabilities of NHs in this study (Table 1), and nationwide data on this issue are not available, how representative the 20 NHs studied are in this regard cannot be determined. Although the demographic and clinical characteristics of Georgia NH residents are similar to those of residents in other U.S. NHs, Georgia differs from other states in some important ways that could influence the interpretation of the results. For example, the Georgia QIO has excellent relationships with its stakeholders, and the Georgia Health Care Association has instituted several innovative programs in the state's NHs, including the use of quality improvement software, a career ladder for certified nursing assistants, and a pay-for-performance system based on quality indicators derived from the MDS.

Second, the method used to rate hospitalizations as potentially avoidable relied on retrospective record review. Retrospective review may miss data on clinical and other factors that could influence the rate of hospitalizations and resultant biases in the data collected and conclusions drawn. The SIR is comprehensive and guides the reviewer through a thorough assessment of the resident and the circumstances surrounding the hospitalization in a systematic manner, but even expert clinicians may have difficulty making judgments given limitations of the documentation in typical NH records and without knowing the individual NH resident, their family, and the NH staff. For example, resident and family finances, social circumstances, and preferences might play an important role in the decision to hospitalize, but these issues may not be clearly documented in the medical record. Some acute care transfers may result from a desire on the part of NH staff for residents not to die while in the NH; this information would also not be documented in the NH record. Although the SIR tool has its limitations, it is likely to be just as, if not more, valid in defining potentially avoidable hospitalizations as using administrative data, such ACSDs. ACSDs derived from administrative data do not include the type of individual case-based clinical information that is critical in making judgments about care that are included in the SIR review.

Third, the expert panel was aware of the purpose of the study and may have been biased in terms of perceiving a need to improve the quality of NH care and reduce unnecessary hospitalizations. In addition, panel members were clinicians with substantial NH experience, who may be better trained and more comfortable with assessing and managing sicker residents in the NH than more-typical NH primary care clinicians. Most of the panel members were physicians, and the perspective of other front-line NH staff may have been underrepresented in the record reviews. The ratings of potentially avoidable hospitalizations must be interpreted in this context.

Despite these limitations, potentially avoidable hospitalizations of NH residents appear to represent an opportunity to improve the quality of NH care and lower healthcare expenditures. To achieve these goals, infrastructure in NHs to manage sicker residents safely must be supported; strategies and tools must be further developed and disseminated that are helpful to NH professionals in their everyday assessment, management, and communication about residents with acute changes in condition; the amount of medically futile care must be reduced; and adequate financial and other incentives must be provided that will motivate NHs, physicians, and acute care hospitals to reduce potentially avoidable hospitalizations.

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