

Analyzing Hospital Transfers Using INTERACT Acute Care Transfer Tools: Lessons from MOQI

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OBJECTIVES: We explored the differences in potentially avoidable/unavoidable hospital transfers in a retrospective analysis of Interventions to Reduce Acute Care Transfers (INTERACT) Acute Transfer Tools (ACTs) completed by advanced practice registered nurses (APRNs) working in the Missouri Quality Improvement (QI) Initiative (MOQI).

DESIGN: Cross-sectional descriptive study of 3996 ACTs for 32.5 calendar months from 2014 to 2016. Univariate analyses examined differences between potentially avoidable vs unavoidable transfers. Multivariate logistic regression analysis of candidate factors identified those contributing to avoidable transfers.

SETTING: Sixteen nursing homes (NHs), ranging from 120 to 321 beds, in urban, metro, and rural communities within 80 miles of a large midwestern city.

PARTICIPANTS: A total of 5168 residents with a median age of 82 years.

MEASUREMENTS: Data from 3946 MOQI-adapted ACTs.

RESULTS: A total of 54% of hospital transfers were identified as avoidable. QI opportunities related to avoidable transfers were earlier detection of new signs/symptoms (odds ratio

[OR] = 2.35; 95% confidence interval [CI] = 1.61-3.42; $P < .001$); discussions of resident/family preference (OR = 2.12; 95% CI = 1.38-3.25; $P < .001$); advance directive/hospice care (OR = 2.25; 95% CI = 1.33-3.82; $P = .003$); better communication about condition (OR = 4.93; 95% CI = 3.17-7.68; $P < .001$); and condition could have been managed in the NH (OR = 16.63; 95% CI = 10.9-25.37; $P < .001$). Three factors related to unavoidable transfers were bleeding (OR = .59; 95% CI = .46-.77; $P < .001$), nausea/vomiting (OR = .7; 95% CI = .54-.91; $P = .007$), and resident/family preference for hospitalization (OR = .79; 95% CI = .68-.93; $P = .003$).

CONCLUSION: Reducing avoidable hospital transfers in NHs requires challenging assumptions about what is avoidable so QI efforts can be directed to improving NH capacity to manage ill residents. The APRNs served as the onsite coaches in the use and adoption of INTERACT. Changes in health policy would provide a revenue stream to support APRN presence in NH, a role that is critical to improving resident outcomes by increasing staff capacity to identify illness and guide system change. *J Am Geriatr Soc* 00:1-7, 2019.

Key words: avoidable transfers; INTERACT; nursing homes

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Residents living in US nursing homes (NHs) are commonly transferred to hospitals; however, some research suggests 29%¹ to more than 60% of hospitalizations are potentially avoidable.^{2,3} In another study, NH staff rated 76% of hospital transfers as *unavoidable*, only 4% rated as *avoidable*, and 20% as *potentially unavoidable*.⁴ These findings suggest differing perspectives and pose important considerations for clinical care and health policy. Avoidable hospitalizations are costly to

Medicare and, to a lesser extent, Medicaid. In 2005, Medicare and Medicaid expended \$2.6 billion for potentially avoidable hospitalizations among dual-eligible NH residents.⁵ More than one-third of dually eligible beneficiaries in a long-term care or skilled nursing facility setting were hospitalized at least once, totaling almost 1 million hospitalizations in the same time frame.⁵ Finding ways to reduce avoidable hospitalizations of NH residents is clearly imperative.¹⁻⁵

Interventions to Reduce Acute Care Transfers (INTERACT) is a publicly available quality improvement (QI) program that focuses on early identification and management of acute changes of condition in NH residents.⁶ Specifically, studies of INTERACT have contributed to what is known about staffs' reasons for transferring residents to the hospital. Among avoidable transfers, nearly 32% relate to missed opportunities for treatment before transfer, 14% due to the insistence of patients/families on transfer, more than 11% noted advance directives were not followed or in place, and nearly 6% were due to lack of staff capacity to manage the condition.⁴ A recent study⁷ found that symptoms the residents experienced before transfer included behavior/cognitive changes, fall, trauma or fracture, and cardiovascular, respiratory, pain, infection, and acute gastrointestinal symptoms.

In an attempt to influence this complex problem, the Medicare-Medicaid Coordination Office, in collaboration with the Center for Medicare & Medicaid Innovation, developed a funding opportunity in 2012 called the Initiative to Reduce Avoidable Hospitalizations among Nursing Facility Residents. This initiative focused on long-stay residents enrolled in Medicare and Medicaid programs and recruited organizations to partner with NH facilities to implement evidence-based interventions that included INTERACT tools to both improve care and lower costs.⁸ The Sinclair School of Nursing Missouri Quality Initiative (MOQI) for NHs was one of seven sites selected to participate. MOQI achieved 30% reduction in all-cause hospitalizations by the end of the study. Unavoidable transfers declined from 64% to 47%. Avoidable transfers increased from 48% to 54%, indicating a change in what conditions advanced practice registered nurses (APRNs) perceived as avoidable.⁹ This article reports on characteristics of both avoidable and unavoidable transfers as well as APRN-recognized opportunities for improvement to decrease avoidable transfers through the use of INTERACT and other QI methods.

METHODS

MOQI Initiative

Sixteen NHs participated in the MOQI, ranging in size from 120 to 321 beds, and located in urban, metro, and rural communities within 80 miles of a large midwestern city. To be eligible, residents had to be in the NH more than 100 days, with a traditional Medicare and/or Medicaid fee-for-service payer. Overall, 5168 residents were enrolled in MOQI with a median age of 82 years (range = 20-104 y).⁹ The MOQI embedded one full-time APRN per NH to provide resident assessment of acute and chronic illness, care management, education and support for early illness recognition and management, support for the use of INTERACT tools, improvement in advance care planning/advance directives, medication reconciliation/management, QI, and

improved use of healthcare technology.⁹ To accomplish initiative goals, MOQI APRNs worked with a support team that included a qualified master's-prepared social worker, QI/INTERACT coach, health information technology coach, project supervisor, and medical director. Further information is available at <https://nursinghomehelp.org/MOQI-initiative/>.¹⁰

APRNs used various strategies to influence hospital transfer rates including performing a root cause analysis on all transfers using a slightly adapted INTERACT QI Acute Care Transfers (ACTs) tool, v.3.0.^{10,11} Broad ACT categories included (1) Resident characteristics and risk factors for hospitalization; (2) acute change in condition and other non-clinical factors that contributed to the transfer; (3) action(s) taken to evaluate and manage the change in condition before transfer; (4) description of the hospital transfer; and (5) opportunities for improvement. Individual items within each of the broad categories described common clinical and non-clinical factors that helped clinical staff understand reasons for the transfer and for process improvement considerations to avoid future transfers.¹² The ACT was modified to capture information about APRN evaluation of residents before transfer.

APRNs completed ACTs for each transfer using a combination of chart review and nurse interviews. ACT QI procedures included (1) monthly review of all ACTs by a team composed of the APRN, project coordinator, and APRN supervisor; (2) identification of resident and NH factors contributing to the transfer; and (3) agreement by the team on the question "Was the transfer potentially preventable (avoidable)?" using the QI technique "Five Why's."¹³ This technique is an iterative interrogative approach to exploring cause and effect and was used by the team to assure root causes of transfers were considered when establishing agreement on which transfer were deemed avoidable vs unavoidable. The term "preventable" is used in the INTERACT ACT and was retained in our version of the tool; however, we use the term "avoidable" in this article for consistency with other literature describing the relationship between avoidable transfers and INTERACT.^{3,4,10} APRNs also reviewed transfer findings with NH leadership and submitted data to the NH's QI committee to discuss needed systems change. The original version of the QI Tool for ACT, excluding minor MOQI adaptations, is available at <http://www.pathway-interact.com/>.¹¹

Design and Analysis

This was a cross-sectional descriptive study of the common clinical and nonclinical factors (individual items) within broad ACT categories for 32.5 months from 2014 to 2016. Institutional review board approval was obtained for studies pertaining to MOQI. Descriptive statistics were calculated and compared for all factors for each transfer for almost 3 years of data. Univariate analyses using χ^2 tests were conducted to examine differences between potentially avoidable vs unavoidable transfers. Factors identified as candidates from the univariate analysis that were significant at the .1 level were entered into multivariate logistic regression analyses to identify the most important factors contributing to transfers. A forward model selection option was used. Additionally, the number and percentages of all transfers were calculated and tested for significant

differences between each study year using the χ^2 test. We then compared our analysis of ACTs completed by MOQI APRNs with the analysis of ACTs completed by NH staff in other studies.^{12,14}

RESULTS

Factors Related to Avoidable Hospital Transfers

From February 20, 2014, through November 6, 2016, APRNs submitted 3996 ACTs of which 3946 were substantially completed and included in these analyses. There were 1516 ACTs submitted in 2014, 1336 in 2015, and 1144 in 2016. Table 1 describes the avoidable transfers. Over one-half of transfers (n = 2112 [54%]) were identified as avoidable using the team-based approach described earlier. Clinical factors related to avoidable transfers included falls (n = 370 [19%]; $P < .001$), fever (n = 228 [12%]; $P = .021$), and urinary symptoms/incontinence (n = 94 [5%]; $P = .036$). The only high-risk condition was dementia (n = 916 [44%]; $P < .001$). Avoidable transfers received medical evaluation via telephone (n = 1739 [83%]; $P < .001$). Transfers that were not examined by a MOQI APRN occurred because the APRN was not notified (n = 183 [13%]; $P = .039$). Additionally, avoidable transfers did not have advance

healthcare directives stating their preferences (n = 32 [2%]; $P = .049$). Avoidable transfers were more likely to occur either in the afternoon (n = 775 [37%]; $P < .001$) or evening (n = 571 [27%]; $P < .001$). Inadequate staffing was noted more often in avoidable transfers (n = 14 [16%]; $P = .004$). Regarding transfer outcomes, 940 residents were transferred to the emergency department (ED) without hospital admission, and of those, 33% (n = 701; $P < .001$) were avoidable vs 13% unavoidable (n = 239). Supplementary Tables S1-S4 list all the ACT data elements comparing avoidable and unavoidable transfers.

A number of processes contributed to the decision to transfer for those deemed avoidable. These processes included a condition could have been managed in the NH (n = 1161 [58%]; $P < .001$); better communication about the condition was needed (n = 776 [39%]; $P < .001$); new signs/symptoms detected earlier (n = 6526 [31%]; $P < .001$); resident/family preferences could have been discussed earlier (n = 368 [18%]; $P < .001$); and advance directive/hospice in place earlier (n = 219 [11%]; $P < .001$). When QI factors were analyzed using multiple regression as noted in Table 2, all QI opportunities were predictive of avoidable transfers except for one, resources not available to manage (odds ratio [OR] = .101; confidence interval [CI] = .078-.138; $P < .0001$) that predicted unavoidable transfer.

Table 1. Factors Relating to Avoidable Hospital Transfers

| Hospital transfers | Total (%) 3946 (100) Transfers n (%) with condition | Avoidable N (%) 2111 (54) Avoidable n (%) with condition | Unavoidable N (%) 1835 (46) Unavoidable n (%) with condition | P value |
|--|--|---|---|---------|
| Change in clinical factors ^a n = 3518 | | | | |
| Falls | 532 (15) | 370 (19) | 162 (10) | <.001 |
| Fever | 378 (11) | 228 (12) | 150 (9) | .021 |
| Urinary symptoms/Incontinence | 149 (4) | 94 (5) | 55 (4) | .036 |
| High-risk conditions ^a n = 3872 | | | | |
| Dementia | 1592 (41) | 916 (44) | 676 (38) | <.001 |
| Resources not available ^a n = 493 | | | | |
| Staffing | 40 (8) | 14 (16) | 26 (6) | .004 |
| Medical evaluation before transfer ^a n = 3869 | | | | |
| Telephone communication | 3048 (80) | 1739 (83) | 1309 (74) | <.001 |
| If not evaluated by MOQI APRNs, reason n = 2471 | | | | |
| MOQI APRNs not notified | 287 (12) | 183 (13) | 104 (10) | .039 |
| Preferences for hospitalization ^a n = 2933 | | | | |
| Advance directive not in place | 46 (2) | 32 (2) | 14 (1) | .049 |
| Time of day transferred n = 3965 | | | | |
| Afternoon (1201-1800) | 1,441 (37) | 775 (37) | 666 (36) | <.001 |
| Evening (1801-2400) | 959 (24) | 571 (27) | 388 (21) | <.001 |
| Outcome of transfer n = 3927 | | | | |
| ED only | 940 (24) | 701 (33) | 239 (13) | <.001 |
| Processes contributing to hospital transfer decision ^a n = 2787 | | | | |
| Condition could have been managed in the nursing home | 1186 (43) | 1161 (58) | 25 (3) | <.001 |
| Better communication about condition needed | 804 (29) | 776 (39) | 28 (4) | <.001 |
| New signs/Symptoms detected earlier | 670 (24) | 626 (31) | 44 (8) | <.001 |
| Resident/Family preference discussed earlier | 403 (15) | 368 (18) | 35 (5) | <.001 |
| Advance directive/Hospice in place earlier | 245 (9) | 219 (11) | 26 (3) | <.001 |

^aMultiple items can be checked, results do not add to 100%.

Abbreviations: APRN, advanced practice registered nurse; ED, emergency department.

Factors Related to Unavoidable Hospital Transfers

A total of 1835 (46%) transfers were identified as unavoidable. Table 3 lists the factors related to unavoidable transfers. Clinical factors included behavioral symptoms (n = 244 [15%]; $P = .037$), bleeding (n = 182 [11%]; $P = .002$), nausea/vomiting (n = 175 [11%]; $P = .001$), unresponsiveness (n = 152 [10%]; $P = .048$), and requiring an electrocardiogram (n = 49 [6%]; $P < .001$). Residents with unavoidable

transfers were more likely to have an order for resuscitation, for example, full code (n = 965 [55%]; $P = .007$). A higher percentage of residents with unavoidable transfers had either requested or had their family request hospital transfer (n = 564 [43%]; $P = .043$). More unavoidable transfers occurred in the morning (n = 552 [30%]; $P < .001$), and more were likely to be admitted to inpatient (n = 1510 [83%]; $P < .001$) and observation status (n = 78 [4%]; $P < .001$). Of processes contributing to transfer, only

Table 2. Multiple Regression Quality Improvement Opportunity Related to Transfer

| | Odds ratio estimates | | | P value |
|--|----------------------|----------------------------|-------|---------|
| | Point estimate | 95% Wald confidence limits | | |
| Quality improvement opportunity related to avoidable transfers | | | | |
| New sign/Symptom detected earlier | 2.34 | 1.61 | 3.41 | <.000 |
| Resident/Family preference discussed earlier | 2.11 | 1.37 | 3.25 | .000 |
| Advance directive/Hospice in place earlier | 2.25 | 1.32 | 3.81 | .002 |
| Better communication about condition needed | 4.93 | 3.16 | 7.68 | <.000 |
| Condition could have been managed in the nursing home | 16.62 | 10.9 | 25.37 | <.000 |
| Quality improvement opportunity related to unavoidable transfers | | | | |
| Resources not available to manage | .104 | .078 | .138 | <.000 |

Table 3. Factors Relating to Unavoidable Hospital Transfers

| Hospital transfers | Total (%) 3946 (100) Transfers n (%) with condition | Avoidable N (%) 2111 (54) Avoidable n (%) with condition | Unavoidable N (%) 1835 (46) Unavoidable n (%) with condition | P value |
|--|--|---|---|---------|
| Change in clinical factors ^a n = 3518 | | | | |
| Behavioral symptoms | 492 (14) | 248 (13) | 244 (15) | .037 |
| Bleeding | 342 (10) | 160 (8) | 182 (11) | .002 |
| Nausea/Vomiting | 325 (9) | 150 (8) | 175 (11) | .001 |
| Unresponsiveness | 300 (9) | 148 (8) | 152 (10) | .048 |
| Resuscitation status (n = 3777) | | | | |
| Resuscitate (full code) | 1798 (48) | 798 (44) | 965 (55) | .007 |
| Medical evaluation before transfer n = 3869 | | | | |
| MOQI APRNs | 854 (22) | 425 (20) | 429 (24) | .003 |
| Physician visit | 358 (9) | 138 (7) | 220 (12) | <.001 |
| MOQI APRN examination before transfer n = 3946 | 1095 (28) | 519 (25) | 576 (31) | <.001 |
| If not evaluated by MOQI APRN, reason n = 2471 | | | | |
| MOQI APRNs not on duty | 2184 (88) | 1253 (87) | 931 (90) | .039 |
| Testing ordered to evaluate condition ^a n = 1838 | | | | |
| Electrocardiogram | 57 (3) | 8 (1) | 49 (6) | <.001 |
| Preferences for hospitalization ^a n = 2933 | | | | |
| Resident or family request | 1200 (41) | 636 (39) | 564 (43) | .04 |
| Time of day transferred n = 3965 | | | | |
| Morning (0601-1200) | 1052 (27) | 500 (24) | 552 (30) | <.001 |
| Outcome of transfer n = 3927 | | | | |
| Admitted inpatient | 2844 (72) | 1334 (64) | 1510 (83) | <.001 |
| Admitted outpatient observation | 143 (4) | 65 (3) | 78 (4) | <.001 |
| Resident died in ED or hospital n = 3930 | 214 (5) | 96 (5) | 118 (6) | .001 |
| Processes contributing to hospital transfer decision ^a n = 2787 | | | | |
| Resources not available to manage | 501 (18) | 91 (5) | 410 (54) | <.001 |

^aMultiple items can be checked, results do not add up to 100%.

Abbreviations: APRN, advanced practice registered nurse; ED, emergency department.

resources not available to manage the resident in the NH were identified (n = 410 [54%]; $P < .001$). As shown in Table 4, items predictive of unavoidable transfer included bleeding (OR = .59; CI = .46-.773; $P < .0001$), nausea/vomiting (OR = .70; CI = .54-.9; $P < .007$), and resident or family preference for hospitalization (OR = .79; CI = .68-.93; $P < .003$).

Changes in Avoidable Transfers

As seen in Figure 1, the total number of transfers decreased over time as the number of avoidable transfers increased. Based on analysis by study year, transfers identified as avoidable significantly increased ($P < .001$) from year 1 (n = 714 [47%]) and year 2 (n = 745 [56%]) and between year 1 and year 3 (n = 653 [58%]).

DISCUSSION

Findings from this study analyzing 3946 ACTs collected over almost 3 years of MOQI suggest more than half of all transfers are likely avoidable. Other studies detailing descriptive analysis of ACTs have identified that most are unavoidable.^{12,14} Over time, the APRNs sustained the

judgment that most transfers were avoidable. The increase in transfers identified as avoidable over time suggests that the APRNs’ application of QI and INTERACT processes influenced the perception of what constituted an avoidable transfer.

In MOQI, clinical factors such as falls, fever, and urinary symptoms were associated with avoidable transfers; however, another study using INTERACT found these conditions were associated with unavoidable transfers.¹⁴ As part of MOQI, NH teams under the direction of the APRN targeted care processes related to hydration management, comprehensive medication reviews, fall reduction programs, advance care planning, and improved communication including technology as ways to identify, communicate about, and manage conditions.¹⁵⁻¹⁷ Moreover, MOQI APRNs were positive about the NHs’ capacity to care for ill residents with nearly 43% of transfers identified as “being able to be handled in the NH”; this is 7% more than was identified by Ouslander et al.¹² Because resource availability is a factor in keeping residents in the NH, it is an important consideration when attempting to decrease avoidable transfers.¹⁸

APRNs viewed the transfers for residents who were full resuscitation or who died in the ED or hospital as avoidable transfers because earlier discussions about goals of care may result in different, less aggressive treatment decisions by residents and their families at the end of life.¹⁹ Even with the focus on advance care planning, however, 43% of transfers occurred because of family preference, far higher than the nearly 16% reported elsewhere.¹² Others studies noted that family preferences for transfer were related to concerns about the NH’s capacity to manage conditions, perception that the illness is a crisis, and lack of communication about goals of care.¹⁹⁻²¹ The reasons for resident/family preferences for transfer are not clear and require further examination.

To address concerns about goals of care proactively, APRNs and the MOQI team targeted improvement in the use of advance directives. In MOQI, resident advance directives were considered in nearly 72% of all transfer

Table 4. Multiple Regression of Factors Related to Transfer

| Factors related to unavoidable transfer | Odds ratio estimates | | | P value |
|---|----------------------|----------------------------|-----|---------|
| | Point estimate | 95% Wald confidence limits | | |
| Bleeding | .59 | .45 | .77 | .000 |
| Nausea/Vomiting | .70 | .54 | .90 | .007 |
| Resident or family preference for hospitalization | .79 | .67 | .92 | .003 |

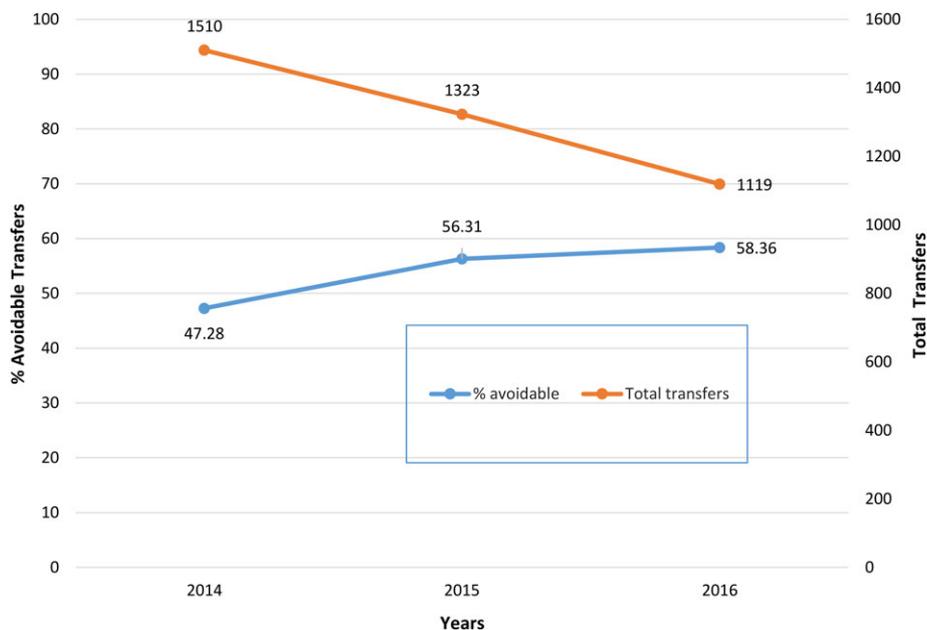


Figure 1. Total vs percentage of transfers identified as avoidable by study years.

decisions, more than double what was noted in other studies, and there were nearly three times the number of new advance directives/orders written.¹² This difference is most likely due to MOQI's aggressive multidisciplinary approach to advance care planning that included advance directive and serious illness conversation training²² for APRNs, and having APRNs work with an master's-prepared social worker care transition coach to train NH staff in discussions. Additionally, the MOQI medical director worked with facility attending physicians to improve advance care plan discussions.

MOQI APRNs worked with each NH to build on their strengths to manage their residents' care and improve early illness detection and management. One major challenge of the MOQI was that APRNs could not primarily write treatment orders due to state regulatory constraints not allowing them to enter into a collaborative practice agreement and bill for services.²³ Because of this critical constraint, APRNs focused on building relationships with physician colleagues and changing the NH staff capacity to identify residents' changes in health and manage illnesses.

It should be noted that although INTERACT tools were not found to be statistically significant in this analysis, our team believes INTERACT facilitates communication about illness recognition and management with the NH team and between the NH and providers. Given that most provider communication occurs via telephone, Situation, Background, Assessment, Recommendation (SBAR) becomes an essential tool to deliver accurate and meaningful information about assessment to providers. The use of Stop and Watch tools provided the opportunity for all NH staff to participate in early illness detection.

Limitations of this study include the relatively small sample size of the NHs from one state; urban and rural areas are represented in the sample as well as for-profit and not-for-profit corporations. The fact that these NHs had the unique opportunity to participate in MOQI and have full-time APRNs embedded in them^{9,15-17} limits generalizability. Finally, the INTERACT tools are not primarily designed for use in research but rather for QI purposes.

In conclusion, the MOQI demonstrated success in decreasing hospital transfers. Moreover, a critical component of this success was changing the perception of what was considered an avoidable transfer. Lessons learned and practice recommendations include (1) application of the INTERACT and the QI process in an reiterative learned approach provided opportunities to understand root causes of conditions resulting in transfer; (2) challenging clinicians' assumptions about what constitutes a potentially avoidable transfer; (3) early and continuous use of INTERACT to assist with the identification of underlying causes of emerging clinical issues and facilitate improving NH processes; (4) use of INTERACT and other goals of care tools to increase resident, family, and NH team communication about preferences including advance directives and hospice care; and (5) use of APRNs to provide the critical clinical expertise needed to implement and use INTERACT processes effectively to make systems improvements and increase NH capacity to manage ill residents.

Finally, we note that in the United States, practice restrictions for APRNs is inconsistent across states, and Medicare reimbursement restrictions make it difficult for

NHs to hire APRNs. Changes in health policy that eliminate unnecessarily restrictions on APRN practice and billing²³ would provide a revenue stream to support APRN presence in the NH, a role that is critical to improve resident outcomes, increase staff capacity to identify illness, and guide system change.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article.

Supplementary Table S1. Factors Contributing to Avoidable and Unavoidable Hospital Transfers.

Supplementary Table S2. Characteristics of All Hospital Transfers.

Supplementary Table S3. Outcomes Related to All Hospital Transfers.

Supplementary Table S4. Quality Improvement Opportunities Related to All Hospital Transfers.