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Featured Article

Factors associated with avoidable hospital transfers among residents in Swiss nursing homes

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ABSTRACT

Unplanned hospitalizations from nursing homes (NHs) may be considered potentially avoidable and can result in adverse resident outcomes. There is little information about the relationship between a clinical assessment conducted by a physician or geriatric nurse expert before hospitalization and an ensuing rating of avoidability. This study aimed to describe characteristics of unplanned hospitalizations (admitted residents with at least one night stay, emergency department visits were excluded) and to examine this relationship. We conducted a cohort study in 11 Swiss NHs and retrospectively evaluated data from the root cause analysis of 230 unplanned hospitalizations. A telephone assessment by a physician (p=.043) and the need for further medical clarification and treatment (p=<0.001) were the principal factors related to ratings of avoidability. Geriatric nurse experts can support NH teams in acute situations and assess residents while adjudicating unplanned hospitalizations. Constant support for nurses expanding their clinical role is still warranted.

Introduction

Multimorbidity is common among residents living in nursing homes (NHs), with 56,4% of NH residents living with at least five chronic conditions.[1] Exacerbations of chronic conditions, such as cardiovascular disease or complications due to injuries from falls, might lead to unplanned hospitalizations, as they often require a higher level of care that can not be provided in NHs.[2–4] Unplanned hospitalizations are transfers from NHs to an acute care setting for an unplanned reason (e.g., after a fall) with at least an overnight inpatient stay, excluding emergency department visits.[5] These transfers are stressful for NH residents. They are associated with negative consequences such as functional decline, falls and delirium, and higher mortality or morbidity after hospital discharge.[6–8] The prevalence of unplanned hospitalizations from NHs varies between 7% and 46%,[9] and a proportion of these unplanned hospitalizations are avoidable with estimates between 19% and 67%.[7,10] Avoidable hospitalizations are defined as hospitalizations for conditions that could have been either treated in the NH or avoided with earlier detection of the acute changes in the resident's condition and adequate disease management, providing the appropriate resources are available in the NH.[11–13]

Influencing factors for unplanned hospitalizations

Factors at the resident and facility levels influence the need for unplanned hospitalizations. Resident-level factors that can influence decision-making regarding the need for an unplanned hospitalization include - but are not restricted to - living with clinical conditions (e.g. cardiovascular or respiratory diseases),[3,14] the severity of illness and the consequences the latter can have on residents' autonomy or their quality of life.[15] Other factors include the availability of advance directives (e.g., living will) and the residents' and relatives'

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preferences for hospitalization.[15,16] Facility-level factors include limited NH staffing and high turnover,[15,17] unbalanced staff skill mix,[18] lack of timely availability of physicians,[7,19] and lack of resources for treatment in the NHs such as availability of diagnostic services (e.g., x-ray) or the provision of treatment (e.g., intravenous therapy).[4,14,20]

Root cause analysis for quality improvement

Several quality improvement programs and nurse-led care models have effectively reduced unplanned and avoidable hospitalizations from NHs.[20–25] These often include root cause analysis (RCA) which has been introduced as a helpful approach to conducting a retrospective evaluation of hospitalizations and systematically identifying contributing factors and underlying causal factors of avoidable hospitalizations.[26] Addressing whether an unplanned hospitalization was avoidable has been described as challenging and complex.[27] NH staff use a review tool to perform RCA, which includes information about residents and the transfer characteristics, advanced care planning, and opportunities for quality improvement. Studies reporting results of RCA have underpinned the importance of this method to better understand the reasons and circumstances leading to avoidable hospitalizations. While previous studies used RCA to examine the common signs and symptoms, and outcomes (e.g., diagnostic procedures, inpatient admission) of avoidable transfers and identified opportunities for quality improvement,[20,21,28] information is lacking about factors contributing to rating an unplanned hospitalization as an avoidable one. Identifying these factors is essential to inform appropriate and effective interventions that aim to reduce avoidable hospital transfers and to understand the need for geriatric nurse experts as part of care models, especially in countries that do not have access to advanced practice nurses (APN).

The Swiss healthcare system

In Switzerland, GPs are the dominant responsible medical providers for primary care. Most NHs work with different medical providers since 77% of GPs responsible for NH residents are off-site.[29] Compared with the U.S., NHs in Switzerland have very limited access to APNs. Therefore, residents are usually managed by registered or licensed practical nurses and rely on phone calls with a GP when the clinical situation of a resident changes. While regular on-site visits by physicians, geriatric nurse experts, or APNs are critical for reducing unplanned or avoidable hospitalisations,[30] timely medical on-site assessment by a physician depends on the NH's physician model.[31]European studies have shown physicians medically assessed less than 40% of the residents before hospitalization.[5,31]

Since the physician model impacts the possibility of assessment, this study explored how factors such as a physical examination, a phone assessment and the need for medical clarification or treatment might be related to ratings of avoidability. The study's importance lies in its potential to improve the understanding of what factors contribute to an avoidable hospitalization from a nurse's perspective. Specifically, this study aimed (1) to describe characteristics of unplanned hospitalizations from NHs on a resident- and hospitalization level, (2) to compare evaluation characteristics and contributing factors of unplanned hospitalizations rated as avoidable versus not avoidable by geriatric nurse experts, and (3) to determine whether an evaluation by a physician or geriatric nurse expert is associated with a rating of avoidability.

Methods

Design, setting and sample

This sub-study is embedded in the "Improving INTERprofessional CARE for better resident outcomes (INTERCARE)" implementation science study to develop and implement a nurse-led model of care "INTERCARE" to reduce unplanned hospitalizations.[23] The INTERCARE model was implemented in 11 NHs with a stepped-wedge hybrid type 2 intervention study in the German-speaking part of Switzerland. NHs had three months of pre-intervention data collection and between 12 and 18 months of intervention (Jun 2018 – Feb 2020). INTERCARE was successful in decreasing unplanned transfers,[32] was deemed acceptable and feasible by NH staff,[33] and while costlier, it was also more effective from a NH perspective.[34] The INTERCARE model comprises six core elements, including introducing INTERCARE nurses in NHs. INTERCARE nurses are geriatric nurse experts with at least three years of experience in long-term care with additional specialist training in geriatrics. INTERCARE nurses were responsible for leading the RCA discussions after each unplanned hospitalization and rating each transfer. The protocol describing the INTERCARE study and training for INTERCARE nurses was published elsewhere.[23] For this sub-study, we used a cohort study design to evaluate unplanned hospitalizations using review tools of unplanned hospitalizations to conduct RCA. RCAs were performed for all unplanned hospitalization(s) between June 2018 and February 2020 for residents who previously consented to participate in the INTERCARE study in all the participating NHs. Emergency department visits with immediate return to the NH were excluded.

Data collection

Data collection included four sources: (1) a reflection tool to conduct RCA, (2) the Resident Assessment Instrument-NH Swiss version (RAI-NH), (3) NH facility questionnaires, and (4) INTERCARE nurse's questionnaires.

The reflection tool was based on the "Quality improvement tool for review of acute care transfers" of the Interventions to Reduce Acute Care Transfers (INTERACT) program, a well-established quality improvement program in the US long-term setting.[35] For INTERCARE, the tool was translated into German, and additional items were integrated after consultation with and feedback from participating NHs. The adapted reflection tool included five dimensions: (1) residents' risk factors (e.g., preexisting diagnoses or problems), (2) description of the acute change in condition and contributing factors (e.g., new or worsening symptoms or problems), (3) assessment and management of changes in condition in the NH (e.g., medical evaluation), (4) transfer characteristics (e.g., the outcome of transfer) and (5) identification of opportunities for quality improvement (e.g., rating of avoidability). The research team trained INTERCARE nurses to complete the reflection tool, particularly involving the nursing staff. If available, the physician was involved in the resident. Each tool had to be completed within six weeks of the resident's admission to the hospital.

The research team developed the INTERCARE facility and INTERCARE nurse questionnaires and sent them to the managing directors and the INTERCARE nurses at baseline. Routine data from RAI-NH (Swiss version) was used to extract resident characteristics. We included resident RAI-NH assessments that were carried out closest to the start of the project in each NH.

Variables and measurements

Resident characteristics: Resident characteristics from the reflection tool included preexisting diagnoses (e.g., dementia, diabetes, congestive heart failure) and preexisting problems (e.g., polypharmacy, high risk for fall, chronic pain). The variables were dichotomous with yes/no answers, and multiple answers were possible (i.e., residents could have dementia and chronic pain). Further resident information was obtained from the RAI-NH (Swiss version) standardized routinely collected data, including age, gender, length of stay in NH, dependency in activities of daily living (ADLs),[36] Depression

Rating Scale (DRS),[37] and cognitive performance scale (CPS).[38,39] The length of stay (in days) was calculated from the date of entry into the NH and the date of the first hospitalization after the start of the INTERCARE study. The ADL long-form scale was used, ranging between 0 and 28, with higher values indicating a higher dependency, with cut-offs of 0–4 for mild impairment, 5–23 for mild to moderate impairment, and 24–28 for severe impairment. The DRS ranges from 0 to 10, with a cut-off of ≥ 3 for residents who need further evaluation for depression. The CPS ranges from 0 to 6, with cut-offs of 0–2 for no to mild impairment, 3–4 for moderate impairment, and 5–6 for severe to very severe impairment.

Unplanned hospitalizations: Unplanned hospitalizations were described by new or worsening situations (e.g., pain, abnormal blood pressure, fall, changes in behavior) before hospitalization, time until the medical help requested by the nurse was given by the physician (< 6 h/ ≥ 6 h) and whether that time was appropriate (three answering options: yes/no/different views in the team), the rating of avoidability (yes/no, a separate question for RNs, INTERCARE nurses and physicians) and reasons for the rating of avoidability (e.g., better communication, earlier detection of symptoms). A phone assessment or an on-site examination were the two options provided to evaluate the residents' situation before hospitalization. Contributing factors for unplanned hospitalizations included medical clarification/treatment needed or whether treatment resources were unavailable.

Facility and INTERCARE nurse characteristics: Facility characteristics included the location of the NHs, ownership status, number of beds participating in INTERCARE, number of INTERCARE nurses, and the physician model. INTERCARE nurses' characteristics included age, gender, and the number of residents for which they were responsible.

Statistical analysis

For the first aim, we used descriptive statistics for resident and hospitalization characteristics, including means, standard deviations (SD), medians, ranges, interquartile ranges (IQR), frequencies, and percentages, where appropriate.

Chi-Square tests were performed for the second aim to assess the differences between unplanned hospitalizations rated as avoidable or unavoidable by the INTERCARE nurses, using a significance level of 0.05. The INTERCARE nurses answered this question most reliably; therefore, we considered this rating. In some cases, contributing factors were infrequently or not selected in the reflection tools, so these RCA tools were excluded from the analysis.

The dependent variable for the third aim was the rating of avoidability by the INTERCARE nurses. To select the independent variables, regression models were separately built for each variable. All variables with a p-value of <0.05 in the model were combined, and no significant variables were removed. The odds ratio and the 95% confidence interval were used to interpret the results. The multiple regression was performed with a significance level of 0.05. All analyses were performed using R version 4.0.3[40] with the packages tidyverse,[41] questionr,[42] imputeTS,[43] and tableone.[44]

Ethical considerations

INTERCARE received ethical clearance for all 11 NHs from the ethics committee of Northwest and Central Switzerland (Ethikkommission Nordwest- und Zentralschweiz EKNZ) (EKNZ 2018–00,501), as NHs in Switzerland do not have an internal institution review board. It is registered at clinicaltrials.gov (NCT03590470). All methods were carried out following relevant guidelines and regulations. Informed consent was obtained from all subjects.

Table 1
Baseline characteristics of nursing homes (N = 11) and INTERCARE nurses (n = 19) [a].

Characteristics	N (%), mean (SD) median (range)
Location of nursing home (n (%))	
- Urban area	8 (72.7)
- Rural area	2 (18.2)
- Suburban area	1 (9.1)
Legal status of nursing home (n (%))	
- Privately funded	9 (81.8)
- Publicly funded	2 (18.2)
N of beds included in INTERCARE (median (IQR))	89 (28.5)
INTERCARE nurses per nursing home (median (IQR)) [b]	1 (1)
Physician models, (n (%))	
- Physician(s) on-site responsible for ≥ 80% of residents	3 (27.2)
- External physician(s) responsible for ≥ 80% of residents	4 (36.4)
- Mixed model	4 (36.4)
INTERCARE nurses (n = 19)	
- Age, years (median (IQR))	39 (30.5–51)
- Female (n (%))	17 (89.5)
- Bed responsibility per INTERCARE nurse (median (IQR))[c]	95 (41.5)

[a] INTERCARE = Improving INTERprofessional CARE for better resident outcomes.
[b] INTERCARE nurses were also responsible for units not participating in INTERCARE.
[c] 19 INTERCARE nurses worked across 11 NHs; some NHs had 1–2 INs responsible for the same number of residents, which explains why the median is higher than the median number of INTERCARE beds.

The NHs were not financially incentivized to participate in the INTERCARE study. Still, they did receive a lump sum to compensate for the hours INTERCARE nurses spent on data collection for the study.

Results

Table 1 gives an overview of the baseline characteristics of the participating NHs and INTERCARE nurses. The median number of beds included in INTERCARE per NH was 89 (IQR 28.5). The median number of beds INTERCARE nurses were responsible for was 95 (41.5). Some NHs had 1–2 INTERCARE nurses accountable for the same number of residents, which explains why the median is higher than the median number of INTERCARE beds (Table 1). We identified 182 NH residents transferred and 230 unplanned hospitalizations between June 2018 and February 2020. The residents were, on average, 83.9 years old (SD: 8.7), mainly female (68.1%) (Table 2), and most had two or more conditions (59.3%). Table 2 gives an overview of residents' characteristics. In our sample, 74% of residents were hospitalized once (Table 2). At the hospitalization level, the most common new or worsening situations before hospitalization were pain (50%), loss or deterioration of mobility (33%), and fall (32%), or a combination of multiple factors (multiple factors could be ticked) (Table 3). INTERCARE nurses rated 17.8% of unplanned hospitalizations as avoidable, against 9.6% for physicians and 15.2% for NH staff (Table 3). In 73.7% of hospitalizations, NH residents received a telephone assessment or an on-site examination by a physician before the unplanned hospitalization occurred. About 22% of residents who had an unplanned hospitalization were evaluated by INTERCARE nurses (Table 4). Differences were observed between avoidable and non-avoidable hospitalizations for two factors: a phone assessment by a physician (p=.043) and the need for further medical clarification and treatment (p=<0.001).

The first factor, a phone assessment by a physician, was related to a three times higher probability that a hospitalization was rated as avoidable by the INTERCARE nurse (p=.012; CI [1.325, 7.469]). A phone assessment refers to situations where a registered or licensed practical nurse calls the physician to report and discuss the current clinical situation. The physician decides to hospitalize based on the information received via a phone call only, without personally

Table 2
Baseline characteristics of nursing home residents with at least one unplanned hospitalization [a] (*N* = 182).

	N (%), mean (SD), median (IQR)	Missing N (%)
Age, years (mean (SD))	83.9 (8.7)	2 (1.1)
Female (n (%))	111 (68.1)	19 (10.4)
Length of stay in NH in days (median (IQR))	631.5 (301.2 –1223)	0
Dependency in activities of daily living (ADL, range: 0 to 28), (n (%))		19 (10.4)
- No or limited assistance (0–4)	62 (38.0)	
- Extensive to maximal assistance (5–23)	101 (62.0)	
Cognitive Performance Scale (CPS, range: 0–6) (n (%))		19 (10.4)
- No to mild impairment (0–2)	96 (58.9)	
- Moderate impairment (3–4)	54 (33.1)	
- Severe to very severe impairment (5–6)	13 (8.0)	
Depression Rating Scale (DRS, range: 0–14) (median (IQR))	0 (2)	19 (10.4)
Preexisting diagnoses [b] (n (%))		
- Symptoms of dementia	90 (49.5)	0
- Diabetes	51 (28.0)	0
- Osteoporosis	41 (22.5)	0
- Depression	40 (22.0)	0
- Congestive heart failure (CHF)	34 (18.7)	0
- Advanced renal insufficiency	32 (17.6)	0
- Anemia	28 (16.7)	14 (7.7)
- Chronic obstructive pulmonary disease (COPD)	20 (11.0)	0
Preexisting problems [b] (n (%))		
- Polypharmacy	93 (51.1)	0
- High risk for fall	70 (38.5)	0
- Chronic pain	48 (26.4)	0
Unplanned hospitalizations (n (%))		
Number of residents with one hospitalization	134 (73.6)	
Number of residents with two hospitalizations	37 (20.3)	
Number of residents with > three hospitalizations	11 (6,1)	

[a] in case of multiple unplanned hospitalizations for one resident, the table included only data for the first one since intervention start.
[b] percentage may add to more than 100% because multiple answers were possible.

Table 3
Characteristics of unplanned hospitalizations (*N* = 230).

	N (%)	Missing (%)
New or worsening situations before hospitalization due to:		
- Pain	117 (50.9)	0
- Loss/ deterioration of mobility	76 (33.0)	0
- Fall	74 (32.2)	0
- Abnormal blood pressure	34 (14.8)	0
- Fever	33 (14.3)	0
- Shortness of breath	31 (13.5)	0
- Nausea	28 (12.2)	0
- Fatigue	27 (11.7)	0
New or worsening situations before hospitalization (continued)		
- Changes in behavior	56 (24.3)	0
- Loss of functionality in activities of daily living	39 (17.0)	0
Rating of avoidability		
- Hospitalizations rated as avoidable by at least one professional group [b]	42 (18.2)	5 (2.2)
- By INTERCARE nurses	41 (17.8)	13 (5.6)
- By nurses	35 (15.2)	6 (2.6)
- By physicians	22 (9.6)	24 (10.4)
Reason(s) for ratings of avoidability for hospitalizations rated as avoidable (*n* = 42), [a, b]		4 (9.5)
- Better communication	16 (38.1)	
- Needed resources to safely handle change of condition were inaccessible	12 (28.6)	
- Safe handling in NH possible with available resources	11 (26.2)	
- Earlier detection of symptoms	11 (26.2)	
- Earlier discussion of wishes	7 (16.7)	
- Earlier use of advance care planning	5 (11.9)	
Reason(s) for ratings of avoidability for hospitalizations (continued)		4 (9.5)
- Transfer back from hospital too early	2 (4.8)	
- Other reasons	12 (28.6)	

[a] percentage may add to more than 100% because multiple answers were possible.
[b] for reflection tools with at least one rating of avoidability from nurses, INTERCARE nurses, or physician.

Table 4
Differences between unplanned hospitalizations rated as avoidable versus not avoidable by INTERCARE[a] nurses (IN).

	Total, n (%)	Avoidable, n (%)	Nonavoidable, n (%)	*p*-value[b]	X^2
Number of unplanned hospitalizations rated by IN	217 (100)	41(18.9)	176 (81.1)		
Evaluation was performed before transfer by physician					
- Phone assessment OR on-site examination (yes)	160 (73.7)	35 (85.4)	125 (71.0)	.092	2.831
- Phone assessment[c] (yes)	137 (63.1)	32 (78.0)	105 (59.7)	.043	4.074
- On-site examination[c] (yes)	85 (39.1)	18 (43.9)	67 (38.1)	.609	0.262
- No evaluation by phone or on-site (yes)	57 (26.3)	6 (14.6)	51 (29.0)	.092	2.831
Evaluation was performed before transfer by INTERCARE nurses					
- Phone assessment OR on-site examination (yes)	48 (22.1)	10 (24.4)	38 (21.6)	.857	.032
- Phone Assessment[c] (yes)	34 (15.6)	8 (19.5)	26 (14.8)	.608	0.263
- On-site examination[c] (yes)	36 (16.6)	7 (17.1)	29 (16.5)	1[d]	<0.001
- No evaluation by phone or on-site	169 (77.9)	31 (75.6)	138 (78.4)	.857	.032
	Total, n (%)	Avoidable, n (%)	Nonavoidable, n (%)	*p*-value [b]	X^2
Time until medical help has been given from a physician[e]				.151	2.058
- < 6 h	113 (52.1)	18 (43.9)	95 (54.0)		
- ≥ 6 h	61 (28.1)	16 (39.0)	45 (25.6)		
Appropriateness of time until requested help was given either by IN or Physician[f]				.056	5.748
- Time was appropriate (no)	32 (14.7)	11 (26.8)	21 (11.9)		
- Time was appropriate (yes)	163 (75.1)	28 (68.3)	135 (76.7)		
- Different views in team	3 (1.4)	0	3 (1.7)		
Contributing factors of unplanned hospitalizations [c]					
- Medical clarification/ treatment needed	154 (71)	18 (43.9)	136 (77.2)	<0.001	16.39
- Resources for treatment not available	50 (23)	5 (12.2)	45 (25.6)	.104	2.642
- Relative insisted on hospitalization	32 (14.7)	10 (24.4)	22 (12.5)	.091	2.854
- Resident insisted on hospitalization	27 (12.4)	9 (22.0)	18 (10.2)	.074	3.188
- Living will not available	28 (12.9)	9 (22.0)	19 (10.8)	.097	2.757

[a] INTERCARE = Improving INTERprofessional CARE for better resident outcomes.
[b] *p*-values calculated by X^2 tests, significance at the 0.05 level.
[c] percentage may add to more than 100% because multiple answers were possible.
[d] p-value of 1 because the expected frequencies were almost identical to the observed frequencies.
[e] information was missing for 43 hospitalizations.
[f] total does not equal 230 hospitalizations, but 213, as 17 reflection tools did not include this question as it was added to the form later, and information was missing for 15 hospitalizations.

examining the resident. Secondly, if there was a need for medical clarification and treatment, the probability of a hospitalization being rated as avoidable was 80% lower (OR 0.199, *p*=<0.001; CI [0.093, 0.414]).

Discussion

This sub-study explored the characteristics of 230 unplanned hospitalizations from Swiss NHs to acute care, the type of medical evaluation received before hospitalization, and factors related to avoidability. Almost one in five unplanned hospitalizations were rated as avoidable by the INTERCARE nurses. We found two factors associated with ratings of avoidability by INTERCARE nurses: a phone assessment by a physician before hospitalization and the need for further medical clarification and treatment (i.e., a follow-up assessment or treatment review). Our results suggest that an on-site examination could help decrease avoidable hospitalizations as it enables a more objective evaluation of the situation than a phone assessment. It may also allow residents and their relatives to clarify their anxieties, receive reassurance and refrain from insisting on a transfer. The results indicate that avoidable hospitalizations are linked to the lack of medical clarification/ treatment possibilities. This might be addressed with greater availability of diagnostic tests and a more comprehensive range of medical treatment possibilities in the NHs if avoidable hospitalizations are to be reduced, which aligns with strategies already proposed to reduce avoidable hospitalizations.[4,30]

INTERCARE nurses and root cause analysis

Changing the perception and understanding of what is considered an avoidable hospitalization can take time and requires a collaborative approach, as well as applying RCA in a reiterative fashion to better understand the underlying causes of avoidable hospitalizations and opportunities for improvement.[28,27] The rating of avoidability by INTERCARE nurses reported here is lower than in previous studies.[20,28,45] INTERCARE nurses were trained to complete and use the reflection tools, similarly to other studies which focused on RCA[28,46]; however, the INTERCARE study consensus discussions were not led with the research group due to resource constraints, so the use of RCA may not have been reinforced. An additional strategy documented to be successful is the use of the "Five Why" technique,[28] which asks "why?" until the underlying cause of a problem is uncovered.[26] This approach might favor discovering higher rates of avoidability. The Missouri Quality Initiative team routinely discussed each transfer with the APN to re-assess their potential avoidability during the study. It demonstrated that through regular discussions and training, ratings of avoidability increased over time.[28] However, during the INTERCARE study, ratings and completed reflection tools were discussed during individual coaching sessions with an INTERCARE project member. Overall hospitalization trends were examined in two monthly meetings with NH leadership. This may not have changed the INTERCARE nurses understanding of what constitutes an avoidable hospitalization. Moreover, using RCA has been described as a lengthy and resource-costing procedure. An alternative may be to apply a 12-item avoidable item scale to discharge reports to assess avoidability more accurately.[47]

Supporting decision-making

The Missouri model had a multidisciplinary team supporting the APNs, including a social worker. A further step for Swiss NHs to consider in the future would be integrating trained social workers in NH teams to support the decision-making process regarding unplanned transfers, as transfers occurring towards the end of life may be avoidable, mainly when residents die in the emergency department or

Table 5
Relationship between evaluation by a physician before hospitalization and the rating of avoidability by INTERCARE[a] nurses (217 hospitalizations).

	Regression coefficient	p-value[b]	Odds Ratio (95% CI)
Intercept	−1.247	.002	0.287 [0.122, 0.616]
Phone assessment by physician	1.101	.012	3.007 [1.325, 7.469]
On-site examination by physician	0.049	.896	1.051 [0.494, 2.197]
Medical clarification/treatment needed	−1.614	<0.001	0.199 [0.093, 0.414]

[a] INTERCARE = Improving INTERprofessional CARE for better resident outcomes.
[b] significance level at level 0.05.

hospital.[28] Transfer close to the time of death may indicate that residents did not receive adequate end-of-life care planning.[21]

Opportunities for improvement

In three-quarters of all unplanned hospitalizations, a medical assessment, either by telephone or an on-site examination, was carried out by physicians and by INTERCARE nurses in about 20% of hospitalizations. These are new findings, as earlier studies did not differentiate between the professional groups. One of our main findings is that hospitalizations are more likely to be rated as avoidable by a nurse in an extended role if a telephone assessment by a physician was performed. Interestingly, and in contrast to our results, a US study showed the same association for assessment by an advanced practice registered nurse (APRN).[28] APRNs have advanced educational and clinical competencies and thus can demonstrate expanded skills in clinical assessment. In contrast, INTERCARE nurses are minimally trained in this area and are not expected to replace an on-site physician assessment. In addition, only about 5% of Swiss nurses with a master's degree work in NH settings.[48] These roles are still relatively new in Swiss NHs, and the scope of practice still needs to be fully developed.

Physicians' knowledge of the resident's condition and/or situation has been identified as one area that could potentially reduce avoidable hospitalizations. If physicians question information received or a resident's condition they tend to opt for hospitalization.[5,29] We showed a relationship between the rating of avoidability and hospitalizations where medical clarification and treatment were deemed necessary. Insufficient diagnostic and therapeutic infrastructure in the NHs has been identified to contribute significantly to avoidable hospitalizations.[4,20] This infrastructure includes, for instance, access to timely laboratory testing or the possibility of an X-ray in the NH if there is no need for an emergency X-ray.[20,49] Future studies are warranted to investigate whether access to a greater variety of diagnostic and therapeutic resources has an impact on reducing avoidable hospitalizations.

Limitations

There are significant limitations to this sub-study that should be considered. First, the small sample of NHs recruited from German-speaking Switzerland does not allow generalization to other Swiss regions. Second, we used clinical data from the reflection tool, which the INTERCARE nurses only filled in. The tool is an extensive document not cross-checked with diagnoses from medical records or discharge reports. Given the retrospective nature of RCA, there may be biases, especially if some time elapsed between an unplanned hospitalization and the completion of the reflection tool. Reflection tools were only filled out for residents who returned to the NH after an unplanned hospitalization. From a methodological point of view, this study does not provide information about the inter-rater reliability to check for agreement or differences between two raters (i.e., INTERCARE nurses). This missing information on reliability as a measure for a consistent and error-free measurement must be considered when interpreting the findings.[50] Third, the sample size in this sub-study was small, which limited the independent variables used in the logistic regression model.

Conclusion

Unplanned hospitalizations are common, but the perception of avoidability is complex and shaped by the professional background or direct access to first-hand information. Improving health care in the NHs should allow better access to physicians, geriatric nurse experts, and resources to perform diagnostic tests and treat residents in NHs. Geriatric nurse experts are predestined for all of this, but their great potential can only be used if these roles have been fully implemented in Switzerland. Table 5

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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