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Original Study

Identifying Appropriate Nursing Home Resources to Reduce Fall-Related Emergency Department Transfers

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Raphaëlle A. Guerbaai MSc, BNurs (Hons) [a], Reto W. Kressig MD [b,c], Andreas Zeller MD, MSc [d], Monika Tröger [e], Christian H. Nickel MD [f], Brigitte Benkert MSN, RN [a], Nathalie I.H. Wellens PhD [g,h], Magdalena Osińska MScN, RN [a], Michael Simon PhD, RN [a], Franziska Zúñiga PhD, RN [a,*], the INTERCARE Research Group

[a] Department Public Health, Faculty of Medicine, Institute of Nursing Science, University of Basel, Basel, Switzerland
[b] University Department of Geriatric Medicine FELIX PLATTER, Basel, Switzerland
[c] Faculty of Medicine, University of Basel, Basel, Switzerland
[d] Centre for Primary Health Care, University of Basel, Basel, Switzerland
[e] Leitung des ärztlichen Dienstes, Viva Luzern, Luzern, Switzerland
[f] Emergency Department, University Hospital Basel, University of Basel, Switzerland
[g] Directorate General of Health, Department of Public Health and Social Affairs of the Canton of Vaud, Lausanne, Switzerland
[h] La Source School of Nursing, HES-SO University of Applied Sciences and Arts of Western Switzerland, Lausanne, Switzerland

Keywords:
Emergency department transfers
falls
hospitalizations
nursing homes
potentially avoidable transfers
long-term care

A B S T R A C T

Objectives: To describe potentially avoidable fall-related transfers to the emergency department (ED), and to identify infrastructure, training needs, and resources deemed appropriate for implementation in nursing homes (NHs) to decrease fall-related transfers to EDs.
Design: A multi-method design, including (1) in-depth case review by an expert panel, (2) structured discussion with NH stakeholders, and (3) appropriateness rating.
Setting and Participants: Fall-related transfers were identified from the prospective reporting of every unplanned hospital transfer occurring within 21 months, collected during the INTERCARE study in 11 Swiss NHs.
Methods: Eighty-one fall-related transfers were rated for avoidability by a 2-round expert panel. NH stakeholders were consulted to discuss key implementable resources for NHs to mitigate potentially avoidable fall-related transfers. A questionnaire composed of 21 contextually adapted resources was sent to a larger group of stakeholders, to rate the appropriateness for implementation in NHs. χ^2 tests were used to assess whether avoidability was associated with an ED visit and to describe transfers. The RAND/ UCLA method for appropriateness was used to determine appropriate resources.
Results: One of 4 fall-related transfers were rated as potentially avoidable. A positive association was found between an ED visit and a rating of avoidability (χ^2 (1, N = 81) = 18.0, P < .001). Fourteen resources, including developing partnerships with outpatient clinics to access imaging services and strengthening geriatric expertise in nursing homes through clinical training and advanced nurse practitioners, were rated as appropriate by NH stakeholders for NH implementation to reduce potentially avoidable fall-related ED transfers.
Conclusions and Implications: Access to diagnostic equipment, geriatric expertise, and clinical training is essential to reduce fall-related potentially avoidable transfers from NHs. Implementing and supporting advanced practice nurses or nurses in extended roles provides NH directors, policymakers, and health care institutions with the possibility of re-engineering resources to limit unnecessary transfers, which are detrimental for resident quality of care and costly for the health system.
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Falls are very common in nursing home (NH) residents, with an average of 1.6 falls occurring per bed per year,[1,2] and are associated with a decrease in quality of life due to impaired mobility and functional decline.[3] Despite efforts invested in NHs to prevent falls with multi-component interventions,[4,5] falls are responsible for 25% to 87% of emergency department (ED) transfers or hospitalizations with at least 1 night stay.[6,7] Furthermore, up to 67% of ED transfers with or without hospitalization are considered potentially avoidable.[8–10] In Switzerland, falls in NHs were identified as the primary reason for potentially avoidable ED transfers (53.6%), costing 65 million Swiss francs per year (25% of the overall avoidable transfers cost).[11]

Potentially avoidable ED transfers and hospitalizations are defined as transfers occurring for a problem or condition that could have been optimally managed in the NH with the availability of diagnostic and treatment resources (eg, imaging, wound care), timely test results, and nursing and physician availability and expertise.[8,12] Several factors have been associated with fall-related potentially avoidable transfers, including NH staffing, level of caregivers' training, degree of interprofessional collaboration with general practitioners (GPs), and availability of diagnostic resources.[13–15]

Swiss NHs are staffed with a majority of nursing aids (41%, 3 months of training) covering shifts and performing bedside care, and licensed practical nurses (34%, 2–3 years training) and registered nurses (RNs) (24%) supervising or working as unit leaders.[16] Even when shifts are staffed with qualified caregivers, NHs suffer from a lack of geriatric expertise contributing to fall-related avoidable transfers.[15,17] Decision making regarding a hospital transfer is left to NH caregivers who do not have the specific skills to help initiate a structured assessment immediately after a fall.[18] As GP access can be challenging, fall-related situations are often assessed by phone,[18] restricting interprofessional decision making. Residents or relatives can pressure for a transfer for reassurance, which can be difficult to handle for caregivers, especially if it is not needed.[19,20]

NH access to diagnostic resources (eg, mobile imaging) is limited, and partnerships between NHs and outpatient facilities are weak or nonexistent.[21] Sluggett et al.[22] identified root causes contributing to better management of fall-related transfers such as a GP's or advanced practice nurse's (APN) rapid availability for an assessment, as well as mobile imaging, but recommended to focus on medication review and fall prevention.

Current research focuses on fall prevention strategies and only limited and general guidance about the post-fall period is available for NHs.[23,24] For example, a reliable post-fall assessment tool with the aim of identifying opportunities to prevent falls focusing on underlying reasons causing falls has been developed for NHs.[25,26] In addition, studies in hospital and rehabilitation settings developed post-fall assessment algorithms and guidelines; however, they are rather focused on staff expectations regarding patient care and the development of feasible algorithms to reduce injuries post-fall and prevent repeat falls from occurring.[27,28] Studies describing appropriate infrastructure, training needs, and resources for NHs to prevent avoidable transfers after a fall are lacking and are needed to develop contextually adapted NH interventions. The aims of this study were (1) to identify and describe potentially avoidable fall-related transfers; and (2) to identify infrastructure, training needs, and resources deemed appropriate for NHs to safely manage potentially avoidable fall-related transfers after a fall.

Research Design and Methodology

Design and Setting

This study uses data collected during the implementation science study INTERCARE to reduce unplanned hospital transfers (including ED visits). The study was conducted in 11 NHs situated in the German-speaking region of Switzerland, between June 2018 and February 2020.[29] This study used a combination of methods including (1) in-depth and structured case review of all falls by independent experts followed by (2) a structured discussion with NH stakeholders about resources needed for Swiss NHs to prevent avoidable fall-related transfers, and (3) a questionnaire survey rating the appropriateness of resources for implementation in Swiss NHs. This multi-method approach involved NH stakeholders throughout the study to promote active public involvement and support coproduction of research with those directly affected.[30] The findings generated set the basis for development of interventions that are contextually appropriate.

Sample

INTERCARE recruited 944 residents and recorded 367 hospital transfers. All residents present in the NHs at the time of the study were included except (1) holiday residents, (2) short-stay residents, and (3) day-care residents. Additional inclusion criteria can be found elsewhere.[29] Fall-related transfers were identified from the prospective reporting of every unplanned hospital transfer (either an ED visit only or at least 1-night stay as an in-patient) collected with a standardized root cause analysis tool and electronic health record data including medical discharge reports. Fall-related transfers were included in the final sample based on the following criteria: (1) root cause analysis indicated that a fall occurred before the transfer, (2) the medical discharge report indicated a fall as admission reason or fall-related injuries as the main diagnosis.

Data Collection and Procedures

An overview of the study design can be found in Supplementary Figure 1.

Step 1: Expert panel and adjudication of fall-related transfers

An expert panel independently rated each fall-related transfer with a self-developed rating questionnaire for potential avoidability, selected reasons attributable to avoidability, and possible resources that could mitigate these transfers. The root cause analysis tool and the medical discharge report were available for each fall's case. A potentially avoidable fall-related transfer was defined as a transfer occurring after a fall or for a fall-related injury with no urgent medical reason that could have been managed in the NH.

The panel was composed of 5 experts purposefully selected by the INTERCARE research group based on their experience and expertise in older people's care and complementary specialties. The panel included 4 NH medical doctors [geriatrics (2), general practitioner (1), emergency medicine (1)] and 1 NH-experienced APN.

The expert panel rating questionnaire (Supplementary Table 1) was developed based on a literature review that identified common reasons attributed to avoidability of NH transfers.

A first panel expert meeting occurred in October 2020, to enable the experts to familiarize themselves with the rating process and discuss rating issues. All fall cases were independently rated by each expert. A second meeting occurred in December 2020 to resolve any disagreement between raters and obtain consensus. Cases with disagreement were re-rated and discussed. Finally, the expert panel discussed potential resources for NHs to safely manage the potentially avoidable rated cases.

Step 2: NH stakeholder meeting

To contextually validate the resources discussed by the expert panel, a structured meeting was held with a group of NH stakeholders

Table 1
Definition and Source of Resident Characteristics

Variable	Definition/Measurement	Source
Age	Resident age at time of transfer (if resident was transferred more than once, age was taken at time of the first transfer)	Electronic health record
Gender	Resident gender (male or female)	Electronic health record
ADL	The ADL score ranges from 0 to 28 based on the RAI-NH assessment, repeated every 6 months after NH entry or sooner if condition alternates. The 7 items included in the MDS-ADL Long Form scale[25] include bed mobility transfer, locomotion, dressing, eating, toilet use, personal hygiene (scores range from 0 [total independence] to 4 [total dependence]). The total score was used to build 3 categories of dependence: Not/mildly impaired (0–4), Moderately impaired (5 −23), Severely impaired (24–28)	Electronic health record
CPS	The CPS score ranges from 0 (intact) to 6 (severe impairment) based on the RAI-NH assessment, repeated every 6 months after NH entry or sooner if condition alternates. These scores are derived from 4 MDS variables: 2 cognitive items (short-term memory and decision making), 1 communication item (ability to make oneself understood), and 1 ADL item (eating)[25]	Electronic health record
NH entry date	Date of entry in the NH	Root cause analysis tool
Date and time of transfer	For each transfer the date and time was retrieved	Root cause analysis tool
NH length of stay	Resident length of stay in the NH at time of transfer (if resident was transferred more than once, length of stay was calculated until the first transfer). Calculated based on the NH entry date and transfer date	Root cause analysis tool
Risk of falls	This variable was ticked if the resident was considered at risk of falls, based on the NH fall-risk assessment policy	Root cause analysis tool
Polypharmacy	This variable was ticked if the resident was prescribed 9 or more active substances daily	Root cause analysis tool
Identification of fall-related transfers	Three variables were selected from the root cause analysis tool to capture all fall-related transfers. We used the *suspected diagnosis* at time of transfer, *a fall* was ticked as a new symptom warranting the transfer or an *X-ray* was ticked (to exclude or confirm a fracture)	Root cause analysis tool

ADL, activities of daily living; CPS, Cognitive Performance Scale; MDS, minimum data set; RAI, Resident Assessment Instrument.

in January 2021. Fifteen stakeholders were invited via e-mail to participate. These stakeholders were selected by the research group based on experience in the field of geriatrics and their implication in the INTERCARE project. The final group included 2 NH GPs, 2 NH directors, 4 nurses with expanded roles who took part in the INTERCARE study, and a NH physiotherapist.

Step 3: Rating of appropriateness

An appropriateness questionnaire was developed by the research group, comprising 21 items (eg, mobile X-ray brought to the NH) relating to resources needed in NHs (Supplementary Table 2). Each item was rated on a scale from 1 to 9, 1 being not at all appropriate for implementation in Swiss NHs and 9 being appropriate. The appropriateness questionnaire was sent to the 9 stakeholders who

participated in the NH stakeholder meeting (step 2) and to other stakeholders who participated in the INTERCARE study (n = 21). The response rate was 43.3%, with 13 questionnaires returned.

Variables and measurements

For step 1, the resident's characteristics (including age, activities of daily living,[31] and cognitive performance[31]) and fall-related characteristics were extracted from the standardized root cause analysis tool adapted for INTERCARE based on the INTERACT tool[32,33] and from the electronic health record data (Table 1). The items of the questionnaire for step 1 are in Supplementary Table 1. Avoidability was dichotomized as avoidable or potentially avoidable versus nonavoidable. The questionnaire for step 3 is shown in Supplementary Table 2. Each item

Table 2
Resident Characteristics at the Time of the Fall-related Hospital Transfer

Resident Characteristics (N = 73)	n (%) or median (IQR)	Nonavoidable (n = 55)	Potentially avoidable (n = 18)	Difference P value
Age, y	88 (85–92)	87.5 (83.5–91)	88 (86–92)	.453
Gender				.169
Female	58 (79.5)	41 (75.9)	17 (94.4)	
Male	15 (20.5)	14 (25.5)	1 (5.6)	
Length of stay in NH, y	2.5 (1.2–4.0)	6 (3–7)	0 (0–1.8)	<**.001**
Residents with polypharmacy (9 or more active substances)	33 (45.2)	27 (49.1)	6 (33.3)	.372
Residents deemed at high risk for falls	36 (49.3)	28 (50.9)	8 (44.4)	.838
Activities of Daily Living score				.237
Not/mildly impaired (0–4)	22 (30.6)	15 (27.8)	7 (38.9)	
Moderately to severely impaired (5–23)	50 (69.4)	39 (72.2)	11 (61.1)	
Cognitive Performance Scale				.618
Intact to mild impairment (0–2)	29 (40.3)	23 (42.6)	6 (33.3)	
Moderate to moderate severe (3–4)	35 (48.6)	26 (48.1)	9 (50)	
Severe to very severe (5–6)	8 (11.1)	5 (9.3)	3 (16.7)	

For Activity of Daily Living and Cognitive Performance Scale, we have missing information for 1 resident. Information is reported for 72 residents for the overall characteristics and for 54 residents in the nonavoidable group.
The bold refers to the statistically significant difference between the groups.

Table 3
Comparison of Characteristic Differences of Fall-related Transfers

ED and Hospital Transfer Characteristics	All	Potentially Avoidable	Nonavoidable	Difference P Value
Number of transfers, n (%)	81 (100)	21 (25.9)	60 (74.1)	
Length of hospital stay, d, median (IQR)	5 (1–7)	0 (0–2)	6 (3–7.3)	.006
Type of transfer				<.001
ED visit only	23 (28.4)	14 (66.7)	9 (15.0)	
Transfer resulting in a hospitalization	58 (71.6)	7 (33.3)	51 (85.0)	
Time of transfer				.636
Office hours, week days	63 (78.8)	17 (85.0)	46 (76.7)	
Out-of-hours, weekends/evenings	17 (21.2)	3 (15.0)	14 (23.3)	
Treatment (surgery)	34 (42.0)	0 (0.0)	34 (56.7)	<.001
Diagnostic procedure, imaging	75 (92.6)	17 (81.0)	58 (96.6)	.005
Residents with polypharmacy	37 (45.7)	6 (28.6)	31 (51.7)	.115
Residents with fall risk	39 (48.1)	9 (42.9)	30 (50.0)	.756

For time of transfer, we have missing information for 1 case, meaning we have information for 80 transfers in the "All" category and for 20 transfers in the "Potentially avoidable category". χ^2 tests (including contingency tables) were performed to compute the P values.

was rated on a scale from 1 to 9, with 1 indicating not appropriate and 9 appropriate for the Swiss NH context.

Ethical Considerations

The INTERCARE study is registered at clinicaltrials.gov (Protocol Record NCT03590470) and received ethical clearance from all the ethics committees responsible for the 11 participating NHs (EKNZ 2018–00501). Written informed consent was obtained from all residents to participate in the INTERCARE study or from a resident's relative if otherwise.

Data Analysis

Analyses were performed with R 3.5.2[34] on Mac with dplyr,[35] and tidyverse[36] packages.

For step 1, descriptive statistics were used for residents' and fall-related transfer characteristics and reported as median (IQR) or frequencies and percentages as appropriate. χ^2 tests (including contingency tables) were used to assess whether a relationship existed between avoidability and the type of transfer (ED visit only vs hospitalization) and the differences in proportion between potentially avoidable and nonavoidable transfers.

The RAND/UCLA method was used to calculate appropriateness and agreement for each questionnaire item for step 3. Per-item medians were computed and 3 relevance categories assigned: 1 to 3: not appropriate; 4 to 6: uncertain; and 7 to 9: appropriate.[37] Agreement was calculated based on the statistical measures of ratings' dispersion across the 3 categories. Disagreement was indicated when the unadjusted interpercentile range (IPR) was greater than the IPR adjusted for asymmetry (IPRAS) (ie, IPR > IPRAS). Agreement was indicated when IPR was less than the IPRAS (ie, IPR < IPRAS). The final set of resources comprised the items that reached agreement and had a median rating of 7 to 9.

Results

A total of 73 residents and 81 fall-related transfers were collected in this 21-month study. Residents had a median age of 88 years (IQR: 85–92) at the time of transfer and 79.5% were women (Table 2). Nearly half of the residents had been evaluated at high risk of falls. Transfers resulted in ED visits only, in 28.4% of cases, and the median length of stay for hospitalized residents for a nonavoidable transfer was 6 days (IQR: 3–7.3) (Table 3).

Potentially Avoidable Post-Fall Transfers

Approximately 1 of 4 fall-related transfers were rated as potentially avoidable by the expert panel and 2 of 3 adjudicated transfers as potentially avoidable resulted in an ED visit without an overnight stay (Table 3). We found ED visits only were more likely to be rated as potentially avoidable by the expert panel, χ^2 (1, N = 81) = 18.0, P < .001.

The 4 main reasons attributed to potential avoidability were as follows: (1) the possibility for an outpatient appointment (71.4%) (ie,

Table 4
Characteristics of Potentially Avoidable Fall-related Transfers

Cases rated as potentially avoidable (N = 21)	
Reasons attributed by the expert panel for potential avoidability*	n (%)
An outpatient appointment could have been possible before transfer	15 (71.4)
The transfer occurred before a medical assessment was obtained (ie, GP consultation)	13 (61.9)
The resident was treated in hospital after an incorrect assessment of the situation	10 (47.6)
The necessary resources to handle and treat the resident were not available in the NH	7 (33.3)
The status of the resident at the time of the fall was not an emergency	3 (14.3)
No further procedures were performed in hospital or ED to those received in NH	3 (14.3)
Relatives asked for the transfer	3 (14.3)
Palliative care status was known and not considered	2 (9.5)
The resident asked for the transfer	2 (9.5)
Presence of advanced care practice guidelines against transfer	1 (4.8)
Diagnostic procedures and treatment performed in the ED	n (%)
Diagnostic procedures	
Transfers requiring imaging (CT or radiograph)	17 (81.0)
- Evidence of a fracture only	7 (41.2)
- Evidence of head trauma only	7 (41.2)
- Evidence of a fracture and head trauma	1 (5.9)
- No evidence of fracture or head trauma	2 (11.8)
Laboratory workup	6 (28.6)
Treatment	
Resident transfers requiring surgery	0 (0)
Resident transfers requiring pain relief	14 (66.7)
Resident transfers requiring a wound dressing	7 (33.3)

*Multiple answers were possible for each answer option.

Table 5
Appropriateness Rating of 21 Potentially Implementable Resources in Swiss NHs

Item Rated	Median (IQR)	SD	IPR	IPRAS	Disagreement Between NH Stakeholders	Decision for NH Implementation
Diagnostic resources						
X-ray brought to NH during office hours	9 (5.6−9)	2.54	3.4	5.8	No	Appropriate
X-ray performed in an outpatient department	7 (6.6−8)	2.22	1.4	5.8	No	Appropriate
Build connections with local networks, such as outpatient departments	8 (7.6−9)	1.64	1.4	7.3	No	Appropriate
CT scanner brought to NH during office hours	8 (5.6−8.4)	3.18	2.8	5.35	No	Appropriate
Clinical assessment and diagnosis after a fall by APN	9 (9−9)	2.38	0	8.35	No	Appropriate
Clinical assessment and diagnosis after a fall by RN after additional training	8 (6.6−9)	1.49	2.4	6.55	No	Appropriate
Consultation after a fall by an internal GP	9 (8−9)	2.24	1	7.6	No	Appropriate
Consultation after a fall by an internal APN	9 (9−9)	1.33	0	8.35	No	Appropriate
Consultation after a fall by an internal physiotherapist	7 (6.2−8.4)	2.50	2.2	5.8	No	Appropriate
Neurological assessment by APN after additional training	9 (9−9)	0.58	0	8.35	No	Appropriate
Neurological assessment by RN after additional training	7 (7−9)	1.44	2	6.85	No	Appropriate
X-ray brought to NH during out-of-hours (evenings, bank holidays, weekends)	6 (5−9)	2.91	4	5.35	No	Uncertain
CT brought to NH during out-of-hours (evenings, bank holidays, weekends)	6 (5−7)	2.97	2	3.85	No	Uncertain
CT performed in an outpatient department	6 (5−7)	2.46	2	3.85	No	Uncertain
Consultation after a fall by an external GP	6 (5−8)	2.72	3	4.6	No	Uncertain
Consultation after a fall by an external APN	5 (3.6−5.4)	2.15	1.8	3.1	No	Uncertain
Neurological monitoring by NH staff after initial assessment by APN or RN	6 (6−9)	2.18	3	6.1	No	Uncertain
Treatment and care resources						
Wound suturing by APN	8 (5.6−9)	2.90	3.4	5.8	No	Appropriate
Availability of an algorithm for immediate post-fall management to guide NH staff	9 (8.2−9)	1.83	0.8	7.8	No	Appropriate
Availability of an algorithm to help NH staff reflect on the management after a fall	9 (9−9)	0.60	0	8.35	No	Appropriate
Wound suturing by RN after training	5 (3−8)	3.00	5	3.1	Yes	Uncertain

This table displays the items rated by NH stakeholders via a questionnaire. Each item was rated on a 1−9 agreement scale. Per-item medians were computed and 3 relevance categories assigned: 1−3: not appropriate for implementation in NHs; 4−6: uncertain; and 7−9: appropriate for implementation in NHs.[31] Agreement was calculated based on the statistical measures of ratings' dispersion across the 3 scoring categories. Disagreement was indicated when the unadjusted IPR was greater than the IPRAS (ie, IPR > IPRAS). Agreement was indicated when IPR was less than the IPRAS (ie, IPR< IPRAS). The final set of resources comprised the items that reached agreement and had a median rating of 7−9 (highlighted in gray).

to a walk-in-clinic); (2) the transfer occurred before a medical assessment (ie, by a NH GP) could be carried out (61.9%); (3) the resident was treated in hospital after an incorrect assessment of the situation (47.6%); and (4) the necessary resources to handle and treat the resident were not available in the NH (33.3%) (Table 4).

Appropriateness of Resources

Twenty-one different resources were rated in the appropriateness questionnaire, by 13 raters. Fourteen (66.7%) resources were considered appropriate for implementation in Swiss NHs including access to radiographs, in-house consultation by a variety of professionals, and further training for APNs and RNs. Six (28.6%) resources were rated as uncertain (neither appropriate nor inappropriate) and would need further investigation. These resources included access to imaging during out-of-hours and consultation by external professionals. Disagreement between the raters occurred only for "suturing by an RN after training." Table 5 provides a detailed overview.

Discussion

To our knowledge, this is the first study to focus exclusively on the avoidability of post-fall ED transfers and exploring appropriate resources for NHs. This study found that one-fourth of transfers are avoidable, of which two-thirds are ED visits only.

Our findings are comparable with other studies, whereby most fall-related transfers are necessary and most residents benefit from hospitalization after a fall (ie, hip fractures).[38] Almost half of the residents needed surgery post-fall (42%, Table 3). However, some situations seem safe to handle in NHs with close monitoring or with an organized outpatient appointment for further medical evaluation.[38] Most transfers rated as potentially avoidable occurred during working hours, which allows for a range of different interventions to be feasibly implemented. An outpatient visit to a GP's practice or outpatient clinic was the most commonly reported reason for a rating of potential avoidability. One of 5 fall-related transfers did not receive any diagnostic imaging or medical treatment in the ED beyond a simple assessment, which underpins the importance of proposing solutions to prevent these unnecessary transfers and the detrimental consequences on residents. Fourteen resources, including access to imaging services (particularly mobile X-ray) during office hours, timely access to GPs, and in-house presence of nurses with additional clinical skills or specialist training (ie, APNs, expert nurses, or specialist nurses) were deemed appropriate by NH stakeholders for NH implementation to reduce potentially avoidable fall-related transfers (Table 5).

Access to Onsite Infrastructure

Burke et al.[12] reported that 20% of NH residents were transferred to the ED and rapidly discharged without further treatment. According to

Wang et al.[39] approximately 72% of NH-transferred residents needed diagnostic imaging; of these, approximately 85% needed radiographic examinations, and 35% needed computed tomography (CT) scans. This is very similar to our findings, whereby a radiograph and/or CT was performed in 97% of fall-related transfers rated as nonavoidable and in 81% of those considered potentially avoidable. This corroborates the need for NHs to be able to safely assess and diagnose residents within NHs to only transfer the residents when there is evidence that it is needed.

NHs that are geographically close to outpatient imaging facilities use these more easily and frequently compared with NHs that are distant or isolated,[21] indicating that partnerships between facilities and NHs should be developed or strengthened. For NHs that do not have logistical or financial possibilities to access mobile/outpatient services, a "half, half" solution is possible. Residents are transferred to the ED for diagnostic imaging and sent back to the NH for clinical management, as opposed to being formally admitted.[5] This requires strong partnerships between NHs, EDs, or outpatient services, and access to an onsite GP or APN to interpret the diagnostics and develop the treatment plan. The feasibility for NHs that wish to improve their access to imaging services and take over the resident's medical management might depend on the NH GP's level of geriatric expertise, willingness to interpret imaging results, and availability of APNs.

Access to Clinical Training

In Switzerland, geriatric expertise is lacking in NHs, and caregivers, residents, and relatives need timely geriatric support and advice after a fall or fall-related injury.[40] The presence of APNs in NHs or support from RNs working in extended roles are considered key solutions to re-engineer resources already present in Swiss NHs.[40–42] NH stakeholders are in favor of APNs and RNs with additional training providing that these roles are fully embedded in teams, as opposed to "consulting" APNs or RNs, which visit NHs based on needs.[43,44] A viable solution for NHs is to offer RNs within NHs the possibility of additional clinical training, such as wound assessment, dressing, and monitoring, and simple suturing techniques, after final sign-off as competent (ie, timely review by a GP). These are services that are often delivered in the ED and performed by APNs and nurses working in extended roles, such as nurse practitioners, in acute care.[45,46] These services could be offered in NHs, if RNs could benefit from additional clinical skills training such as neurological assessments, monitoring, and initiating a care plan (ie, pain management), and would greatly benefit residents who do not need an ED transfer.

Access to NH Decision-Making Algorithms

Algorithms for immediate post-fall management to guide NH caregivers to establish whether an immediate transfer is necessary are not available in Swiss NHs or internationally, despite there being many regularly updated recommendations available for the prevention of falls.[47] The Registered Nurses' Association of Ontario provides a list of interventions to follow after a fall has occurred; however, these are non-NH specific and rather general.[23] According to our results (Table 5), an algorithm with recommendations is deemed appropriate and validated by stakeholders.

Implementation of the Previously Mentioned Resources

Evaluation of contextual readiness to implement and sustainably use the previously mentioned services/resources is crucial before implementation. This study gives an insight into possible resources that could be implemented in NHs, providing that NH leadership and medical teams are committed and willing to support change in practice, according to the principles of implementation science.[48]

Further research is needed to determine how these resources can be implemented. In addition, it would be interesting to collect data about falls that were managed in NHs and resources that were used to enable this.

Recommendations for Practice

Addressing the lack of geriatric expertise in Swiss NHs and supporting the implementation of nurses working in extended roles is necessary, as APNs are not routinely implemented in Swiss NHs despite pilot projects since 2016.[44] Enhancing geriatric training and diagnostics (eg, wound care, basic physical and neurological examinations) of both RNs and nurses working in extended roles can increase attractivity for nurses and allied health professionals to work in NHs and develop their careers. Swiss NHs have a variety of nurses working in extended roles,[49] but their daily tasks and responsibilities are heterogeneous. Implementing post-fall management guidelines and standardizing training would move the field ahead.

Strengthening partnerships between GP practices, outpatient departments, and EDs and NHs, driven by nursing and medical associations to develop collaboration between these settings are needed to leverage resources and ensure better coordination between NHs and hospitals, to ensure minimal time spent in the ED.

As most NHs in Switzerland work with multiple GPs, involving them in discussions regarding clinical practice in NHs and considering what they perceive as important skills are prerequisites for better practice in NHs.

Strengths and Limitations

The generalizability of findings may be limited, as the study took into consideration the legal framework in which Swiss NHs operate, but provides insights into possible solutions to improve the management of residents after a fall. We worked with a small, purposefully selected expert panel, which was blinded to the residents, NHs, and care settings. The panel has extensive experience and represents the different settings to which NH residents are usually exposed to when transferred from a NH. This enabled in-depth and rich discussions between panel members. The appropriateness questionnaire was simple to use and internally developed but was not piloted and is not exhaustive.

Conclusion and Implications

To reduce avoidable transfers after a fall, NHs should consider possible organizational changes, invest in geriatric-focused clinical skills training for nurses, and better integration of APNs in NHs. Most of the resources discussed here could also benefit other common conditions associated with an avoidable transfer, such as the use of diagnostic imaging for better management of respiratory or cardiac conditions within NHs.

Acknowledgments

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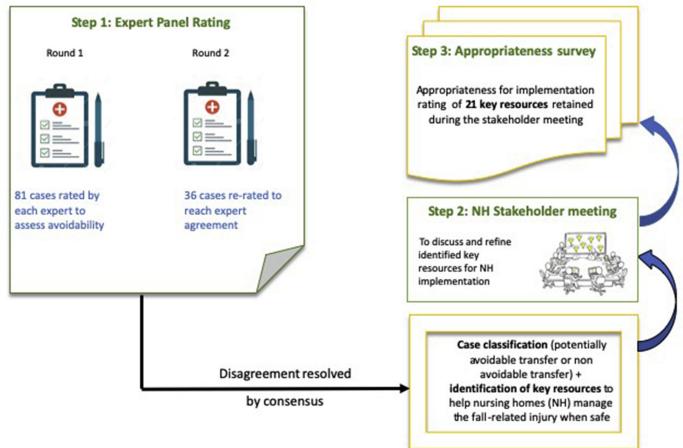
Supplementary Table 1
Rating Questionnaire for Hospital Transfers Occurring After a Fall in Swiss NHs

Question 1a: Could this situation have been handled in the nursing home?		
Yes ☐	No ☐	Maybe ☐
Question 1b (If yes was answered in question 1a, please answer the following question): What are the reasons for the transfer being rated as avoidable? Multiple answers possible, please tick the appropriate answer(s)		
1	Incorrect assessment of the situation	☐
2	Resources needed to assess the resident were available in the nursing home	☐
3	Absence of somatic emergency	☐
4	Palliative care status known before transfer	☐
5	Presence of advance directives for non-hospitalization in the reflection tool	☐
6	The resident was transferred before a medical assessment could be carried out in the nursing home to determine if transfer was necessary	☐
7	An outpatient's appointment could have been arranged	☐
8	No treatment/further examinations were performed in the hospital	☐
9	Relatives insisted for the resident's transfer	☐
10	Other reason(s), please state:	
Question 2: What kind of resources or infrastructure would a nursing home need to handle such a situation in situ? Please state below:		☐

Supplementary Table 2
Appropriateness Questionnaire Rating 21 Key Resources (Translated From German)

	Item Rated by Nursing Home Stakeholders	Scale
1	Mobile X-ray brought to the nursing home during office hours	1–9
2	Mobile X-ray taken to the nursing home outside office hours (evenings, nights, weekends/holidays)	1–9
3	Resident goes for an X-ray at an outpatient radiology service or GP[20] practice (if these can be reached in a reasonable time)	1–9
4	Establishment of local networks between nursing home, nearby hospital, and/or outpatient radiology service to provide outpatient radiology (X-ray/CT[21])	1–9
5	Mobile CT is brought to the nursing home during office hours	1–9
6	Mobile CT is brought to the nursing home outside office hours (evenings, nights, and weekends/holidays)	1–9
7	Resident goes for a CT at an outpatient radiology service (if this can be reached in a reasonable time)	1–9
8	Extended assessment and diagnostics by a nursing expert APN[22] who has additional training for these situations. They are supervised by a doctor via telemedicine or otherwise.	1–9
9	Extended assessment and diagnostics by a qualified nurse[23] who has additional training for these situations. She is supervised by a doctor via telemedicine or otherwise.	1–9
10	1st consultation by home doctor after a fall	1–9
11	Consultation by external family doctor after a fall	1–9
12	Consultation by external nursing expert APN after a fall	1–9
13	Consultation by internal nursing expert APN after a fall	1–9
14	Supplementary consultation with internal physiotherapist after a fall	1–9
15	After fall on head: in-depth neurological assessment by a nursing expert APN with additional training	1–9
16	After a fall on the head: in-depth neurological assessment by a qualified nurse (HF/FH) with additional training	1–9
17	Suturing of simple wounds by nursing experts APN, after appropriate training under the supervision of a doctor	1–9
18	Suturing of simple wounds by qualified nurse (HF/FH), after appropriate training under the supervision of a doctor	1–9
19	Implement an algorithm to assist in decision making at the time of the fall (use during post-fall management)	1–9
20	An algorithm to help reflect on what happened after a fall	1–9
21	Continuous training and update of nursing home staff (all levels) on the use of a falls' guideline or algorithm	1–9

Supplementary Fig. 1. Study design depicting the various steps to classify each falls' case and identify key resources implementable in Swiss NHs. Step 1 shows the number of cases rated during each panel expert round and the information generated. This information was used for step 2 during the NH stakeholder meeting to discuss and refine resources needed to reduce potentially avoidable fall-related admissions. Finally, based on the stakeholder's input, 21 resources were rated for implementation appropriateness by a larger group of NH stakeholders.