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Technical Report

"What's wrong in here?" – Implementing a room of horrors simulation in nursing homes to increase awareness for patient safety

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Abstract

Objectives: To implement a room of horrors simulation in nursing homes.

Design: Multicenter study with an in situ simulation training. Two case scenarios were developed for the simulation. Each scenario included ten errors or risks for patient safety. Participants had to uncover all risks and errors within a limited time. A moderated debriefing took place after the exercise. Data were gathered from the solution sheets from participants and a one-page feedback survey. Welch's ANOVA and χ^2-tests were used to assess differences among professional groups (registered nurses, licensed practical nurses, certified nurse assistants, other).

Setting: The training was implemented in five nursing homes in Switzerland.

Participants: 326 staff members, mostly nursing care workers with different levels of education, participated in the exercise in groups of two to seven people.

Results: Most participants completed the resident room scenario (n=258). In the resident room scenario, participants found on average 5.6 out of 10 errors (min: 1, max: 9), in the dining room scenario, participants found 5.5 out of 9 errors (min: 1, max: 8). In the resident room scenario, registered nurses and licensed practical nurses identified on average more errors than nursing aids and other staff members. Errors detectable by examination of the environment were found more often than errors that had to be elicited from the resident's chart. The simulation exercise was very well received by all professional groups.

Conclusions: The room of horrors is an easy to use and interactive simulation method that introduces participants to potential errors and risks for patient safety and renders them tangible in a close to real life environment. Future research should focus on investigating the effectiveness of the training.

Introduction

Providing safe care to residents is of high priority in nursing homes. Despite increased awareness for patient safety issues, residents in nursing homes are still at risk for experiencing adverse events such as injuries from falls, pressure ulcers, nosocomial infections and adverse drug events [1]. In-depth analyses of adverse events in long-term care settings revealed that they were oftentimes the result of errors, substandard care, communication failures and inadequate documentation and can thus be considered preventable [2,3]. Hence, one important measure to increase safety is for healthcare workers to be able to recognize and act upon such errors and unsafe care practices when they occur in daily practice. This in turn requires healthcare workers to be alert to their surroundings, anticipate risks and problems that may cause patient harm and react accordingly [4]. Feeling comfortable to speak up and address concerns when needed is essential as well [5]. One way to train these non-technical skills is through simulation-based training. Simulation exercises provide an opportunity to experience clinical situations without putting real patients at risk and offer time for reflection and debriefing to increase learning [6]. Simulation has become a widely-used strategy for training and educating healthcare workers to improve quality and safety [7,8]. In Switzerland, simulations have been well-established in the hospital care setting. Due to resource and equipment constraints, the strategy has been used to a lesser extend in the nursing home setting.

The “room of horrors” is a low-fidelity simulation exercise to train knowledge and awareness for patient safety issues. Based on a fictitious, but realistic patient chart, a patient room is prepared specifically for the exercise. Several risks and errors are deliberately hidden in the room, the patient documentation and, if available, applied to the mannequin. Healthcare workers visit the room alone or in groups and have to uncover these risks and errors within a limited time. In contrast to theoretical instructions, the simulation exercise offers the opportunity to experience patient safety hazards in everyday clinical situations in an immersive and interactive way. Originating as a novel method to teach awareness for patient safety threats to medical students and interns [9–12], the simulation exercise has gained attention in different countries and across different disciplines. It has since been successfully applied to professional training in acute care hospitals [13,14] and subspecialties such as surgery [15], orthopedics [16], intensive care [17], dentistry [18] or hospital pharmacy [19]. To our knowledge, however, no study has yet transferred the concept to the nursing home setting. The aim of this study was to develop materials and appropriate methods for the implementation of the room of horrors simulation in nursing homes and evaluate first experiences with its application in different groups of staff with varying levels of training and expertise commonly working in nursing homes.

Methods

Development of case scenarios and user manual

For this study, we built upon a previous version of the room of horrors simulation developed for acute care hospitals [13]. We created two case scenarios set in the nursing home environment. The first scenario takes place in a resident’s room, the second in a dining room at breakfast. Each scenario includes a detailed description of the resident’s medical history, their medication list, nursing diagnoses, care plan and progress notes. The case scenarios were developed in cooperation with long-term care nursing experts to ensure that they are accurate and realistic. Each case scenario contains a list of ten intentional errors or risks for patient safety (table 1).

Table 1. Patient safety risks and errors intentionally integrated in the case scenarios

Case scenario	WHO classification of incident type	Representation in the room
Dining room	Medication (administration): wrong patient/wrong drug	Wrong resident's name on medication dispenser
	Medication (administration): risk for omission	Pills dropped on the floor
	Medication (prescription): wrong drug	Amoxicillin/clavulanic acid prescribed despite penicillin allergy†
	Patient accidents: risk for falls	Rollator out of reach or brakes not locked
	Patient accidents: risk for falls	Drinking cup on the floor, floor wet
	Nutrition (administration): wrong diet	Dairy yoghurt on the table despite lactose intolerance
	Nutrition (administration): expired product	Milk has expired
	Clinical process (diagnosis, assessment): not updated	Change in behavior not recognized as sign for acute confusion†
	Clinical process (general care): not performed when indicated	No monitoring of fluid intake†
	Clinical process (general care): not available	Missing care planning regarding risk of malnutrition† ‡
Resident room	Medication (administration): wrong quantity	Unnecessary insulin injection†
	Patient accidents: risk for poisoning	Cleaning supplies left in the room

Patient accidents: risk for falls	Floor sensor mat unplugged
Nutrition (administration): wrong diet	Provision of coca cola despite diabetes
Clinical process (general care): incomplete	Incorrect or invisible date and time on clock and calendar
Clinical process (general care): not performed when indicated	Medication dispenser on bedside table, no supervision of intake
Clinical process (general care): not performed when indicated	No pain assessment despite indication†
Clinical process (diagnosis, assessment): not updated	Missing pressure ulcer prevention measures
Clinical process (treatment): indication not evaluated	Indication for urinary catheter not evaluated†
Healthcare-associated infection: general risk for infection	Empty bottle of hand sanitizer in the room

†: Errors detectable from resident chart only (chart-based errors)

‡: Item excluded from analysis due to inconsistencies in the case scenario, which did not allow to clearly identify the error

Some of the risks were physically represented in the room and detectable by close examination of the environment (e.g., cleaning supplies forgotten in the room, water spilled on the floor) or in combination with information from the resident chart (e.g., a dairy yoghurt despite the resident's lactose intolerance, medication dispenser with a wrong name). Some of the risks and errors were only represented in the resident chart (e.g., missing pain assessment, no evaluation of indication for urinary catheter). The list of errors and risks for patient safety was established based on previous studies [13], data on adverse events in nursing homes [3,20], inputs from nursing experts as well as practical considerations regarding the feasibility of depicting the error. The international classification for patient safety was used to ensure that the list represents a wide array of different incident types [21]. In addition to the case scenarios, we updated the existing user manual [22] that provides step-by-step instructions for preparing and holding the simulation and for conducting a structured debriefing immediately after the exercise.

Implementation in nursing homes

The new case scenarios were tested in a convenience sample of five nursing homes in the German-speaking part of Switzerland. The participating nursing homes had to hold a room of horrors simulation between May and July of 2021. They were required to use one of the two case scenarios and not to alter the predefined list of errors. However, nursing homes were allowed to install their own additional errors. They were asked to follow the recommendations in the user manual for planning and implementing the exercise but could adapt certain parameters according to their preferences. For example, the nursing homes could determine whether staff participation was voluntary or mandatory, on how many days the training took place and how staff was invited. The simulation exercise is primarily targeted at all staff members who directly provide care and assistance to residents. However, nursing homes were free to invite staff from other professional groups such as medicine, physical therapy, gastronomy or housekeeping.

In general, the exercise followed the same sequence in all places: participants received a brief instruction from a moderator before entering the room. They were instructed to carefully read the resident documentation and scan the room and the documentation for any errors or risks to patient safety during 10 to 15 minutes. Participants who entered in groups were allowed to talk to each other. Participants were asked to write down any hazard that they had identified on a sheet of paper. After the exercise, the moderator held a debriefing session. During the debriefing, participants listed all the errors they had identified and the moderator presented the correct solution. Participants then completed a brief feedback survey and handed in their solution sheets. They were asked not to share the solutions with their colleagues who had not yet participated in the training.

Data collection and analysis

Data were gathered from the solution sheets with the hand-written notes from participants and a one-page feedback survey with ten closed-ended and one open-ended question. Information on local implementation were gathered by means of a short, informal survey among staff charged with implementing the simulation in the nursing homes. The solution sheets and the completed feedback surveys were collected by the moderators after the debriefing session and sent to the study team for analysis. All data collected were anonymous. Solution sheets were manually coded to assess the number of deliberately installed risks and errors discovered by each participant. Additional errors that were implemented by single nursing homes were excluded from the analysis due to a lack of comparability among the different research sites. During implementation in the nursing homes, we noticed that one of the errors in the dining room scenario could not be clearly identified as an error due to inconsistencies in the case description. This error was subsequently

excluded from analysis and was replaced by a new error in the user manual, which was updated after the data analysis.

We calculated the frequency and mean number of errors and risks that were documented on the solution sheets by participants. Errors were categorized as “chart-based” if they had to be elicited from the resident chart and as “room-based” if they were detectable by examination of the environment only. One-way ANOVA was used to test for differences in mean number of errors between professional groups for the resident room scenario. As homogeneity of variances was violated in some subgroups, Welch’s ANOVA was performed. Sample size in the dining hall scenario was too small to analyze differences among professional groups. The four-point response scales on the feedback survey were dichotomized into “strongly or rather agree” and “strongly or rather disagree”. χ^2-tests were performed to determine differences among professional groups. The answers to the open-ended question were coded and grouped together by the first author in broad categories. For all analyses, $p < .05$ was considered statistically significant. Stata 17.0 (StataCorp LLC, College Station, TX) was used to conduct the analyses. The SQUIRE 2.0 guideline was used for reporting.

Results

Training characteristics

A total of 326 staff members in five nursing homes participated in the simulation exercise. Most participants were nursing care workers with different levels of education (table 2).

Table 2: Sample characteristics

Participants per site	n (%)
Nursing home A	41 (13)
Nursing home B	32 (10)
Nursing home C	46 (14)
Nursing home D	24 (7)
Nursing home E	183 (56)
Profession	n (%)
Registered nurse†	69 (21)
Licensed practical nurse‡	110 (34)
Certified assistant nurse or nurse aide§	81 (25)
Other¶	30 (9)
n/a	36 (11)
In training	61 (19)

Participants per case scenario	n (%)
Resident room	258 (79)
Dining room	63 (19)
n/a	5 (2)

Professional titles were translated from German for this study. Roles and responsibilities may not be fully comparable across countries.

†: 3-4 years of higher education

‡: 3 years vocational training

§: 1-2 years vocational training

¶: Category includes housekeeping and gastronomy, activation worker, therapist and other

The resident room scenario was used in four nursing homes with a total of 258 participants, the dining room scenario was used in two nursing homes with a total of 63 participants. In five cases, participants only completed the feedback survey, but not the solution sheet. One nursing home implemented both scenarios, but participants completed one of the two scenarios only. Fifteen participants (5%) visited the room alone, all others participated in groups of two to seven people. 58% of those participating in groups indicated that group members were from different professional backgrounds.

Identification of patient safety risks and errors

In both scenarios, the intentionally implemented errors and risks were identified with varying frequency. Errors such as pills dropped on the floor, the medication dispenser on the bedside table or the rollator out of reach were identified by most participants. These errors were all detectable by close examination of the physical environment. Errors that had to be elicited from the resident's chart such as a missing pain assessment or a change in behavior that is not recognized as a sign for acute confusion were detected only by a small number of participants (table 3).

Table 3. Frequency of correctly identified intentional risks and errors

Case scenario: resident room	Participants (n=257)
	n (%)
Medication dispenser on bedside table, no supervision of intake	238 (93)
Cleaning supplies left in the room	220 (86)
Provision of coca cola despite diabetes	213 (83)
Incorrect or invisible date and time on clock and calendar	210 (82)
Missing pressure ulcer prevention measures	168 (65)
Floor sensor mat unplugged	165 (64)

Empty bottle of hand sanitizer in the room	153 (60)
Unnecessary insulin injection†	57 (22)
Indication for urinary catheter not evaluated†	19 (7)
No pain assessment despite indication†	8 (3)

Case scenario: dining room	Participants (n=63)
	n (%)
Pills dropped on the floor	61 (97)
Rollator out of reach or brakes not locked	57 (90)
Wrong resident's name on medication dispenser	48 (76)
Dairy yoghurt on the table despite lactose intolerance	47 (75)
Amoxicillin/clavulanic acid prescribed despite penicillin allergy†	42 (67)
Drinking cup on the floor, floor wet	42 (67)
Milk has expired	34 (54)
No monitoring of fluid intake†	16 (25)
Change in behavior not recognized as sign for acute confusion†	1 (2)

†: Errors detectable from resident chart only (chart-based errors)

In the resident room scenario, participants found on average 5.6 out of 10 errors (min: 1, max: 9). On average, they found 5.3 out of 7 room-based errors (min: 1, max: 7) and 0.3 out of 3 chart-based errors (min: 0, max: 2). Registered nurses and licensed practical nurses identified on average more errors than nursing aids and other staff members (table 4).

Table 4. Mean number of detected risks and errors by professional group for resident room scenario

Resident room scenario (n=230)	All	RN	LPN	NA	Other	p-value*
All errors	5.6 (1.6)	6.5 (1.1)	5.9 (1.5)	5.0 (1.6)	5.2 (1.8)	<0.001
room-based errors	5.3 (1.4)	5.9 (1.0)	5.4 (1.4)	4.9 (1.5)	5.0 (1.7)	<0.001
chart-based errors	0.3 (0.5)	0.6 (0.6)	0.4 (0.5)	0.1 (0.3)	0.2 (0.4)	<0.001

*p-value for differences among professional groups (Welch's ANOVA)

RN: Registered nurse

LPN: Licensed practical nurse

NA: Certified assistant nurse or nurse aide

In the dining room scenario, participants found 5.5 out of 9 errors (standard deviation 1.3, min: 1, max: 8). In this scenario, participants found on average 4.6 out of 6 room-based errors (standard deviation: 1.0, min: 1, max: 6) and 0.9 out of 3 chart-based errors (standard deviation: 0.8, min: 0, max: 3).

Participants found numerous additional errors and risks that were not deliberately hidden. These unintended errors and risks were not systematically counted and analyzed. In the dining room scenario for example, it was noted that the food and beverage bottles were not adequately prepared for the scenario resident with Parkinson's disease, or that glasses and hearing aids were missing. In the resident room scenario, unintended errors included fall hazards such as slippery carpets and hazards related to the urinary catheter (e.g. tube may cause pressure sores, drainage bag not properly fixated, bag touching the floor).

Participant evaluation

The simulation exercise was evaluated very positively by participants. Most of them (95%) thought that the exercise was rather or very instructive and almost all (99%) would recommend the simulation to others, with no differences among professional groups. Patient safety risks integrated in the scenarios were judged to be rather or very relevant for daily practice by 98% of participants. This was true for all professional groups, except for a very small number of nursing aides who found the errors to be not very relevant for daily practice. A majority of participants (79%) found the errors to be rather or even very easy to detect, however there were some differences among professional groups: 94% of registered nurses, 75% licensed practice nurses, 81% of nursing aides and 60% of other staff members found the errors to be rather or very easy to detect ($p < .001$). The debriefing sessions were considered rather or very pleasant by 99% of participants. When asked about the most important learning for their daily practice, many participants commented that the exercise had reminded them to be vigilant, pay attention to details and consider all potential hazards in the patient environment. Some mentioned that they were reminded to take time to properly

read and keep the resident chart up to date and to follow safety measures in place. Table 5 shows the categories of answers provided to the open-ended question.

Table 5. Categorisation of anwers to the question “What is the most important learning for your daily practice from this exercise?” † (n=264)

Category	n
Be vigilant, keep eyes open, look closely, be careful	91
Pay attention to details, be aware of patient safety hazards	45
Document carefully, read resident file carefully	40
Adopt a holistic view, be aware of patient environment	29
Raised awareness for specific patient safety risks (e.g. do not leave cleaning supplies in the room)	28
Follow specific safety measures (e.g. consider allergies when preparing medication)	
Importance of collaboration, teamwork and communication (e.g. respect everyone’s observations)	27
Always check carefully	19
Other	22

† Individual answers could be attributed to multiple categories

Discussion

With this present study, we successfully adapted the concept of a room of horrors simulation training to the nursing home setting. The training was well received by participating healthcare workers from all professional groups. Even though their roles, responsibilities and educational backgrounds vary, most of the participants found the exercise to be instructive and relevant for their daily practice. This indicates that the case scenarios developed are suitable for interprofessional team trainings in nursing homes.

Not all errors were found with the same frequency; some of them were found almost always while others were rarely found. This is in line with previous studies in acute care hospitals [13]. Analyzing the error type in relation to the frequency of detection shows that errors visible in the room were detected much more frequently as compared to errors that had to be deduced from information (or missing information) in the patient chart. In the resident room scenario, registered nurses and licensed practical nurses found these types of errors more frequently than nursing aids, which is not surprising given their different tasks and responsibilities. However, detection rates for chart-based errors by registered nurses and licensed practical nurses were still lower than for room-based errors. This finding could in part be due to the way participants were instructed before entering the room. It is possible that some of them were not instructed to specifically search for errors in the documentation. We would also argue that chart-based errors are generally more difficult to find as compared to room-based errors, because they require the application of professional

knowledge and the ability to critically analyze the information in the chart in the context of existing clinical and organizational guidelines. Lastly, this finding could also be symptomatic for deficiencies prevalent in resident documentation in general. Most of the chart-based errors in our scenarios were related to information missing or not revised in the nursing documentation. Studies examining the quality of nursing documentation in long-term care facilities found that resident records were frequently inaccurate [23,24]. This, in turn threatens patient safety. Andersson et al. for example found that incomplete or lack of documentation was among the most frequent contributing factors to serious adverse events in nursing homes [3]. Including these chart-based errors in the room of horrors simulation can therefore be an important reminder to staff to pay attention to complete and consistent nursing documentation.

A novel element in our study was the mandatory and structured debriefing after the exercise to foster exchange among participants. Guided debriefings after simulations provide an opportunity for participants to reflect on what they have experienced, thereby increasing the learning effect of the training [25,26]. The focus of the debriefing was to resolve the installed risks and errors. Previous studies found patterns of participants underestimating the level of difficulty or overestimating their ability to identify risks and errors [12,13]. To prevent this, we specifically encouraged moderators to discuss errors that were rarely found. However, our data show that even though participants identified only slightly more than half of the installed risks and errors, they still rated detecting errors and risks as rather easy. The debriefing sessions could not resolve this discrepancy between actual performance and self-assessment. This might be because participants detected many other, unintentional errors in the room. Thus, the actual number of errors noted on the solution sheet was much higher, which may have biased the assessment of participants. It is also possible that the time allotted for the debriefing (10 to 15 minutes) did not allow for an in-depth reflection of errors that were rarely found. Nevertheless, we encourage debriefing sessions to be added after the simulation, in order to combine the rather playful and interactive part of the exercise with a more theoretical and structured learning opportunity. Debriefing sessions can help foster an understanding on why certain hazards might put residents' safety at risk.

Limitations

The findings of this study should be interpreted in the light of some limitations. First, we solely analyzed data from the solution sheets and the feedback surveys. We did not observe the actual implementation of the room of horrors exercise at the different sites. We therefore have no information on how participants were instructed before entering the room, if and how participants interacted with each other during the error search and the debriefing and how the discussions in debriefing sessions unfolded. Observational studies or interviews with participants afterwards could provide a more complete understanding of the processes and team dynamics during simulation and debriefing and help interpret the findings in more depth. Second, sample sizes were not equally distributed among participating nursing homes. However, we did not analyze differences among nursing homes, because it would not be possible to determine if differences reflect true differences in staff performance or statistical artifact. Lastly, we have no information on effects of the training on actual care performance or sustainability of the awareness on patient safety issues addressed during the training. Further research on the room of horrors simulation that focusses on impact is necessary to systematically investigate its long-term effectiveness.

Conclusion

The room of horrors is an easy to use and interactive simulation method that introduces participants to potential errors and risks for patient safety and renders them tangible in a close to real life environment. With this study we successfully adapted the concept to the nursing home setting. Our findings show that the concept is suitable for interprofessional team trainings in long-term care.

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Ethics

The study does not require full ethical review according to the Human Research Act, as confirmed by the Ethics Committee of the Canton of Zurich, Switzerland (BASEC-Nr. Req-2022-00021).

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