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SPECIAL REPORT

IMPLEMENTATION OF EVIDENCE-BASED PREVENTION OF FALLS IN REHABILITATION UNITS: A STAFF'S INTERACTIVE APPROACH

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Objective: **To provide strategies to assist healthcare professionals in the area of rehabilitation to improve prevention of falls.**

Design: **A conceptual framework is described as a foundation for the proposal of 2 intertwined strategies, of intervention and implementation, which target the questions: Which strategies for intervention represent the current best evidence? and: How can these strategies be implemented and continuously developed?**

Results: **Strategies for multifactorial and multiprofessional fall preventive interventions are presented in terms of a "fall prevention pyramid model", including general, individualized, and acute interventions. A systematic global fall risk rating by the staff is recommended as an initial procedure. Fall event recording and follow-up are stressed as important components of local learning and safety improvement. Development of implementation strategies in 3 phases, focusing on interaction, facilitation and organizational culture, is described**

Conclusion: **A well-developed patient safety culture focusing on prevention of falls will, when successfully achieved, be seen by staff, patients and their significant others as being characteristic of the organization, and will be evident in attitudes, routines and actions. Moreover, it provides potential for positive side-effects concerning organizational and clinical improvements in additional areas.**

Key words: accidental falls, prevention, rehabilitation, evidence-based practise, safety management.

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INTRODUCTION

In rehabilitation wards 1–5 patients out of 10 will fall at least once during their hospital stay (1–10). Patients with stroke, cognitive disorders, or hip fracture have a particularly high risk of falling (3, 11, 12), as well as those who have fallen previously (13). The risk of fall may vary by clinical department and during the stay in the ward (9, 14). Patients in the initial phase of rehabilitation who are disoriented or able to transfer themselves despite poor mobility are at high risk at the time of admission to the ward. In contrast, patients with a hip fracture or with a severe stroke who initially are unable to transfer without personal assistance will be more susceptible to falling during the later part of the rehabilitation period. The risk of fall can also change from hour to hour as a result, for example, of complications such as acute infection or delirium (15–17). Some fall risk assessment tools intended for patients in hospitals are available (18, 19), but the staff's attention to the risk of falling and their global rating are potentially better predictors of falls than these tools (20, 21).

Fall-related injury rates among in-patients undergoing rehabilitation range from 9% to 33% of the falls, with a corresponding range for severe injury rates, including hip fractures, of 2–4% (1, 3, 5–8). As much as 7% of all hip fractures, occurring anywhere in society, are caused by patients' falls during a hospital stay (22). At least half of the patients with a hip fracture sustained in hospital had a known history of falls, of which the majority had occurred during the same stay at the ward (22, 23). Besides these physical consequences of a fall, psychological factors, such as fear of falling, are likely to occur. It may be assumed that restriction of activity resulting from fear of falling will probably have a negative effect on the rehabilitation process. Furthermore, a prolonged hospital stay is often required for patients who fall, which adds substantial expenditure (24, 25). A fall event in the hospital is also, at least among stroke patients, a significant predictor of falls after discharge, which in turn are related to lower activity levels and increased stress among the carers (26). All these aspects considered together emphasize the importance of effective fall prevention in rehabilitation settings. There are reports of randomized controlled trials (27–29) that have shown a reduction in falls by 30–60% as a result of multifactorial intervention in rehabilitation wards, and in one of these studies a reduction in the number of persons with injuries due to falls was also found (29).

One dilemma, however, is that even though the body of research indicating advances in fall prevention is growing, the rates of implementation of improved preventive interventions are still low (30). Contributory reasons for this deficiency are

most likely that the existence of evidence is not in itself enough to change practices and that there is no simple formula to ensure successful implementation of research-based clinical improvements. Principles such as "understanding of the local context", "local negotiation and adaptation", "opinion leader influence" and "well-integrated processes of change" in interaction with "good research evidence" have been pointed out as significant factors for implementation success (31). In connection with improvement of fall prevention strategies, it is thus important to acknowledge that there are (at least) 2 intertwined processes that need to be considered and receive attention, namely the intervention with its specific outcomes, and the implementation with other outcomes. Hence, strategies not only for fall preventive interventions, but also for the implementation of such interventions, should be clearly defined, described and systematically employed.

Publications that combine queries regarding *what* we should do in terms of interventions with *how* these interventions should be implemented to reduce falls in healthcare settings are still sparse. In the only article found employing such an approach (32), the authors stressed the importance of creating an organizational climate in which all clinical professionals are encouraged to use research data as a basis for planning strategies for quality improvement and risk management, and to gain new ways of developing an improved capacity for change. Continuous improvement in the development of fall preventive strategies is necessary to allow constructive use to be made of the rapidly growing amount of new scientific evidence and technical solutions, such as computerized report systems. This may be of particular relevance for rehabilitation units, as attention has recently been called to the lack of safety literature specific to this area (33).

Aims and enquiries

The overall purpose of the current report is to improve patient safety, by proposing strategies to assist healthcare professionals in the area of rehabilitation to systematically improve the prevention of falls and fall injuries. The following questions concerning fall prevention in rehabilitation settings are addressed: Which strategies for intervention can be considered to represent the current best evidence? And: How can these strategies be implemented and continuously developed?

CONCEPTUAL FRAMEWORK

The proposed strategies for fall preventive intervention and its implementation are supported by the following assumptions, which are based on scrutiny of the literature concerning prevention of falls, healthcare improvement, and patient safety.

- Evidence-based practice (EBP), implying conscientious and explicit application of the current best evidence in decisions about care (34), provides a good foundation for fall preventive interventions in rehabilitation units. Evidence from high-quality research should, however, be complemented with local data based on both clinical and patient experiences, such as fall event reports, to provide a broader, functional and organizationally fitted evidence base (35).
- For a successful fall prevention intervention at a rehabilitation unit, a common and clear definition of falls is fundamental. Two well-known definitions are "an event in which a person unintentionally comes to rest on the ground or floor or another lower level below knee height" (3) and "an unexpected event in which the participants come to rest on the ground, floor, or lower level" (36). The first definition explicitly includes falls at levels below knee height only, which excludes falls back into a sitting position after a failed attempt to rise from a chair or bed. Such events are difficult to measure and, additionally, constitute ingredients of active rehabilitation.
- The risk of falling in a hospital may vary by clinical department and during a patient's stay in a ward. Staff knowledge of previous falls and staff rating of fall risk based on continuous observation of both predisposing and precipitating factors for falling have a potential to better predict falls and target fall preventive measures than any fall risk assessment tool (20, 21).
- To reduce falls in rehabilitation wards, there is a need to implement a multifactorial and multiprofessional intervention measures that target both general and each patient's individual fall risk factors (27–29).
- Preventing falls appears to be the best approach when aiming at minimizing fractures and other physical injuries due to falls (37). Hip protectors for fracture reduction have been evaluated in studies in residential care facilities, but the results of these studies are inconclusive (38, 39).
- Effective interaction and communication between individual staff members, between teams, and between the staff and patients and their significant others, enhance information transfer and relation building and increase the capacity for change; functions that are essential for the quality of care and patient safety (40).
- Facilitation, i.e. the "technique by which one person makes it easier for others" (41) including visible back-up from senior and clinical leadership (40), can assist problem solving and preparedness for change in the implementation processes.
- A "patient safety culture" is a desirable subset of the organizational culture, which in turn is defined as the shared attitudes, beliefs, values and assumptions that underlie the perceptions and actions of people in an organization (42). A patient safety culture is more specifically related to the values and beliefs concerning patient safety within healthcare, and is manifested behaviour of both clinical professionals and managers (43).

WHICH FALL PREVENTIVE STRATEGIES TO USE IN REHABILITATION UNITS?

The following suggested strategies are mainly based on results of successful studies in rehabilitation wards using targeted multifactorial and multiprofessional interventions (27–29).

General interventions (Fig. 1)

General interventions aimed at all patients are a prerequisite for optimal fall prevention in the ward. Examples of interventions

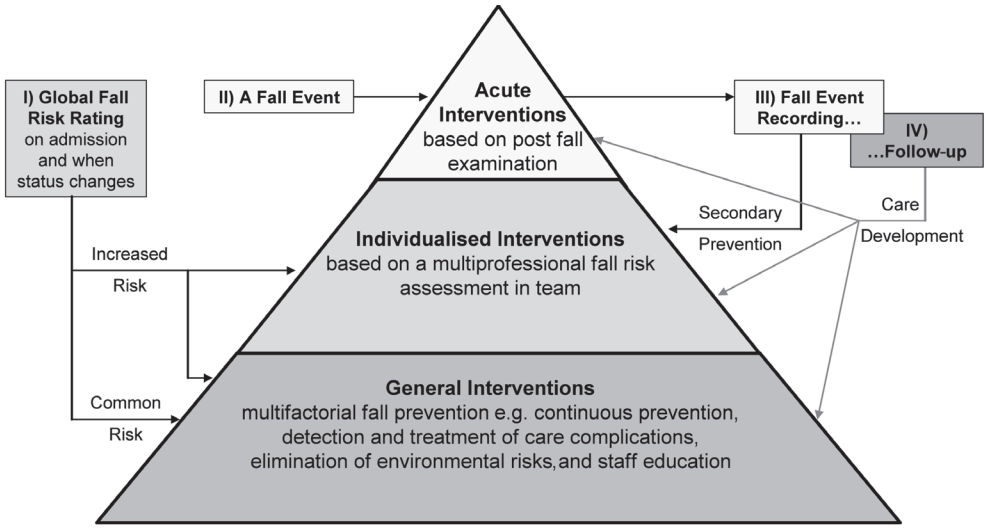

Fig. 1. The fall prevention pyramid, illustrating the fall prevention process in rehabilitation units, where I, II, III and IV are the main events influencing the types of interventions. These are: a base of general interventions aimed at all patients; individualized interventions are added for patients rated as being at increased risk of falling, including those who fall during their hospital stay, and, finally; acute interventions given immediately after a fall event. A fall event also leads to a recording of the fall and its circumstances, which in turn leads, first, to interventions for the individual after analyses of the recorded information and then to follow-up of all falls in the ward during a certain period of time. The knowledge thus gained is useful for care development, in terms of both planning and evaluating (systems and routines for) fall prevention interventions in the ward.

are to provide education for the staff about prevention of falls and fall injuries, to continuously and actively prevent, detect, and treat common conditions that could increase the risk of falls (e.g. urinary tract infection and delirium), and to eliminate or modify risks in the environment (e.g. to improve insufficient lighting, fasten loose cables, or dry wet floors).

Global fall risk rating

As soon as possible after admission to the ward, preferably within 24 h, the fall risk should be rated in all patients aged 65 years or over and in other adult patients with neurological or cognitive disorders, by asking:

1. the patient, his/her significant other, or a member of the staff at the previous care unit who knows the patient well whether the patient has fallen during the last year; and
2. the staff of the present ward (day as well as night shift) whether they consider that the patient might fall during the stay in the ward if no fall preventive interventions are carried out.

An affirmative reply to either of these 2 questions indicates an increased risk of falling and should lead to an individualized intervention.

Immediately after any changes occur concerning the patient's status (including a fall incident) or in the environment, the global fall risk rating should be repeated.

Individualized interventions

In patients rated to be at increased risk of falling, a fall risk assessment should be made in order to establish why the patient's risk is increased. The fall risk assessment is a team-based procedure including medical examination, observations and assessments by the nursing and rehabilitation staff, and consideration of information provided by the patient and his/her significant other. Table I gives examples of risk factors and hazardous situations that require attention. Fall prevention interventions, to be carried out by the multiprofessional team, are then individually tailored for each patient and aimed at modifying or compensating for the factors identified as increasing the risk of falling.

Acute interventions

Immediately after a fall, an examination should be performed with focus on any physical or psychological consequences of the fall and the reasons for the fall should be established.

Fall event recording and follow-up

Each fall that occurs in the ward should be recorded systematically by the staff on a structured form including questions about when, how and why the patient fell. Questions about the time, place, and circumstances (e.g. activity, use of assistive device) when the fall occurred, and any injuries or other consequences of the fall (e.g. fear of falling or anxiety) provide useful information. The recording has 2 purposes. First, with the aim of preventing further falls in patient in question, the information should be analysed and used as a basis for individual interventions. This process should preferably start as soon as possible after the fall occurs and include participation of all members of the staff in post-fall problem-solving discussions, for example as part of a team conference. Secondly, to increase the knowledge about fall-related circumstances, and thus improve the care, all fall events in the ward should be followed up by systematic analyses. This knowledge obtained

Table I. *Examples of factors and situations that increase the risk of falls and fractures, and of targeted interventions to reduce the fall risk*

Areas of interest	Examples of risk factors and risky situations to pay attention to	Examples of targeted interventions to reduce the risk of falling
Gait and transfer	Unsafe gait? Impulsive or risk-taking transfers? Difficulties in sitting down or getting up from chair or bed? Improperly adjusted walking aid? Forgets walking aid?	Assess and treat possible causes. Exercise. Provide or adjust walking aid. Rearrange furniture. Individualize supervision or personal assistance.
Vision and visual perception	Difficulties in seeing? Multifocals? Difficulties in distance estimation? Difficulties in navigating (e.g. walks into furniture)?	Assess and treat possible causes. Improve lighting and contrasts in the environment. Check condition and usage of glasses. Rearrange furniture.
Personal care	Unsafe or risk-taking behaviour in grooming, dressing and toileting? Unsafe use of assistive device?	Assess and treat possible causes. Train specific tasks. Modify how the task is performed or adapt clothing and shoes. Provide or adjust assistive device. Individualize supervision or personal assistance.
Cognition and behaviour	Delirium, disorientation, anxiety, or agitation? Difficulties with orientation in the ward, e.g. cannot find their own bed or toilet? Difficulties in understanding instructions or ignores them?	Assess and treat possible causes. Create a calm and understandable atmosphere. Individualize supervision.
Continence	Incontinence? Frequent toileting? Constipated?	Assess and treat possible causes. Bed close to toilet. Individualize scheme for toileting.
Diseases and drugs	Dizziness? Fall in blood pressure? Infections, e.g. urinary tract infections? Osteoporosis? Previous fractures? Drug side-effects (e.g. neuroleptics, benzodiazepines, antidepressants, diuretics, or polypharmacy)?	Assess and treat possible causes. Review prescribed drugs from a fall preventive perspective.
Nutrition	Underweight? Known recent loss of weight? Low appetite? Dehydrated?	Assess and treat possible causes. Adjust, enrich or increase intake of food and liquid. Improve the environment of the meals.
Environment	Poor lighting for the tasks that are performed, e.g. the walk to the toilet? Inappropriate footwear? Too high bed and or use of bed rail for anxious or agitated patients? Patients not optimal allocated in the ward according to their need of supervision? Difficulty in using the alarm bell?	Improve lighting (e.g. light on in toilet room 24 h). Change shoes. Optimal bed height and use of bed rails only after consideration of advantages and risks. Consider the patients' need of frequent supervision in the room allocation. Ensure that the patient can use the alarm bell and that it is within easy reach.

will be useful both when planning and when evaluating the fall prevention in the ward.

Initiation of interventions and information transfer

One of the staff should preferably be given the main responsibility for fall prevention in a specific patient, from admission to discharge, for example by initiating preventive interventions and informing the patient, significant others, and other members of the staff about them.

The patient's involvement is a prerequisite for successful fall prevention. Thus, it is of major importance to initiate a dialogue, if possible, with the patient and his/her significant other about the risk of falling and any planned fall preventive interventions. Likewise, all members of the staff should be aware of the patient's state of fall risk, his or her fall risk factors, and fall preventive measures. Furthermore, in connection with discharge from the ward, the patient's future care providers should be similarly informed.

HOW TO REALIZE FALL PREVENTIVE STRATEGIES

The basis of the implementation of the fall preventive strategies summarized in Fig. 2, is 2-fold. On the one hand, this process is based on the staff's specific professional competence built on a foundation of basic skills, scientific knowledge, and ethical development (44), and on the other hand it is dependent on

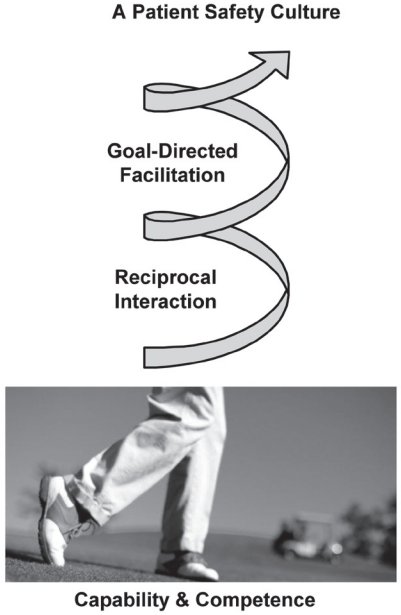

Fig. 2. Overview of the core elements in the staff interactive approach, based on 2 (metaphoric golfer's) legs; the "standing leg" of the team's assembled professional competence and the "driving leg" of their capability (i.e. the ability to use competencies in new and complex situations, focusing on the future), which together, in a staff interactive process are directed towards a 3-phase development of: reciprocal interaction, goal-directed faciltation and a pateint safety culture, focusing on fall prevention.

the staff's capability, that is, their ability to apply their competences in new and complex (clinical) situations, focusing on the future, on change, and on new possibilities (45). The process of implementation is developed through 3 overlapping phases, each with its specific main focus; from reinforcement of reciprocal interaction, to goal-directed facilitation and, finally, to development of "a patient safety culture".

Reciprocal interaction

To provide opportunities for interaction between members of the staff is the first and most fundamental requirement for successful implementation of new fall preventive routines. Realization of strategies for systematic fall preventive interventions in a rehabilitation unit must involve constructive communication with a multiprofessional focus, including involvement of organizational teams and leadership (35). This communication should include discussions on how to achieve consensus regarding common long- and short-term goals and how to bridge the "knowing-doing gap" (46), the gap that means that we are not using (all) our available knowledge in practice. One of the principal goals is to arrive at shared understanding about the criteria for EBP, the organizational priorities, and the importance of a negotiating approach (47).

Moreover, as most fall preventive procedures require active engagement on the part of the patient, the dialogue and reciprocal interaction between staff and patient and/or the patient's significant others should, as indicated above, be allowed to influence these processes. A patient's attitudes, willingness, and understanding of the needs to adopt fall preventive behaviour can only be dealt with through interaction. It is essential to maintain partnerships with patients and their significant others, by sharing complete and unbiased information, respecting their views and choices, and encouraging participation in fall preventive tasks (43). In this connection, risk communication, is important, such as sharing the identification of risks, and explaining the rationale underlying procedural changes.

Routines involving constructive dialogue and interaction within and between teams of different professionals need to be initiated and systematically integrated into the organization. Arenas such as recurring workshops and leadership walkarounds (33, 48) focused on fall risk and safety, provide opportunities for different professionals to meet, discuss and make plans about fall preventive routines and organizational changes (49). Having at least one clinical staff member on each ward or unit to serve as a representative for fall preventive work and creating networks between such representatives, giving them support and education and getting them to engage in dialogues between one another and with the leadership concerning advantages, hindrances and new ideas in this area, can be a constructive part of the reciprocal interaction. All staff should, furthermore, be encouraged to resolve issues related to risks of falls, and to adopt a safety-conscious and quality improvement approach (33), including fall risk identification and feedback on results of implementation of preventive strategies.

Goal-directed facilitation

In the next phase of the implementation process an important objective is to ensure that the reciprocal interaction involves facilitation, such as activities aimed at helping people to understand what they have to change and how to do it – including interactive problem solving – in order to achieve successful translation of evidence into practice (50). The facilitation is focused on achieving common long- and short-term goals formulated as a result of ongoing reciprocal interaction. Depending on the local needs and circumstances, the facilitation activities may include education; clinical supervision; processes initiating reflection; and identification and solving of problems. The facilitation can be internally and/or externally provided, which means that an external facilitator (e.g. a project leader) may work with an internal one to develop the facilitating skills of the latter. However, identification and promotion of local facilitation expertise is necessary for process continuity.

Flexibility, relevant experience and knowledge (e.g. regarding EBP and management of changes in the implementation process), good communication skills and credibility, are all examples of individual factors that are critical for facilitation success. Reserved time, leadership support and recognition, management structures and resources and the overall organizational culture are examples of contextually related factors that all influence the facilitation effect (35, 50).

A patient safety culture

The third continuing phase of the implementation process is focused on development of a "patient safety culture", which implies an organizational culture with shared understandings of the importance of patient safety as the organization's first priority. This is necessary for essential and sustained improvement of routines aimed at prevention of harmful incidents in healthcare, such as patients' falls (49). Efforts should be made to see that the whole organization is permeated by awareness of and commitment to issues related to fall prevention and the safety of patient; in attitudes, assumptions and, most importantly, in safety-promoting behaviour. This involves breaking undesired habits, in favour of safety-enhancing behaviour, including clinical routines, with resulting behavioural patterns so regularly followed that they become automatic, in the same way as looking in both directions before crossing a street (51).

The safety culture is shaped through leadership attention and follow-up, and creation of organizational systems and procedures (52), in interaction with clinical staff including facilitators. In this development, attention should be directed towards particular sub-dimensions of patient safety culture (43), related to staff, leadership and organization, as described in Table II.

The staff's active participation in the fall event reporting system and in the subsequent follow-up process (see Fig. 1), constitutes an essential part of a fall preventive safety culture. Such involvement provides opportunities to make continual sense of and learn from the reports, leading to an understanding that will allow direct actions to be taken to reduce the risk of falls (53). This may also serve as feedback that will further reinforce the commitment and motivation of the staff (54).

In conclusion, when successfully achieved, a mature patient safety culture focusing on prevention of falls will be regarded by staff including new staff, patients and their significant others

Table II. *Overview of important patient safety culture* dimensions, including examples of critical components and procedures targeting development of a patient safety culture*

Dimensions of a patient safety culture	Examples of related critical components	Examples of procedures targeting the patient safety culture dimensions
Staff dimension	Competence Capability Commitment	Education and (teamwork) training. Systematic multi-professional interaction to improve safety routines. Maintaining partnership with patients and their significant others. Systematic collection of feedback from patients and their significant others, to learn from their experiences. Engagement in fall event reporting and follow-ups, including learning from the reports.
Leadership dimension	Visible Engagement Support Control	Communication that "patient safety" is the first priority. "Safety walkarounds". Encouragement of open communication about incidents and analyses of causes, without personal blaming, but focusing on system errors/improvement. Identification and support of facilitators. Initiation of regular (at least annual) prospective risk/safety analyses, including patient record screening. Data collection and feedback concerning safety outcomes such as incident frequency, consequences and possible causes/improvements, as well as regarding process-oriented measures and patients' perceptions.
Organizational dimension	Staffing Policies Physical Environment	Provision of arenas for continuous reciprocal interaction focused on risk and safety, to improve change capacity in this area, and to enhance "organizational learning". Update of staffing policies, physical environment and equipment, in accordance with research evidence, central policies, established safety guidelines and models, and lessons learned from local experiences.

*Based on well-functioning reciprocal interaction and goal-directed facilitation.

as something characteristic of the organization; as something "ingrained in the walls", that is evident in values, attitudes, routines and actions. The change processes preceding and maintaining this culture will, additionally, bring obvious potential for positive side-effects concerning organizational and clinical improvements in other areas, besides the continuous development of fall prevention.

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