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HOW TO MANAGE RECURRENT FALLS IN CLINICAL PRACTICE: GUIDELINES OF THE FRENCH SOCIETY OF GERIATRICS AND GERONTOLOGY

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Abstract: *Background:* Health care professionals need a simple and pragmatic clinical approach for the management of recurrent fallers in clinical routine. *Objective:* To develop clinical practice recommendations with the aim to assist health care professionals, especially in primary care in the management of recurrent falls. *Methods:* A systematic English and French review was conducted using Medline, Embase, Pascal and Cochrane literature. Search included systematic reviews, meta-analyses, controlled trials, cohort studies, case-control studies and transversal studies published until July 31, 2008. The following Medical Subject Heading (MeSH) terms were used: "aged OR aged, 80 and over", “frail elderly”, “Accidental Fall”, “Mental Recall”, and “Recurrent falls”. The guidelines were elaborated according the Haute Autorité de Santé methods by a multidisciplinary working group comprising experts and practitioners. *Results:* A fall is an event that results in a person coming to rest inadvertently on the ground or floor or other lower level and should be considered as a recurrent event as soon as a subject reported at least two falls in a 12-month period. Recurrent falls impose a prompt and appropriate management with the first aim to systematically evaluate the severity of falls. The evaluation of fall severity should be based on a standardized questionnaire and physical examination. It is recommended not to perform cerebral imaging in the absence of specific indication based on the clinical examination and to reevaluate the subject within a week after the fall. Prior to any intervention and after an evaluation of signs of severity, it is recommended to systematically assess the risk factors for falls. This evaluation should be based on the use of validated and standardized tests. The education of recurrent fallers and their care givers is required in order to implement appropriate intervention. In the event of a gait and/or balance disorders, it is recommended to prescribe physiotherapy. A regular physical activity should be performed with low to moderate intensity exercise. It is recommended to perform rehabilitation exercises with a professional, between therapy sessions and after each session, in order to extend rehabilitation benefits to the daily life. *Conclusion:* The clinical guidelines focused on management (i.e., diagnosis, assessment and treatment) of recurrent falls in clinical routine. They provide answers to the following clinical questions: 1) How to define recurrent falls? 2) How to identify severe falls? 3) How to assess recurrent falls? and 4) How to treat recurrent falls?

Key words: Recurrent falls, clinical recommandations, management.

Recurrent falls are usually defined as two or more falls in a 12-month period (1). Given their high prevalence and incidence in older adults as well as their serious consequences, recurrent falls are a major public health issue (1-6). Around 25% of adults aged over 75 years suffer at least two falls a year (1, 3, 4, 7-10). Recurrent falls usually occur during basic activities of daily living such as walking and body transfer positions from sit-to-stand or stand-to-sit positions (5-8). Compared to single fall, recurrent falls lead to more injuries, hospitalizations and nursing home admissions, which impose high costs on public health and social services (1-10). These fall-related consequences are in part explained by underlying co-morbidities and age-related decline. This context can turn a simple fall into a milestone that will accelerate loss of independence, and may result in death.

Falls prevention is possible: the incidence of falls can be reduced by about 18% in community-dwelling older adults, and by 25% in hospitalized patients (11, 12), regardless of the type of intervention. The efficiency and cost-effectiveness of falls prevention strategies require: 1) the identification of older adults with high risk of recurrent falls and/or of fall-related consequences, and 2) the determination of an adapted intervention (1-12). However, application of fall prevention strategy may be difficult, especially in primary care and among non-geriatrician. First, recurrent falls are seldom due to a single cause (1, 4). The combination of multiple risk factors of falls is complex and probably contributes to falls in different ways whether in single or recurrent fallers (1-6). Fall risk assessment is considered to be the first step towards efficient fall prevention strategies (11). When assessing the risk of fall, not only intrinsic (subject-related) but also extrinsic (environment-related) and behavioral (activity-related) factors need to be

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considered (4, 11, 12). Unfortunately, multi-factorial fall risk assessment is too often complex and rather time consuming, and thus not easy to implement into clinical routine (11, 12). Moreover, the sensitivity and specificity of existing tools with regard to fall prediction are pretty low (11). Second, a great variety of interventions are available allowing for a reduction of fall risk, recurrent falls, and/or their consequences. To date, however, it could be difficult to determine efficient interventions for recurrent falls. Furthermore, although the practice of regular physical activity is the most well-known intervention, exercise compliance in older adults is still weak regardless of its type. This particularity is too often underestimated however it is essential for the efficacy of any fall-prevention intervention. For instance, Crombie et al. (13) found that lack of interest in physical activity was the main reason that limited the participation of elderly subjects in physical activity. Thus, health care professionals need a simple and pragmatic clinical approach for the management of recurrent fallers in clinical routine.

Based on this current evidence, the French Society of Geriatrics and Gerontology (SFGG), in partnership with the Haute Autorité de Santé (HAS) which is the French national agency for health, developed clinical practice recommendations with the aim to assist health care professionals, especially in primary care in the management of recurrent falls. The SFGG supervised and coordinated the preparation of clinical recommendations. The HAS and the SFGG selected experts and health care professionals to form the working group. These participants were asked to provide disclosure statements of all relationships they may have which might be perceived as real or potential conflict of interest. The working group was responsible for the elaboration of the guidelines. The clinical guidelines focused on management (i.e., diagnosis, assessment and treatment) of recurrent falls in clinical practice. They provide answers to the following clinical questions: 1) How to define recurrent falls? 2) How to identify severe falls? 3) How to assess recurrent falls? and 4) How to treat recurrent falls?

Methods

A systematic English and French review was conducted using Medline, Embase, Pascal and Cochrane literature by two experts (OB and VD) with the help of the HAS. Search included systematic reviews, meta-analyses, controlled trials, cohort studies, case-control studies and transversal studies published until July 31, 2008. The following Medical Subject Heading (MeSH) terms were used: "aged OR aged, 80 and over", “frail elderly”, “Accidental Fall”, “Mental Recall”, and “Recurrent falls”. References lists of retreived articles were also reviewed. In order to ensure a comprehensive approach, additional key studies known to the authors were also included.

Abstract selection was based on the STrengthening the Reporting of OBservational studies in Epidemiology (STROBE) checklist for observational studies (14), and on the consort statement for clinical trials (15). Abstracts identified in the literature search were independently evaluated by two reviewers (OB and VD). Full articles were obtained for final analysis if their abstracts meet inclusion criteria (recurrent falls as main outcome and older adults aged over 65 years as studied population). According to the methodology developed by the HAS, a multidisciplinary working were gathered several times to elaborate the guidelines. This working group is listed in acknowledgments and comprised 20 persons: 2 methodologists and researchers, 3 geriatricians, 2 general practionners, 2 urgentists, a physical medicine and rehabilitation specialist, an internal medicine specialist, 3 physiotherapists, 3 rheumatologists, an otorhinolaryngologist, an orthopedic surgeon, a neurologist. The selection of articles allowed developing evidence-based recommendations, whenever possible. The working group classified and ranked the usefulness and efficacy of recommendations using the grading criteria shown in table 1. The grading criteria were based on the scientific level of evidence classified from level 1 (highest) to level 4 (lowest) defining a grade of recommendation. The grade of recommendations was classified in three levels from A (highest) to C (lowest). When there was no evidence, the recommendation was classified as "professional agreement" which was a consensus opinion of experts. The first version of the guidelines was submitted to a large national panel of 37 mutidisciplinary practionners and experts by email. They rated each statement of the guidelines on a 0-9 scale of agreement and had the possibility to add comments. Their responses were analyzed and discussed by the working group, leading to the final version of the guidelines. Finally, the guidelines were approved by the Scientific committee of the SFGG and by the HAS.

Table 1
Scientific level of evidence and related grade of recommendations

Scientific level of evidence	Grade of recommendations
Level 1 : Randomized clinical trials with high power or meta-analysis of randomized controlled trials	A: High scientific level of strength recommendation
Level 2: Randomized clinical trials with low power, Uncontrolled comparative studies without randomization, cohort studies	B: Moderate scientific level of strength recommendation
Level 3: Case-control studies	
Level 4: Comparative studies with way, retrospective studies, case studies, observational epidemiological studies	C: Low scientific level of strength recommendation

How to define recurrent falls?

There are various definitions of fall in the literature. Most definitions used a combination of topographical, biomechanical and behavioral components. The two main components of

Table 2
Management (Diagnosis, assessment and treatment) of recurrent falls

Questions	Criteria	Definitions
How to define recurrent falls?	Fall	Event that results in a person coming to rest inadvertently on the ground or floor or other lower level
	Recurrent fall	At least two falls in a 12-month period
How to identify severe falls?	Fall-related injuries	- Moderate or severe physical traumas (fractures, dislocations, voluminous intracranial or peripheral hematomas, traumas of the face, and cutaneous lacerations of significant size and/or deeper than the hypodermis) - Inability to stand up from the ground associated with resting on the ground for more than one hour and its potential consequences (rhabdomyolysis, hypothermia ≤ 35°C, bedsores, inhalation pneumopathy, and dehydration) - Post-fall syndrome: motor, psychological and/or cognitive incapacity characterized by extrapyramidal rigidity, retropulsion, and stasiphobia
	Fall-related medical events	Cardiac rhythm or conduction disorders, strokes, heart failure, myocardial infarction, infectious diseases, and hypoglycemia in diabetic patients.
	Fall-related comorbid conditions	- Syncope - Recent increase in the number of falls - Number of risk factors for falls ≥ 3 - Balance and/or gait disorders (one leg balance ≤ 5 seconds and Timed Up & Go score ≥ 20 seconds) - Osteoporosis defined by a T score < 2.5 SD on osteodensitometry and/or a history of osteoporotic fracture - Use of anticoagulants - Social and/or familial isolation and/or living alone
How to assess recurrent falls?	Predisposing risk factors of falls	- Age ≥ 80 - Female gender - A history of traumatic fractures - > 4 drugs taken per day - Psychoactive drugs (benzodiazepins, hypnotics, antidepressants, and neuroleptics) - Cardiovascular drugs (diuretics, digoxin, or class I antiarrhythmic). - Anticholinergic drugs - Gait and/or balance disorders (one leg balance ≤ 5 seconds and Timed Up & Go score ≥ 20 seconds) - Low strength and/or muscular power of the lower limbs (Body Mass Index < 21 kg/m2 or a weight loss ≥ 5% over 1 month or ≥ 10% over six months) - Osteoarthritis of the lower limbs and/or of the spine - Anomalies of the feet (toe deformation and callosity) - Sensor disorders in the lower limbs - Low visual acuity: assess visual acuity using the Monnoyer and/or Parinaud test charts - Depressive syndrome: 4-item Geriatric depression scale > or = 1 - Cognitive decline: Mini Mental Status of Folstein (MMSE) < 27
	Precipitating risk factors of falls	- Cardiovascular symptoms: dizziness, syncope, orthostatic hypotension - Neurological symptoms: sensor-motor neurological deficiency - Vestibular symptoms: vertigo, lateral deviation during Romberg test - Metabolic disorders: hyponatremia, hypoglycemia, and hypoglycemic medication intake - Environmental: examine lighting, cluttering and the organization of the place the subject lives in, as well as the shoes
How to treat recurrent falls?	Systematic intervention when applicable	- Revision of the drugs while the subject takes psychoactive and cardio-vascular drugs and/or the number of drugs is >4 - Correction of modifiable predisposing or precipitating factors - The wearing of shoes with broad, low heels (2 to 3 cm), and firm, thin soles with a high upper - Regular practice of walking and/or any other physical activity - Calcium intake ranging from 1 to 1.5 gram per day; - Use of an adapted walking aid - Vitamin D supplementation (800 IU/day). - Anti-osteoporotic treatment - Education of recurrent fallers and their care givers
	Gait and/or balance disorders	- Performance of static and dynamic postural exercise - Increase the strength and muscular power of the lower limbs. - Regular practice - Intensity of exercises: low to moderate - Performance of physical exercises with a professional, between therapy sessions and after each session.

definition were to come to a lower level involuntarily. In these clinical recommendations, the definition of fall was “an event that results in a person coming to rest inadvertently on the ground or floor or other lower level" (Professional agreement). This could include an event where the person landed on the ground, tripped on stairs, slipped, or lost his or her balance and hit against an object like a chair or bed". Similarly, the definition of recurrent falls varied greatly in the literature. The most common cut-off used is two or more falls. Thus, a fall should be considered as a recurrent event as soon as a subject reported at least two falls in a 12-month period (grade C).

How to identify severe falls?

Recurrent falls impose a prompt and appropriate management (i.e., diagnosis, evaluation and treatment) with the first aim to systematically evaluate the severity of falls which may lead to loss of independence, autonomy or death (Professional agreement). Recurrent falls in older adults is always a serious event because of the related adverse outcomes,

and should not be minimized. The severity of falls is related to several components that may be classified into four categories including the fall-related injuries, the medical event which has caused the fall, the intensity of recurrent falls, and the associated comorbid conditions. It is recommended to systematically assess the fall-related injuries and the medical event that may had caused the fall in all recurrent fallers (grade C).

The fall-related injuries which classified a fall as severe are: 1) A moderate or a severe physical traumas including fractures, dislocations, voluminous intracranial or peripheral hematomas, traumas of the face and cutaneous lacerations of significant size and/or deeper than the hypodermis; 2) the inability to stand up from the ground associated with resting on the ground for more than one hour, and its potential consequences including rhabdomyolysis, hypothermia (body temperature ≤ 35°C), bedsores, inhalation pneumopathy and dehydration; 3) A post-fall syndrome, a functional complication of fall due to a partial or full motor, psychological and/or cognitive incapacity, characterized by extrapyramidal rigidity, retropulsion and stasiphobia.

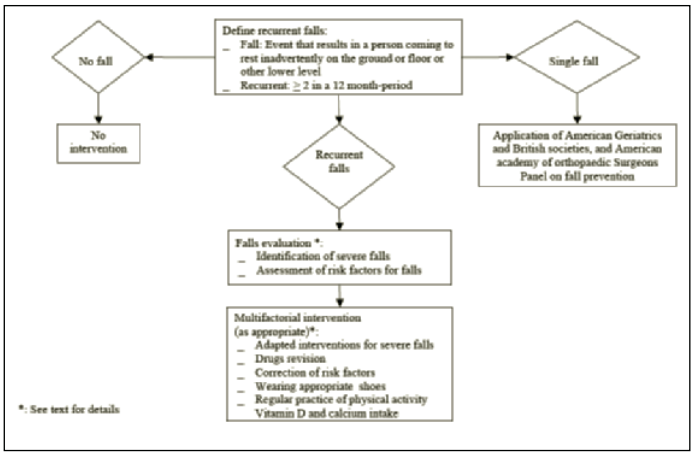
The signs of severity of fall may also be related to an acute medical event producing the fall such as cardiac rhythm or conduction disorders, strokes, heart failure, myocardial infarction, infectious diseases and hypoglycemia in diabetic patients. As an example, syncopal loss of consciousness invariably determines loss of postural tone and, when occurring in the upright position, leads to falls. Syncope should be considered as severity criteria for falls due to fall-related injuries and the underlying cardiovascular etiology. It is recommended to evaluate the frequency of recurrent falls and associated-comorbid conditions in recurrent fallers (Professional agreement). Frequency of recurrent falls is also associated with fall severity. A recent increase in the number of falls should be considered as a marker of severity. Associated comorbid conditions, which make a relatively mild fall potentially dangerous because of fall-related consequences, should be systematically identified and a mild fall in the presence of comorbid conditions should be considered severe. Comorbid conditions related to fall severity are: three or more fall risk factors, balance and/or gait disorders validated with abnormal one leg balance ≤ 5 seconds and a Timed Up & Go score ≥ 20 seconds, osteoporosis defined by a T score < 2.5 SD on osteodensitometry and/or a history of osteoporotic fracture, the use of anticoagulants, and social and/or familial isolation and/or living alone.

The evaluation of fall severity should be based on a standardized questionnaire and physical examination (Professional agreement). In addition, it is recommended to perform the following complementary investigations (grade C):

- Bone radiography in the event of acute pain and/or disability.
- CPK and serum creatinine measurement if the subject remained on the ground for longer than one hour.
- Standard 12-lead ECG in case of dizziness.
- Blood glucose level in subjects with diabetes.

Figure 1

Algorithm summarizing the management of recurrent falls



It is recommended not to perform cerebral imaging in the absence of specific indication based the clinical examination (Professional agreement).

Lastly, it is recommended to reevaluate the subject within a week after the fall in order to (Professional agreement):

- Screen for risk factors of recurrent severe fall: fear of falling and activity restriction, and post-fall syndrome.
- Ensure an interdisciplinary follow-up.

How to assess recurrent falls?

Prior to any intervention and after an evaluation of signs of severity, it is recommended to systematically assess the risk factors for falls (grade C). The risk factors for falls can be classified into two categories. First, the predisposing factors that correspond most of the time to the accumulation of so-called intrinsic risk factors, i.e. they often depend on the subject's health status. Second, the precipitating factors that occasionally intervene in the mechanism of the fall; they may be intrinsic (related to the subject's health status), behavioral (i.e., depending on the motor behavior of the subject at the moment of the fall), and/or environmental (i.e., depending on the environment in which the subject fell).

It is recommended to systematically assess for the following predisposing factors of falls including (grade C):

- Age ≥ 80;
- Female gender;
- A history of traumatic fractures
- Polypharmacy (based on the latest prescriptions and self-medication) with the threshold of 4 or more drugs taken per day.
- Psychoactive drugs intake including benzodiazepins, hypnotic drugs, antidepressants and neuroleptics: record the number and nature of psychotropic drugs, based on the latest prescriptions and also by looking for any psychotropic self-medication.
- Cardiovascular drugs including diuretics, digoxin or class I

antiarrhythmic drugs,
- Anticholinergic drugs other than those mentioned in psychoactive and cardiovascular drugs
- Gait and/or balance disorders. These disorders should be evaluated by two clinical tests. The Timed Up & Go test (TUG), which is a basic evaluation of functional mobility that has been used extensively in geriatric medicine in order to evaluate gait and balance performance and which is considered abnormal if it is ≥ 20 seconds, and the one leg balance, which is considered abnormal if it is < 5 seconds. In addition, the use of specific devices for gait analysis is a promising approach for research in old patients with repeated falls, but their relevance for the clinical practice is still lacking.
- Impaired strength and/or muscular power of the lower limbs: by examining the subject's ability to stand up from a chair without using his/her hands, and by evaluating the global nutritional status of the subject by calculating the Body Mass Index (weight[kg]/height[m2]: a value ‹ 21 being considered as a malnutrition criterion), and by assessing for a recent weight loss (a weight loss ≥ 5% in a month or ≥ 10% in six months indicating malnutrition);
- Osteoarthritis of the lower limbs and/or of the spine: systematically assess for articular deformations and/or mechanical pain in the spine or the lower limbs, and particularly stiffness in the ankle;
- Anomalies of the feet, including toe deformation and callosity: systematically examine feet and shoes;
- Sensitivity disorders in the lower limbs: monofilament exploration of the plantar face of the foot and with a tuning fork by placing it on the lateral malleolus of the ankle;
- Reduced visual acuity: by using the Monnoyer and/or Parinaud test charts;
- Depressive symptoms: by using the 4-item Geriatric depression scale (mini-GDS: a zero score will rule out the diagnosis of depression; a score of >1 should lead to a more detailed assessment of depressive symptoms);
- Cognitive decline: by using the Mini Mental Status of Folstein (MMSE) or the Cognitive Disorders Examination (Codex) test, which is a reliable 3-minute test for detection of dementia in the elderly, available in French, and including the five words test and the clock drawing test.

Precipitating factors that may be involved in the mechanism of a fall should be also systematically assessed (grade C):
- Cardiovascular symptoms/signs: assess dizziness and/or syncope, as well as orthostatic hypotension and heart murmurs;
- Neurological symptoms: assess sensor and motor neurological deficiency with confirmed or transient vascular topography, and mental confusion;
- Vestibular symptoms: assess vertigo and a lateral deviation during Romberg test;
- Metabolic disorders: assess hyponatremia, hypoglycemia and hypoglycemic medication intake;
- Environmental: examine lighting, cluttering and the organization of the place the subject lives in, as well as the shoes.

The following examinations are recommended while evaluating recurrent falls (Professional agreement): serum electrolytes looking for hyponatremia; serum level of vitamin D (25OHD); complete blood tests in the event of signs of anemia; ECG in the event of cardiac signs; and HbA1c measurement in patients with diabetes.

There is no need to systematically carry out the following examinations (Professional agreement): EEG, brain imaging, Doppler sonography of the cerebral arteries, 24-hour Holter ECG, and cardiac echography. These examinations are only carried out as a function of indications guided by data obtained from the clinical examination and the ECG.

How to treat recurrent falls?

Prior to any intervention, a multifactorial assessment is recommended in recurrent fallers. This evaluation should be based on the use of validated and standardized tests. (Grade C).

It is recommended to suggest to recurrent faller, irrespective of where this subject lives, an intervention combining several axes which are (grade C):
- When possible, a revision of the drugs while the subject takes drug-related fall (please see above) and/or the number of drugs is >4.
- The correction or the treatment of predisposing or modifiable precipitating factors (including environmental risk factors of falls);
- The wearing of shoes with broad, low heels (2 to 3 cm), and firm, thin soles with a high upper;
- The regular practice of walking and/or any other physical activity (the duration of exercise for prevention of recurrent falls remains unclear);
- A dietary calcium intake ranging from 1 to 1.5 gram per day;
- The use of an adapted walking aid;
- The correction of a potential vitamin D deficiency by a daily dose of at least 800IU.

In the event of confirmed osteoporosis, it is recommended to initiate an anti-osteoporotic treatment.

The education of recurrent fallers and their caregivers is required in order to implement appropriate interventions (Professional agreement).

Available literature data do not allow for a conclusion regarding the effectiveness of hip protectors in the prevention of fractures of the upper femoral extremity, mainly because of poor acceptability of the device and poor long-term compliance.

In the event of a gait and/or balance disorders, it is recommended to prescribe physiotherapy, including (Grade C):
- Working on static and dynamic postural balance;

- Increasing of the strength and muscular power of the lower limbs.
- Other techniques, including stimulation of sensory afferents or learning to stand up from the ground, may also be proposed.

Such interventions may involve other rehabilitation professionals, such as occupational therapists and psychomotricians (Professional agreement). A regular physical activity should be performed low to moderate intensity exercise (Grade C).

It is recommended to perform rehabilitation exercises with a professional, between therapy sessions and after each session, in order to extend rehabilitation benefits to the daily life (grade C).

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