

FRAILITY, FALLS AND OSTEOPOROSIS: LEARNING IN ELDERLY PATIENTS USING A THEATRICAL PERFORMANCE IN THE CLASSROOM

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Abstract: *Objective:* To ascertain the usefulness of a simulated clinical scene with actors in the classroom (theatrical performance) as a teaching tool for the management of falls and their related injuries. *Design:* Experimental design of two related groups. *Setting:* Spain. *Participants:* A group of 12 students attended a seminar in which the approach to a clinical case was made using a simulated scene with actors in the classroom (scene group); a non-scene group of 34 students attended the seminar, without a theatrical performance (the same clinical case was read and presented in a traditional manner, oral presentation). *Measurements:* Before and after the seminar, students answered a questionnaire [five questions on theoretical knowledge of falls and osteoporosis (score 0-10) and two on subjective learning perception (linear scale: 0-10) (score 0-20)]. In the scene group were two further questions included at the end on their opinion of the scene and on the seminar overall. *Results:* Both groups significantly improved in all questionnaire scores after the seminar ($p=0.001$). The scene group had a greater rise in mean points of the questionnaire before and after the seminar than the non-scene group: theoretical knowledge [3.81 ± 1.69 versus 2.75 ± 1.33 ($p=0.033$)], subjective questions [6.08 ± 4.10 versus 4.97 ± 2.24 ($p=0.247$)], and the questionnaire overall [9.89 ± 4.98 versus 7.72 ± 2.66 ($p=0.060$)]. The scene group had a very good opinion of the usefulness of the scene and of the overall opinion of the seminar: 9.08 ± 0.95 and 9.41 ± 0.79 . *Conclusions:* Theatrical performance in the classroom seems to promote better learning than classic oral presentation, providing qualitative value by adding creativity and different approaches to the teaching of medicine.

Key words: Theatrical performance, education, frailty, falls, osteoporosis, geriatrics.

Introduction

Falls and their consequences are one of the main causes of injury, disability, institutionalisation and death in elderly people. Furthermore, falls are considered a marker of frailty and one of the most characteristic geriatric syndromes, with well-defined risk factors, a specific diagnostic work-up, and well recommended interventions (1-4).

One third of older people living in the community fall at least once a year. This incidence rises to more than 50% in octogenarians and in institutional settings (5). Patients often think it is «normal» to fall when they get older and therefore a fall is not something they feel to mention to their health care provider. On the other hand, many physicians do not ask about falls since they consider them to be «accidents» and thus not predictable or preventable. Although most falls do not cause injury, approximately 5% of persons who fall require hospitalisation for a hip fracture (6). Management of hip fractures requires a broad spectrum of approaches, from prevention to postoperative care (7). After a hip fracture, the risk of another increases considerably; thus, it is important to decide on the best pharmacological treatment option for osteoporosis in these elderly patients (8).

Since fall prevention among the elderly is arguably one of the most important public health issues in today's ageing society, recognising their risk factors to be able to intervene and prevent falls should be a priority in general medical education.

The concept of frailty in the elderly has recently been closely linked to clinical practice and internal medicine; however the absence of this topic in both undergraduate and postgraduate medical education may be the reason why many internists are not sufficiently trained in the management of its consequences. Although age-related disease and some geriatric syndromes have recently been included in the core competencies in internal medicine and family doctors (9), their implantation remains scant (10).

At our centre, falls are included in the undergraduate curriculum and students attend a seminar in which an integrated approach to frailty, falls, fractures and osteoporosis is discussed via a clinical case. In order to make teaching more attractive, a different format with a theatrical performance has been organised. The use of simulated patients has proved to be a useful learning method in health science education. Its value as a teaching tool usually requires students to face the simulated patient individually to carry out an activity (e.g. taking a medical history or doing a physical examination) (11). This model is complex to organise and difficult to perform in the context of routine academic activity.

Some authors have suggested that students can also learn by watching the simulation without participating actively in it – the concept of learning by observing – which has become popular in the international literature under the term «vicarious learning» or «learning by seeing others» (12, 13). This concept offers a theoretical and practical basis for carrying

out simulation techniques in conventional classrooms. Previous experience in our setting showed that the use of actors in the classroom to simulate a clinical scenario may per se be a powerful stimulus to arouse students' interest and attention and break the monotony of the classroom (14).

The aim of the present study was to ascertain, in a group of students of medicine, the usefulness of a simulated clinical scene with actors in the classroom (theatrical performance) as a teaching tool for the management of falls, fall-related injuries and osteoporosis. Results were compared with those of another group of students who attended the classroom in a conventional manner.

Method

Forty-six students of medicine from two universities (Universidad Autónoma de Barcelona and Universidad Pompeu Fabra) attended a teaching seminar at the university hospital Parc de Salut Mar, Barcelona. The seminar was based on the approach to a clinical case of a patient with fall-related injuries.

In a first group of 12 students, this approach was made using a simulated scene with actors, followed by an interactive presentation. Students watched the live scene in the same classroom where lectures are usually given. The simulated scene was entitled "An unfortunate step" and involved four actors. The interpretation showed an octogenarian woman admitted to an orthogeriatric unit who suffered a hip fracture after a fall and who was very worried because she did not know if she would be able to walk; she was also very sad and was in pain. Next to her were a nurse and two doctors who visited her daily during her hospitalisation. A brief summary of the clinical case and a picture of the theatrical performance in the classroom are shown in Figure 1.

At the beginning of the seminar, students were informed of what was to happen. They were provided with a written summary of the case to be simulated and answered a questionnaire with theoretical questions on falls and osteoporosis (questions 1-5) (see foot notes of Table 1), and questions on their subjective learning perception of what they thought they knew about this problem (question 6 and 7) (see footnote of Figure 2).

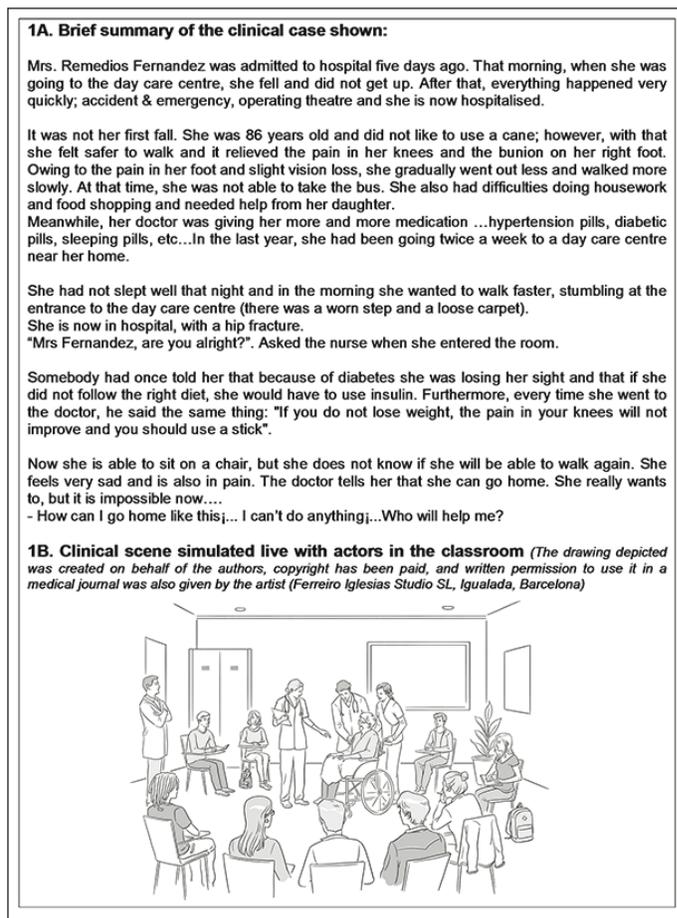
A discussion was then held with open questions on the case (debriefing). The students were divided into groups and encouraged to give their answers; the teacher then provided the correct answers using a powerpoint presentation (learning feedback).

The intended goals to be achieved with the theatrical performance and with the seminar overall were to create a stimulating atmosphere in the classroom to promote learning of five key points: 1. to determine whether the patient was frail (assessing her previous functional, mental and social status); 2. recognise intrinsic and extrinsic risk factors for falls; 3. learn how to organise a multicomponent and interdisciplinary intervention to avoid new falls; 4. detect risk factors for

osteoporosis and assess treatment options and 5. know the general principles of hip fracture rehabilitation (Table 1).

Figure 1

A brief summary of the clinical case and a picture of the theatrical performance in the classroom



At the end of the seminar, students again answered the same questionnaire as at the beginning, but with two new questions added: one on their opinion of the usefulness of the scene for learning (question 8) [Do you think the simulated patient scene as a teaching tool was useful for understanding and treating falls and their consequences?] and the other on the overall opinion of the seminar (question 9) (a linear scale from 0 to 10 points was used for these questions). Finally, at the end of the questionnaire, the students had a free text field to give their opinion and comments on the seminar.

A second group of 34 students also attended the seminar in which exactly the same clinical case was read and presented in a traditional manner (oral presentation) with no theatrical performance. The contents, questionnaires before and after, and debriefing were carried out in the same manner as in the first group. An overall diagram of the seminar and details of the teaching activity are shown in Figure 3.

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Table 1

Summary and brief description of the five key points to meet the educational objectives of the seminar (in response to the case described in Figure 1)

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1. To determine if the patient was frail
 - Frailty can be suspected by observing that the patient needs help in some instrumental activities of daily live: housework, use of public transport (bus) and food shopping (24)
 - Slow walking speed (less than 0.8m/s) (25)
 - A cut-off score of ≥ 3 on the Prisma 7 questionnaire[†].
 2. To recognise risk factors for fall \ddagger
 - Intrinsic risk factors
 - Age
 - Sensorial impairment (visual impairment)
 - Sedatives and hypnotic drugs (sleeping pills)
 - Condition of the feet (deformities, bunion)
 - Gonarthrosis (pain in the knees)
 - Extrinsic risk factors:
 - Worn step and a loose carpet at the entrance to the day care centre
 3. To learn how to organise a multicomponent and interdisciplinary intervention to avoid new falls: Multifactorial risk assessment with targeted management (27) \ddagger
 - Reduce the use of medications associated with increased risk of falls (e.g. benzodiazepines, other sleeping medications, neuroleptics, antidepressants, anti-convulsants, or class IA antiarrhythmics).
 - Targeted examination to rule out the following comorbidities: neurological, which can affect balance and gait (dementia, Parkinson's, dizziness); musculoskeletal, which may affect gait (polyarthrosis, foot problems, etc.); cardiovascular, which may produce syncope).
 - To minimise visual impairment (ample lighting without glare, avoidance of multifocal glasses while walking, referral to an ophthalmologist)
 - To take some vitamin supplements (vitamin D may reduce risk of falls in frail elderly patients) (28)
 - Referral to physical therapist who will prescribe a progressive programme of balance and gait training, muscle strengthening and for devices such as a cane or walker.
 - Referral to podiatrist (use of appropriate footwear).
 - Reduction in home hazards (removal of loose rugs and use of nightlights, non-slip bathmats and stair rails, other interventions as necessary). Changes in environment and activity to reduce the likelihood of recurrent falls.
 - Interventions in the psycho-social sphere: Persons at risk of falling who live alone or who spend large amounts of time alone should be taught what to do if they fall and cannot get up, and should have a personal emergency-response system or a telephone that is accessible from the floor. Psychological support to avoid fear of falling and improve the subjective feeling of well-being. .
 4. To describe risk factors for osteoporosis and assess treatment options \ddagger
 - Risk factors: age, women.
 - Treatment options: pharmacological or non-pharmacological treatment. An individual approach to considering functional and cognitive status is paramount. In this case, calcium and vitamin D supplements, along with a bisphosphonate, were recommended.
 5. To know general principles hip fracture rehabilitation \ddagger
 - It is important to assess premorbid functional and cognitive status, strong determinants of rehabilitation outcome.
 - Contemporary rehabilitation practice is not confined to traditional inpatient rehabilitation units. It also take place in the community and other non-hospital settings, and involves general practitioners (home physiotherapy, day care centres, intermediate care centres and skilled nursing homes)
 - Rational use of rehabilitation (to adapt rehabilitation intensity to the resources available and the patient's tolerance).
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[†] Prisma 7 Questions: 1] Are you over 85 years of age?; 2] Male?; 3] In general, do you have any health problems that require you to limit your activities?; 4] Do you need someone to help you on a regular basis?; 5] In general, do you have any health problems that require you to stay at home?; 6] In case of need, can you count on someone close to you?; 7] Do you regularly use a cane, walker or wheelchair to get about? (26); \ddagger Questions on these educational objectives were included in the five theoretical questions used to evaluate understanding before and after the seminar [1st question: describe risk factors for fall (range: 0-2 points); 2nd question: make a list of measures to avoid news falls (range: 0-2 points); 3rd question: describe risk factors for osteoporosis (range: 0-2 points); 4th question: make a list of the best options to treat osteoporosis in this case (range: 0-2) and 5th question: make a list of place options to carry out rehabilitation treatment (range: 0-2)].

Questionnaires were later corrected by experts blinded to when they were completed (before or after the seminar). Correction criteria of theoretical questions had been previously agreed. According to what was considered important, an arbitrary score was assigned to each of the possible answers to the theoretical questions (see foot notes of Table 1).

Assessment of results and statistical analysis

Students' results (both on theoretical and subjective knowledge) and their opinions on the teaching activity were collected from the questionnaires in the form of numerical

scores. These were treated as quantitative variables (ordinals) and the results expressed as mean and standard deviation. Student's t-test or Mann-Whitney U test were used to compare scores on the questionnaires (mean comparison of different groups), depending on whether the variables followed a normal distribution. In the case of comparison of means in the same group (pre and post-seminar), Student's t-test was used for paired data and also Wilcoxon's t-test depending on the type of variable distribution. Standard categorisation of effect size (ES) was applied to ascertain the magnitude of change scores on the questionnaires before and after the seminar,

according to the formula of Cohen in which ES is equal to the difference between mean scores on a question at the beginning and end of the seminar, divided by the standard deviation of the mean of scores obtained at baseline. This calculation converts the change score into a standard unit of measurement which evaluates whether the difference between the mean score of a question before and after the seminar is small or large depending on the number of standard deviations separating them. The guidelines define an ES of 0.20 as small, 0.50 as moderate and 0.80 as large (15, 16). Finally, a statistically-significant difference was considered when p value was < 0.05.

Results

Students of both groups has significantly improved on questionnaire scores about falls and osteoporosis after the seminar [scene group: theoretical knowledge score before the seminar (mean values) 5.34 ± 1.44 and after 9.15 ± 0.69 ($p < 0.001$; ES 2.64) (range: 0-10); subjective learning perception 10.83 ± 16.9 and 16.9 ± 1.78 ($p < 0.001$; ES 1.60) (range: 0-20) and total seminar score 16.1 ± 4.70 and 26.0 ± 2.19 ($p < 0.01$; ES 2.10) (range: 0-27)], [non-scene group: 6.45 ± 1.29 and 9.21 ± 0.72 ($p < 0.001$; ES 2.13); 12.4 ± 2.95 and 17.4 ± 1.59 ($p < 0.001$; ES 1.68); 18.9 ± 3.13 and 26.6 ± 1.69 ($p < 0.001$; ES 2.46)]. When the points of increase in the questionnaire were compared before and after the seminar, the scene group had obtained a slightly higher average increase in all questionnaire scores, which was statistically significant in the case of the theoretical question-score (Figure 2).

Furthermore, students in the scene group had a very good opinion of the usefulness of the scene for learning, with a mean score of 9.08 ± 0.95 (question 8) and overall opinion of the seminar of 9.41 ± 0.79 (question 9) (limit 0-10 points). Finally, a summary of students' responses and comments as a free text field on the seminar are shown in Table 2.

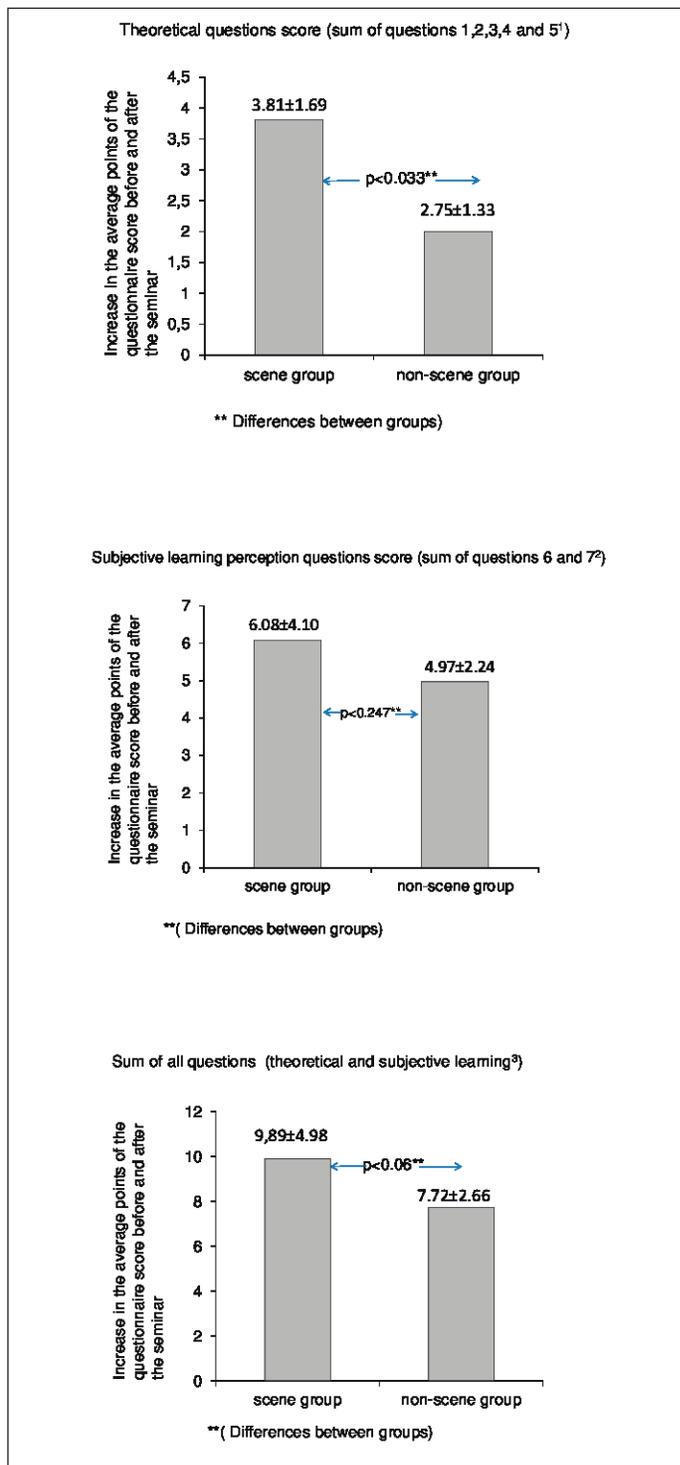
Table 2

Students' responses and comments as a free text field (only students from the scene group)

Students' responses	N (%)
The theatre as a teaching method was generally good and useful: «It was a combination of fun and education», «Method was very good, attractive, fun and meaningful».	7/12 (58%)
The theatre provided realism, proximity: «I saw the patient in real life», «the scene is more live».	5/12 (42%)
The clinical scene made students remain very attentive: «The theatrical performance made me more attentive than usual».	4/12 (33%)
The clinical scene helps to retain information: «There is no better way to retain information than to see the scene live».	2/12 (16%)
One student positively assessed the fact they were provided with a structured observation script which helped them to identify the main points of the theatrical performance.	1/12 (8%)

Figure 2

Points of increase in the questionnaires before and after the seminar (mean increment values of points): comparison between groups

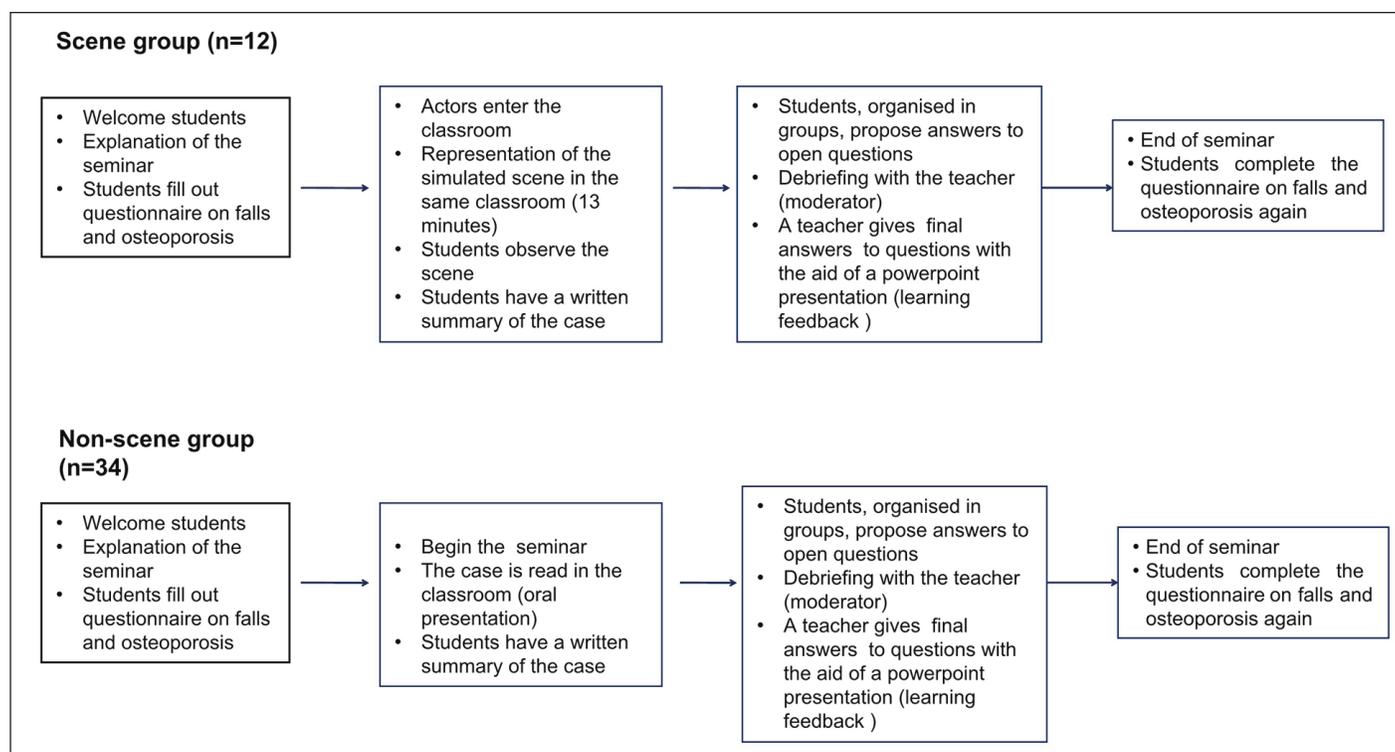


1. See foot notes of Table 1; 2. Two subjective learning perception questions [to what degree would you be able to detect the risk of falls in elderly patients? (Linear scale from 0 to 10 points) and to what degree would you be able to devise a plan of intervention to prevent falls and fractures in an elderly patient? (Linear scale from 0 to 10 points)]. 3. Sum of all questions from 1 to 7.

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Figure 3

Diagrammatic representation of the seminar on falls and osteoporosis with (or without) a simulated clinical scenario in the classroom (duration: 2 hours). Groups attended the seminar separately



Discussion

All students who attended the seminar (scene group and non-scene group) had a statistically-significant increase in all questionnaire scores after the seminar, which signifies that the seminar was equally effective in improving learning on falls and osteoporosis in both groups. Students who saw the live scene in the classroom had a greater increase in mean points of the questionnaire score before and after the seminar (statistically-significant in the theoretical questions) (Figure 2). This tendency towards slightly better results may suggest that theatrical performance in the classroom could promote better learning than the classical oral presentation.

We found no previous experience in the literature using theatre training to widen knowledge on falls and osteoporosis. Nonetheless, Fisher et al, (17) developed a teaching session on falls using simulation mannequins. Students were required to assess an in-patient (mannequin) who had fallen (supplementary information was provided with medical notes, medication list and observation chart). Their knowledge, assessed by a question test, improved significantly after the session and had remained better a month later compared with students who received usual teaching.

In the present study, the questions discussed on the clinical case (debriefing) and the information provided by powerpoint were the same in both groups; this suggests that the difference observed could be attributed to the effect of the theatrical

performance.

Some authors have suggested that theatre holds great promise in the world of education. Using both verbal and non-verbal forms of communication, theatre has the potential to enhance health care practitioners' understanding of the complex emotional and interpersonal dynamics that arise in medical practice (18, 19). Many of these aspects are difficult to fully convey in more traditional forms (e.g. scientific articles).

In the present study, although the results on learning were similar in both groups, the simulated scene provided qualitative value, as reflected by the very high opinion the students had on the usefulness of the scene for learning and on the overall seminar, which had high scores (9 out of 10) (questions 8 and 9). Furthermore, students considered theatre as a teaching method to be fun, attractive and meaningful (60%), incorporating a realistic component (42%), and a third opined that theatre increased their attention (Table 2). These results could be in the same line as those of other authors (20, 21) whose teaching experiences using theatre showed that respondents obtained additional insight into patient care issues and developed new ways of thinking about their situations.

Although presenting a live theatrical performance to medical students is less widespread, some authors (20) consider that the judicious incorporation of dramaturgy into the medical school curricula as a teaching tool may be a useful and innovative technique since medical students can acquire important significant insight into the roles they assume as part of their

professional training. With a live performance, the audience experiences an emotional commitment in a visceral way that becomes especially intense when the actors are also real patients.

Frailty, falls and osteoporosis management and prevention are major age-related health issues, so physicians, internists and family doctors, both present and future, must incorporate them into their good clinical practice. A brief description of the main educational aims of the seminar according to the five key points mentioned in Methods is given in Table 1.

The present study had the limitation that the students were not randomised individually for their group assignment. The groups were distributed following the common university method (alphabetical order, compatibility of timetables and shifts, etc.), which may account for both groups not being similar in basal conditions. Prior to the seminar, students of the non-scene group had better scores on some questions than the scene group. It is difficult to know why these differences existed, since all students were advanced and in their fifth year, and their knowledge may not be homogeneous owing to different interest and trajectories also followed throughout the courses. In addition, the sample of students was small, which may also have contributed to the sample not being homogeneous.

On the other hand, we believe that results on learning in the clinical scene group would have been better if the live performance had been interactive, allowing students to be involved at some point of the live performance by interacting with the actors, as in the experience of other authors (22).

Simulation-based teaching requires more people, time and space, conditions that can be more costly than traditional teaching. However, we believe the benefits described above would compensate for these disadvantages.

Finally, although we cannot affirm that theatrical performance is superior to traditional lectures, medical teachers need to add creativity, new ideas and different approaches to the teaching of falls and osteoporosis in medicine.

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Ethical aspects: The use of simulated patients is common at our university. Students are accustomed and it is not perceived as something new or experimental. Since the research does not directly involve persons, material of human origin or experimental animals, ethical approval for the study was not required according to the current regulations at our university (28). At the beginning of the seminar, all students were informed of the methodology and contents. Oral consent was given by all. Participation in the seminar was in the context of the normal academic course. Furthermore, attending as one seminar group or the other was not a disadvantage from the academic point of view. Students' data and results were treated as part of their normal course in the academic activity of the university; however in the study, data of the students were used anonymously.

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