BMC Medical Education

RESEARCH Open Access

Breaking bad news: an active learning method for medical students

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Abstract

Background Breaking bad news is one of the most difficult aspects of communication in medicine. The objective of this study was to assess the relevance of a novel active learning course on breaking bad news for fifth-year students.

Methods Students were divided into two groups: Group 1, the intervention group, participated in a multidisciplinary formative discussion workshop on breaking bad news with videos, discussions with a pluri-professional team, and concluding with the development of a guide on good practice in breaking bad news through collective intelligence; Group 2, the control group, received no additional training besides conventional university course. The relevance of discussion-group-based active training was assessed in a summative objective structured clinical examination (OSCE) station particularly through the students' communication skills.

Results Thirty-one students were included: 17 in Group 1 and 14 in Group 2. The mean (range) score in the OSCE was significantly higher in Group 1 than in Group 2 (10.49 out of 15 (7; 13) vs. 7.80 (4.75; 12.5), respectively; $p=0.0007$). The proportion of students assessed by the evaluator to have received additional training in breaking bad news was 88.2% (15 of the 17) in Group 1 and 21.4% (3 of the 14) in Group 2 ($p=0.001$). The intergroup differences in the Rosenberg Self-Esteem Scale and Jefferson Scale of Empathy scores were not significant, and both scores were not correlated with the students' self-assessed score for success in the OSCE.

Conclusion Compared to the conventional course, this new active learning method for breaking bad news was associated with a significantly higher score in a summative OSCE. A longer-term validation study is needed to confirm these exploratory data.

Keywords Breaking bad news, Objective structured clinical examination (OSCE), Announcement, Discussion group, S-P-w-ICE-S protocol

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Background

Communication is an essential human skill that can be developed and improved by learning and interacting. One of the most important and most difficult aspects of medicine is breaking bad news, e.g. telling a patient that he/she has a serious or chronic disease [1]. This is an uncomfortable process for the patient and the physician [2, 3]. Along with the challenge of breaking bad news per se, other skills are required: responding to the patient's emotional reaction, getting the patient involved in decision-making, managing the stress induced by expectations of recovery or cure, involving family members and caregivers, and finding how to give the patient the right level of hope when the situation is critical. The avoidance of misunderstanding is a key challenge during these interactions. Lastly, sociocultural differences influence how bad news should be broken and so must be taken into account in this process [4].

There are two critical factors in breaking bad news to a patient or family member in an appropriate manner: the provision of clear, precise, comprehensive information, and the empathy of the physician who gives the information and breaks the bad news [5]. Until recently, communication skills were rarely taught in the field of medicine: healthcare professionals learned through experience and during their clinical training. Various methods have been developed for improving training on how to break bad news [6–10]. The goal is always to enable the clinician to meet the four most important objectives in the patient interview: 1/ collecting information from the patient; 2/ delivering the medical information; 3/ providing the patient with support and 4/ ensuring that the patient commits to a collaborative treatment strategy [11]. The most frequency taught protocol at present is the SPIKES protocol ("Setting up the interview, Perception, Invitation, Knowledge, Emotions and Support"), which has been validated in oncology [12]. SPIKES comprises seven steps: establishing an appropriate setting, checking the patient's perception of the situation, determining the amount of information known or desired, knowing the medical facts and their implication before initiating the conversation, exploring the emotions raised during the interview, responding with empathy, and establishing a strategy for support [12]. By adapting the SPIKES protocol and giving it more clarity and practical value, Meitar et al. recently developed the S-P-w-ICE-S protocol ("Setting up the interview, assessing the patient's Perception, Warning call and pause, Information, Clarifying and dealing with Emotions, Strategy and Summary") [11].

At Paris Cité University medical school, several methods are used to teach second- to sixth-year medical students how to break bad news: mandatory lectures within a medical psychology course and, more recently, simulation workshops. Active learning methods (such as discussion groups, simulation workshops, role-playing games, debates, and formative objective structured clinical examinations (OSCEs)) have become increasingly popular over the last decade and appear to be more suitable for teaching medical students how to break bad news [13].

The objectives of this study were to (i) assess the relevance of a novel active learning method for breaking bad news in fifth-year medical students at Paris Cité University through a summative OSCE station and (ii) to assess the students' levels of self-esteem and empathy after passing the OSCE.

Methods

The study population

Fifth-year students of Université Paris Cité medical school performing internships at Robert-Debré Universitary Hospital or Necker Children's Universitary Hospital were divided into an interventional group based on a discussion-based workshop on breaking bad news and a control group without any additional teaching on breaking bad news other as the usual curricula. In their fifth year (out of six) of medical studies, they have already had all main disciplines, such as all subspecialties, oncology, palliative care, emergencies, and ethics. Students were selected from voluntary units in both hospitals, and units were randomized from both hospitals in both groups, without mixing students from a same unit in different groups, to avoid bias. After the provision of a study information sheet, the students gave their written, informed consent to participation. The study protocol was approved by an independent ethics committee (CER-APHP, Paris, France; reference 2023-07-04).

Workshop on breaking bad news: the discussion group (for the interventional group only)

This workshop was prepared ahead of time during several multidisciplinary meetings comprising a clinical psychologist, a social worker, three physicians, and an expert patient (defined by the French High Authority of Health, as one who has developed over time a detailed knowledge of his illness and thus has real expertise in the daily experience of a disease, or a physical limitation linked to his condition). In order to prepare the teaching and assessment methods as thoroughly as possible, we organized a meeting with the teachers in charge of the "physician-patient relationship" course at Paris Cité University medical school. This discussion group constituted the active, participatory learning method evaluated in the OSCE. The group comprised a clinical psychologist, a social worker, two physicians, and the students from the interventional group. The workshop comprised four phases: 1/ three videos about breaking bad news (two videos about telling a person that their partner is in a critical condition

in the intensive care unit in two different ways, which are used in the Sorbonne University's course on the patient-physician relationship, and a short film with three patient scenarios (available at https://vimeo.com/293814824)); 2/ discussion and dialogue after the videos had been viewed (see details on the free discussion in Additional Methods); 3/ development of a guide on good practice in breaking bad news through collective intelligence (Table 1), and 4/ distribution of copies of the S-P-w-ICE-S guidelines [11].

The formative and summative OSCE (for the interventional and control groups)

The discussion group and the OSCE took place 6 weeks apart. We developed a summative OSCE station on breaking bad news based on the announcement of a diagnosis of breast cancer (Additional file 1). The main purpose was to evaluate the active learning method of the interventional group. During simulation, we assessed the students particularly on their communication skills (Additional file 1, evaluation grid). The station has been validated by the university board in charge of these faculty OSCES. The same day of the summative OSCE had been scheduled, the students of the interventional group were told that what they had learned during the first workshop was going to be assessed in this OSCE. The procedure was as follows: all the students of the intervention and the control group were distributed across seven circuits playing the same station including an evaluator and a standardized female patient. All the evaluators were qualified physicians, and all the standardized female patients were qualified physicians ($n=3$) or other healthcare professionals (a resident, a nurse, an occupational therapist, and a psychomotor therapist). The evaluator was blinded to the students' group allocations (i.e. interventional or control). Each student was rated by one single evaluator. Immediately after the OSCE station, the students were seen by a social worker and a psychologist for informal feedback on their initial impressions and completion of a self-questionnaire (Additional file 2).

Once all the students had been evaluated, they attended multidisciplinary debriefing meeting with the evaluators,

Table 1 Guide to good practice in breaking bad news, with use of the literature data (drawn up by the students at the end of the discussion workshop)

The different steps	
Setting, environment and preparation	- A quiet place, sitting down, telephone off, and tell colleagues not to interrupt during the consultation - Avoid a face-to-face arrangement; sit side-by-side, and have enough chairs - Offer something to drink (get some tissues ready) - Preparation as a team: the person/people who will break the bad news (identified people: nurses, residents, etc.); a psychologist does not need to be present during the consultation but should probably be available afterwards - Choose the right time and ensure that there is no break in the care process - The physician should evaluate his/her state before breaking the bad news: does she/he feels ready? If not, he/she should ask someone else to break the bad news if possible - Language, intelligibility, and having an interpreter or mediator present
Meeting the patient	- Introducing oneself, adopting a suitable posture, sitting down, empathy, kindness, supportive attitude - Let the person introduce him/herself - Ask about their profession or (if the bad news if being given to a family member) how they are related to the patient - Ask how the person is feeling - Ask whether a third party should attend, so that the right people are present on both sides - Establish what information the patient or family member already has (the starting situation). Check what they have understood and what they expect from the consultation.
The transition step	- Summary = a single sentence that summarizes what the patient or family member knows, in order to prepare them for the bad news - One sentence to announce that new information will be given - A pause: give the patient or family member an opportunity not to receive the bad news at that moment (verbal or nonverbal)
Breaking the bad news	- Clarity: say how the new information was obtained (examinations, type, simple explanations) - Give a clear diagnosis and make sure that it has been understood at each step. Give time for emotion - A pause: give time for the person to take in the news. Allow moments of silence
Perspectives	- Ask whether the person has any questions and how they feel about this - Reassure the person (if possible). Say that we are used to this, that we know how they feel - Summary the options for multidisciplinary care - Reassure with regard to support as a team, with care "right to the end" - Offer to see family members if necessary and at the desired time - Offer some documentary resources, saying where to look and give some reliable sources (patient associations, web sites, etc.) if the person is interested - Offer psychological support to the patient and his/her family - Suggest making another appointment (give a day and time in the near future) - Give the patient the medical team's contact details so that, if need be, the patient can contact someone before the next appointment

the standardized female patients, and the teachers from the discussion group workshop. During debriefing session, we conducted group exchanges as follows: 1/ clarification of objectives with the grading grid (explaining and justifying important answers), correction of learning expectations, setting the environment, important items for a good diagnostic announcement; 2/ dynamic analysis of actions, thought processes and emotional states (with the help of a psychologist); 3/ systematic response to students' free questions and 4/ at the end of session, the guide developed in the discussion workshop (including the S-P-w-ICE-S protocol) was returned to the students [11]. All four steps were designed to improve the students' relational skills.

Variables evaluated

The following variables were evaluated for the two groups after the summative OSCE: 1/ the score for the OSCE on a 15-item grid covering the assessment of communication skills and attitudes (Additional file 1); 2/ the blinded evaluator's response to the question: "In your opinion, has the student received additional training in how to break bad news?"; 3/ a self-assessment of the student's performance during the station through a visual analogue scale (VAS)) and an assessment of the university courses on breaking bad news (Additional file 2); 4/ the student's Rosenberg Self-Esteem Scale score [14, 15]; and 5/ the student's Jefferson Scale of Empathy score [16–18].

Statistics

All statistical analyses were performed using GraphPad Prism software (version 6.0, GraphPad Software, Inc., La Jolla, CA, USA). The groups were compared by applying Student's t-test, or Fisher's exact test, as appropriate. The data were quoted as the mean±standard deviation [min max] or effective (percentage). The threshold of statistical significance was set to $p<0.05$ (in the additional files' figures: $^{*}p<0.05$; $^{**}p<0.01$; $^{***}p<0.001$, and $^{****}p<0.0001$).

Results

The study participants

Thirty-one of the 40 eligible students were included: 17 (58%) in the interventional group and 14 (42%) in the control group (Table 2). The nine other eligible students (4 in the interventional group and 5 in the control group) were not included because they did not attend any of the sessions. The sex (male/female) ratio was 0.63.

The results of the OSCE

The station was assessed based on criteria related to skills, clinical attitudes, and communication, which are fundamental elements of an OSCE evaluation.

The external evaluation

The mean [range] score in the OSCE was significantly higher in the interventional group than in the control group (10.49 out of 15 [7; 13] vs. 7.80 [4.75; 12.5]; $p=0.0007$) (Table 3, additional file 3). An analysis of the scores for the "clinical aptitude" grid revealed significant intergroup differences in the proportion of correct answers for the following two items: recommending treatment in a specialist cancer department (100% in the interventional group vs. 64% in the control group; $p=0.012$) and suggesting another appointment (94.1% vs. 57.1%, respectively; $p=0.028$) (Table 3, additional file 4). The intergroup differences for the seven other items were not significant (Table 3, additional file 4). With the exception of one student of the control group, all the students in the two groups mentioned the word "cancer" when breaking the bad news. There were non-significant

Table 2 Characteristics of the study population

	Total ***n*** **= 31** ***n*** **(total %)**	**Interventional group** ***n*** **= 17 (%)** ***n*** **(total %)**	**Control group** ***n*** **= 14 (%)** ***n*** **(total %)**	***P*-value for interventional group vs. control group**
Male (M)	12 (38.7)	7 (41.2)	5 (35.7)	1
Female (F)	19 (61.3)	10 (58.8)	9 (64.3)	1
Sex ratio (M/F)	0.63	0.7	0.56	
Hospital where the internship was performed				
Necker Children's Hospital	18 (58.1)	8 (47.1)	10 (71.4)	0.27
Haematology		0	5 (36)	
Paediatric critical care		0	5 (36)	
Dermatology		5 (29)	0	
Immunology, haematology and rheumatology		3 (18)	0	
Robert-Debré Hospital	13 (41.9)	9 (52.9)	4 (28.6)	0.27
Orthopaedic surgery		0	4 (27)	
Gynaecology-obstetrics		3 (18)	0	
General paediatrics		2 (12)	0	
Paediatric critical care		3 (18)	0	
Radiology		1 (6)	0	

Table 3 External evaluation of the OSCE: overall evaluation, assessment of clinical aptitude and assessment of communication skills and attitudes

	Interventional group (n=17)	Control group (n=14)	p
OSCE overall score	10.49/15 ± 1.6 [7-13]	7.8/15 ± 2.2 [4.75-12.5]	**0.0007**
Assesment of clinical aptitude			
Ask about patient's life and lifestyle	10/17 (58.8%)	6/14 (42.8%)	0.47
Exploring the information already received	13/17 (76.5%)	7/14 (50%)	0.15
Say the word "cancer"	17/17 (100%)	13/14 (92.8%)	0.45
Allowing pauses	9/17 (52.9%)	3/14 (21.4%)	0.14
Explain that curative treatments are available	7/17 (41.1%)	9/14 (64.2%)	0.28
Explain that the care will be multidisciplinary	8/17 (47%)	5/14 (35.7%)	0.71
Recommend a treatment in a specialist cancer department	17/17 (100%)	9/14 (64%)	**0.012**
Offer psychological support	15/17 (88.2%)	13/17 (92.8%)	1
Suggesting another appointment	16/17 (94.1%)	8/14 (57.1%)	**0.028**
Offer to meet the family members	11/17 (64.7%)	4/14 (28.6%)	0.073
Assessment of communication skills and attitudes			
non verbal communication	0.7/1 ± 0.22 [0.5-1]	0.57/1 ± 0.25 [0.25-1]	0.12
ability to listen	0.67/1 ± 0.24 [0.25-1]	0.48/1 ± 0.2 [0.25-1]	**0.04**
ability to lead the interview	0.63/1 ± 0.2 [0.5-1]	0.51/1 ± 0.18 [0.25-0.75]	0.11
ability to provide the patient with information	0.66/1 ± 0.23 [0.5-1]	0.48/1 ± 0.18 [0.25-1]	**0.026**
ability to ask questions	0.64/1 ± 0.25 [0.25-0.75]	0.52/1 ± 0.3 [0-1]	0.2

Table 4 Evaluation questionnaires (blind assessment by the evaluator, self-assessment, and evaluation of the faculty courses)

	Interventional group (n=17)	Control group (n=14)	p
Blind assessment by the evaluator	14/17 (88.2%)	3/14 (21.4%)	**0.001**
Self evaluation			
Visual Analog Scale score for self-assessed success in the OSCE	6.1/10 ± 1.2 [3-8]	6/10 ± 1.2 [3-7]	0.8
Visual Analog Scale score for confidence during the consultation	5.8/10 ± 2.1 [2-9]	5.4/10 ± 2.3 [2-10]	0.66
Rosenberg Self-Esteem Scale score	28.53/40 ± 6.5 [16-39]	27.54/40 ± 4.9 [19-37]	0.68
Jefferson Scale of Empathy score	111.2/140 ± 9.9 [93-122]	105/140 ± 11.2 [89-116]	0.12
Assessment of number of course on this subject	3.6/10 ± 2.3 [0-10]	2.8/10 ± 2.3 [0-10]	0.31
Received other training about the physician-patient relationship	7/17 (41.2%)	3/14 (21.4%)	0.28

trends toward a higher proportion of students in the interventional group "offering to meet the family members" (64.7% vs. 28.6%, respectively; $p=0.07$), "exploring the information already received" (76.5% vs. 50%, respectively $p=0.14$) and "allowing pauses" (52.9% vs. 21.4%, respectively; $p=0.53$). Concerning the assessment of communication skills and attitudes, the scores for "ability to listen" and "ability to provide the patient with information" were significantly higher in the interventional group than in the control group (respectively 0.67 out of 1 vs. 0.48, $p=0.04$; 0.66 vs. 0.48, $p=0.026$). The scores for non-verbal communication, structuring ability and questioning ability were higher in the interventional group than in the control group, although the intergroup differences were not statistically significant (Table 3, additional file 4).

Blind assessment by the evaluator

The proportion of students judged by the evaluator to have received additional training in breaking bad news was 88.2% (15 of the 17) in the interventional group and 21.4% (3 of the 14) in the control group ($p=0.0003$) (Table 4, additional file 5). Even though each evaluator assessed a small number of students, the degree of inter-rater variability in the OSCE evaluation did not appear to be significant (additional file 6).

Self-evaluation

The intergroup difference in the mean (range) Visual Analog Scale (VAS) score for self-assessed success in the OSCE (the students were not aware of their external OSCE score) was not statistically significant (6.1 out of 10 (3;8) in the interventional group vs. 6 out of 10 (3;7) in the control group; $p=0.8$) (Table 4, additional file 7). The mean (range) VAS score for how at ease the student felt during the OSCE was 5.8 out of 10 (2; 9) in the interventional group vs. 5.4 out of 10 (2; 10) in the control group ($p=0.66$) (Table 4, additional file 7). It is noteworthy that the student who obtained the highest score in the OSCE (13 out of 15) had rated their level of success as 3 out of 10. The external OSCE score and the self-evaluated OSCE score were not correlated (data non shown). Likewise, the two OSCE scores were not correlated with the student's gender (data non shown).

Evaluations of self-esteem and empathy

The intergroup difference in the Rosenberg Self-Esteem Scale score was not statistically significant (mean (range) values: 28.53 out of 40 (16;37) in the interventional group

vs. 27.64 out of 40 (19;37) in the control group; $p=0.68$) (Table 4, additional file 8). The low mean Rosenberg Self-Esteem Scale score in both groups indicated a low level of self-esteem. The mean (range) Jefferson Scale of Empathy score was 111.2 out of 140 (93; 122) in the interventional group and 105 out of 140 (89; 116) in the control group ($p=0.12$) (Table 4, additional file 8). There was no correlation between success in the OSCE on one hand and the Rosenberg Self-Esteem Scale score or the Jefferson Scale of Empathy score on the other (data non shown).

The students' assessment of the "breaking bad news" courses

The students' mean (range) stated level of satisfaction with the conventional university courses on breaking bad news was 3.25 out of 10 (0; 10). The intergroup difference was not significant (Table 4, additional file 9).

During the debriefing session, several students stated that the university conventional course was given too early in their medical training. Furthermore, the students appeared to be very satisfied with the discussion group and the OSCE. In response to the question "In your opinion, what is the best learning method for breaking bad news?", 97% of the students mentioned "tutorials and simulation workshops" and 74% mentioned "internships" (data not shown). In response to an open question, the students stated that they preferred to learn via a discussion group with expert patients.

Discussion

Strengths

Relative to the conventional course given at Paris Cité University medical school, participation in a group-based, multidisciplinary, active, participatory course on how to break bad news was associated with significantly greater success in a summative OSCE. A multidisciplinary workshop discussion enabled the interventional group to perform significantly better in the OSCE than the control group did, with regard to both the OSCE score and the blind, bias-free assessment by the evaluator. Hence, the evaluator had indeed sensed that the students in the interventional group had received additional training. This point is important with regard to breaking bad news to patients in a future real-life consultation.

The discussion workshop was an active, participatory learning method. In a study of interns by Shanks et al., the preparation session for breaking bad news consisted of passively watching a video that set out points to include and those to avoid [19]. The pre-OSCE session did not appear to significantly influence success in the OSCE [19]. However, the small number of interns in Shanks et al.'s study ($n=9$ trained and $n=8$ not) might constitute a study limitation. One can therefore hypothesize that an active learning approach (such as ours) is more effective for success in a OSCE about breaking bad news.

Other active learning methods have been described in the literature. For example, Hanya et al.'s study found that role-playing games and training in communication skills improved empathy, the care relationship, and the information summary with the patient [20]. In our study, the students appeared to better plan the next steps in the management of the standardized patients as management in a specialist setting, suggesting another appointment, and offering to meet the family members. They were also more able to listen to the patient and give her information. In the interventional group, we observed a non-significant trend towards more effectively exploring the information already received, allowing pauses, adopting better non-verbal communication, structuring the consultation, and questioning the patient more effectively. The lack of intergroup significant differences might be due to the small number of students in our pilot study. Further research with a larger number of students would be necessary to confirm these trends.

We did not find any literature reports on studies similar to ours, except for a description of the protocol of a more ambitious study in which 200 students were planned to participate in active interventions on breaking bad news [21]. At the time of writing, however, the study's results had not yet been published.

Limitations

The students' self-esteem and empathy scale scores were generally similar in our two groups and did not appear to significantly influence success in the summative OSCE. Hence, there was no confounding bias with regard to the efficacy of the discussion workshop. However, the lack of data on levels of self-esteem and empathy prior to the formative sessions prevented us from assessing the course's possible impact on these variables. However, it has been reported that students with experience of breaking bad news were less likely to display anxiety, stress, or sadness [22]. We were not able to confirm this because we did not assess the impact of our formative sessions on these specific parameters.

The students having attended the discussion workshop estimated that they performed no better and no worse that the students who had not attended the workshop. This lack of a significant intergroup difference might be due to better knowledge of the process of breaking bad news: in fact, this theoretical knowledge might make the individual more conscious of what he or she had forgotten to ask, to do or say during the OSCE. Thus, it might lead to a worse self-evaluated score after the examination. However, identifying errors helps to improve skills in subsequent situations where bad news is broken.

The short (6-week) time interval between the workshop and the OSCE constituted the main limitation in our study because it involved short and/or medium-term memory. By mitigating memory bias, an evaluation of the two groups several months later (i.e. with a control population that had not attended the discussion workshop or the OSCE) would perhaps have highlighted an impact of the active learning methods. As a few ($n=9$) students did not attend this new active learning method, there might be a bias in the groups of students that were actually assessed. One other limitation of our study is the similarity in social and professional backgrounds between both students and standardized patients. Finally, although the SPIKES method has been validated in oncology and the OSCE was for cancer announcement, we believe that this new active learning method for breaking bad news may apply for other conditions, such as chronic diseases, ICU management or accidental death.

The physician-patient relationship is a particular aspect that cannot be defined or constrained by strict criteria and guidelines. Given that we lacked an optimal tool for evaluating these skills, we chose to assess the impact of active learning in a summative OSCE; this gave us an objective, quantitative performance rating. In their future practice, the medical students will have to adapt their behaviour to each individual patient in a context of personalized, patient-focused medicine. This is an argument in favour of using formative OSCEs in training; the students will be better prepared to break bad news in their future practice.

After the debriefing with the study participants at the end of the second session, the students rated the training highly and wanted to see it used more extensively in their degree course. It would be possible to continue to use this active learning method in a course on breaking bad news. In practice, the discussion group would be followed by a formative OSCE and then an active debriefing of the group with the teachers.

Conclusion

The results of our pilot study highlighted the beneficial impact on a discussion-group-based, active learning method on the ability to break bad news in an appropriate way. A longer-term validation study of a larger number of students is now required. The systematic use of a summative OSCE combined with a dedicated debriefing after a formative group discussion might help to prepare medical students to break bad news in their future practice.

Abbreviations

OSCE	Objective structured clinical examination
SPIKES	Setting up the interview, Perception, Invitation, Knowledge, Emotions and Support
S-P-w-ICE-S	Setting up the interview, assessing the patient's Perception, Warning call and pause, Information, Clarifying and dealing with Emotions, Strategy and Summary
VAS	Visual analogic scale

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12909-024-05821-4.

Supplementary Material 1
Supplementary Material 2
Supplementary Material 3
Supplementary Material 4
Supplementary Material 5
Supplementary Material 6
Supplementary Material 7
Supplementary Material 8
Supplementary Material 9
Supplementary Material 10

Acknowledgements

To all the students who participated in the study, to the patient expert, Mr. Bernard Delcour, former president of the French Association of Multiple Myeloma Patients (AF3M), and to the doctors who provided the consultation announcement videos: Dr. Laure Danger, Dr. Martin Dres, Dr. Antoine Guerder, and Dr. Miguel Hié. Special thanks to the colleagues who participated in session 2: Ms. Céline Pelmar, Ms. Claudine Larrue, and Ms. Laetitia Bloqueau. Thanks to the review committee of the ECOS group at the University of Paris Cité: Prof. Albert Faye, Dr. Valentine Marie Ferré, and Prof. Christian Tymowski. Acknowledgments to the group responsible for the "physician-patient relationship" teaching at the University of Paris Cité: Prof. Marie-Aude Piot, Dr. Camille Tlemsani, Dr. Dominique Vodovar, Dr. Laurène Dufayet, and Dr. Jennifer Truchot.

Author contributions

L. Polivka, C. Delcour and I. Melki designed, analyzed, and discussed all the data. L. Polivka and I. Melki wrote the manuscript. A. Faye corrected the manuscript. L. Bekel, J. Bonigen, P. Bataille, C. Bodemer, S. Hadj-Rabia, S. Dimarcq, E. Deladrière, E. Riback, A. Felix, C. Havas, H. Le Goff, M. Levy, A. Welfringer-Morin and V. Houdouin participated in session 2. H. Dufresne and S. Bartoli participated in both sessions and were involved in the preparation of session 1.

Funding

This research did not receive any specific funding from agencies or organizations in the public, commercial, or not-for-profit sectors.

Data availability

Data is provided within the manuscript or supplementary information files. The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request. The data are not publicly available because of the pseudonymization and data protection guidelines according to ethics approval.

Declarations

Ethics approval and consent to participate

The study protocol was approved by an independent ethics committee (CERAPHP, Paris, France; reference 2023-07-04). All participants were informed verbally and in writing and provided written informed consent. The authors confirm that all methods were performed in accordance with the relevant guidelines and regulations and were performed in line with the Declaration of Helsinki.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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Received: 13 March 2024 / Accepted: 25 July 2024
Published online: 12 September 2024

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