A long-term evaluation of a training program on breaking bad news in pediatric neurosurgery: a pilot study

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OBJECTIVE Breaking bad news is a difficult task in medical practice. Several breaking-bad-news training programs have been proposed. However, long-term results of such training have rarely been investigated. The aim of this study was to compare the short- and long-term evaluations by young neurosurgeons of a training program for breaking bad news to patients and their parents.

METHODS Between 2012 and 2015, pediatric neurosurgery residents participated in a training day on breaking bad news in pediatric neurosurgery with professional actors. A personal debriefing, followed by a theoretical session, completed the training. Immediate feedback was evaluated through a survey administered at the end of the day. Long-term results were explored via an online form sent at least 3 years after the training completion.

RESULTS Seventeen participants from 9 different countries were interviewed. Their immediate feedback confirmed their interest. For 71% of them, the program was very interesting, and 77% were extremely satisfied or very satisfied. All trainees wanted more training sessions. At a mean of 4.5 years of follow-up (range 3–6 years), 71% of the trainees fully remembered the session. Most of them (86%) reported a positive impact of the training on their career. Only 21% had another training session on breaking bad news during their residency. At long-term analysis, fewer trainees considered the duration of the training to have been sufficient ($p = 0.044$).

CONCLUSIONS Breaking-bad-news training has a positive long-term educational impact even several years later. Such a training program should be implemented into pediatric neurosurgery residency.

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KEYWORDS simulation training; patient simulation; interpersonal relations; intraoperative complications; pediatrics; role-playing

INTERPERSONAL and communication skills to recognize and deal with social and cultural problems represent a key domain in medical education, and the importance of acquiring these skills has recently been reinforced.^{1,20} This need for effective learning of communication skills is particularly important in pediatric specialties, as both the patient and family should be considered. Pediatric neurosurgeons face severe situations; brain tumor is the second most common oncological pathology in the pediatric population, with an increasing incidence in the past few years.²³ Moreover, the frequency of complex malformations is high in this age group. Head injuries are a leading cause of mortality and severe morbidity. In such a context,

delivering bad or difficult news to the families requires an appropriate training session.^{14,28}

Family and patient satisfaction and reaction in the face of a possible complication are strongly related to both medical information and nonverbal communication.¹² Numerous interventions aiming to improve the communication competency and confidence of physicians in breaking bad news have been proposed. The need for intelligible, appropriate, and truthful information to be delivered further supports the necessity of dedicated educational training programs concerning pre- and postoperative communication.¹⁹ Simulation-based interpersonal communication skills training seems to have satisfied participants and teachers immedi-

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ately after the training.¹¹ Actors have played validated scenarios during which trainees, residents, or fellows have to deal with complex real-life situations. This simulation modality is an increasing part of training in different medical specialties in different countries.^{11,28}

The goal of training is to improve trainees' autonomy during their career. However, long-term results of simulation-based interpersonal communication skills training remain scarcely explored.¹⁴

The aim of this study was to evaluate the long-term benefits of a dedicated simulation-based training performed several years earlier. In addition, the trainees' reactions immediately after the training session were compared with their long-term reactions.

Methods

The institutional review board of Necker-Enfants Malades Hospital approved this study. This study followed the Standards for Quality Improvement Reporting Excellence 2.0 (SQUIRE 2.0) guidelines.²²

Interventions

Simulation-Based Interpersonal Communication Skills Training Program

The characteristics of the trainees and the organization of training sessions are described in Table 1 and Fig. 1. Two professional actors representing the parents of patients were trained through scenarios elaborated by a neurosurgeon and an anesthesiologist. There were 3 different scenarios: hydrocephalus secondary to meningitis in need of a ventriculoperitoneal shunt, hydrocephalus related to aqueductal stenosis requiring a ventriculocisternostomy, and an intraventricular hemorrhage needing external cerebrospinal fluid drainage.

Each resident was randomly assigned to one of these scenarios. Each scenario was divided into two main parts: first, the announcement of the diagnosis and the need for a surgical procedure (for instance, hydrocephalus requiring an endoscopic third ventriculostomy) and, later, the announcement of a surgical complication (bleeding during the endoscopic third ventriculostomy).

All trainees had given their consent to participate in the simulation at the beginning of their internship. The training session occurred during the 6-month pediatric neurosurgery rotation at least 2 months after the beginning of the rotation. The simulation took place at the hospital in a room fully equipped with cameras and sound registration. Its duration was 30 minutes. A psychologist and a neuro-psychologist observed the interactions with the actors to analyze the verbal and nonverbal communication skills of the trainees. After the training session, 1-hour feedback on the session with the help of the videotape of the performance was provided by a team comprising a senior neurosurgeon, a senior neuro-anesthesiologist, a psychologist, a neuropsychologist, and the actors who simulated the patient's parents. Training was performed in a single day to ensure a maximum rate of acceptance and avoid interfering with the daily clinical practice. A common feedback session was also organized with all participants in a 6-month rotation. It consisted of a presentation on

TABLE 1. Population characteristics of residents who underwent breaking-bad-news training

Characteristic	No. of Participants (%)
Sex	
Male	9 (52.9)
Female	8 (47.1)
Age, yrs	
25–30	3 (17.6)
30–35	6 (35.3)
>35	8 (47.1)
Country of origin	
Algeria	2 (11.8)
Brazil	1 (5.9)
Chile	1 (5.9)
France	8 (47.1)
Italy	1 (5.9)
Palestine	1 (5.9)
Saudi Arabia	1 (5.9)
Spain	1 (5.9)
Tunisia	1 (5.9)
Position at beginning of study	
1st third of surgical internship program (0–18 mos)	1 (5.9)
2nd third of surgical internship program (>18–42 mos)	7 (41.2)
Last third of surgical internship program (>42 mos)	9 (52.9)
Position at end of study	
Resident	1 (5.9)
Fellow	7 (41.2)
Attending physician	5 (29.4)
Chief physician	4 (23.5)
Practice at end of study	
Exclusively pediatric neurosurgery	5 (29.4)
Mixed pediatric & adult neurosurgery (mostly children)	1 (5.9)
Mixed pediatric & adult neurosurgery (mostly adults)	3 (17.6)
Exclusively adult neurosurgery	8 (47.1)

verbal and nonverbal communication, on the principles of how to deliver bad news from the psychologist's point of view, and from a senior neurosurgeon detailing the French version of the SPIKES (EPICES)²⁷ protocol (further described in *Discussion*).

Trained Population

All residents who rotated for a 6-month period in the pediatric neurosurgery department during the years 2012 and 2015 were invited to participate in the 1-day training program. None of the invited residents refused to participate. The training program took place after at least 2 months of the 6-month rotation in pediatric neurosurgery. The French residents were part of a larger neurosurgery program called the Diplôme d'Études Spécialisées de Neurochirurgie.

All trainees were fluent in French. All nonnative speak-

FIG. 1. Schedule of the training session (A) and map showing the countries of origin of the trained population (B). min = minutes.

ers had successfully acquired the B2 level of the following accredited degrees in order to work in French hospitals: French assessment test (Test d'évaluation du français), French language test (Test de connaissance du français), diploma in French language studies (Diplôme d'Études de Langue française), or advanced diploma in the French language (Diplôme approfondi de langue française).¹⁵

Intervention Analysis

Evaluation of Immediate Results

The trainees were asked to complete a feedback survey at the end of their training session. Supplementary Table 1 shows the immediate feedback survey. The questionnaire, designed by two experts (a senior neurosurgeon and a senior anesthesiologist), included 8 items with different Likert scales (1–5 and 1–7), binary answers (yes/no), and short answers.

Evaluation of Long-Term Results

An online survey was created using a Google Doc Form by two senior neurosurgeons. Supplementary Table 2 shows the long-term feedback survey. The questionnaire was sent to each participant by mail during December 2018, at least 3 years after completion of the training. Two reminders were sent to ensure a maximal answer rate.

Statistical Analysis

Categorical data are reported as percentages. Cohen's kappa coefficient (κ) was used to measure interrater agreement; $p < 0.05$ was considered statistically significant. Statistical analyses were carried out on the following 5 comparable items: overall satisfaction, recommendation of this training to colleagues, evaluation of the training duration, impact of this training in professional life, and evaluation of the training's pedagogy. Statistical analyses

were performed using JMP software (version 13.2.0, SAS Institute Inc.).

Results

Trained Population

The characteristics of the trainees are described in Fig. 1 and Table 1. The trained population consisted of 17 residents (9 males and 8 females). The residents were mostly between 25 and 30 years of age and came from 9 different countries (8 from France). At the time of the long-term analysis, most were neurosurgeons in an adult neurosurgical practice as fellows. At the time of the long-term survey, the non-French trainees had returned to their countries of origin.

Immediate Feedback Survey

Immediately after the training, most trainees found the training to be interesting (71%, very interesting; 23%, interesting; and 6%, no opinion). Most trainees were satisfied with the training session: 12% ($n = 2$) were extremely satisfied, 65% ($n = 11$) were very satisfied, 18% ($n = 3$) were satisfied, and 5.9% ($n = 1$) had no opinion. In particular, the benefit, duration, organization, usefulness, and atmosphere of the training session were judged very good or good by all except 3 trainees. Only 1 trainee considered the organization unsatisfactory. Although 29.4% ($n = 5$) of the trainees were initially reluctant to participate in the program, all of them, at the end of the training session, wanted this type of educational training to be repeated. When asked whether they would have recommended the program to their fellow trainees after having passed it, 35% ($n = 6$) fully agreed, 47% ($n = 8$) agreed, and 18% ($n = 3$) moderately agreed. The training session was considered useful for simulating the reflection on the patient-physician relationship and influenced the habits of 82% ($n = 14$) of the trainees (Table 2). Of note, the senior neurosurgeon who spearheaded the training session noticed an improvement in participants' abilities to break bad news during the end of their 6-month rotation.

Long-Term Survey

The long-term survey was completed by 82% ($n = 14$) of the trainees: 2 were trained in 2015, 5 in 2014, 5 in 2013, and 2 in 2012. The mean follow-up was 4.5 ± 0.9 years. Only the trainees who responded to the long-term survey were considered for the long-term results (Table 2).

Seventy-one percent ($n = 10$) of the trainees fully remembered the 1-day formation. All except 1 trainee (93% [$n = 13$]) found the duration of the training to be appropriate or very appropriate. Eighty-six percent ($n = 12$) of the cohort found the pedagogic methodology adapted. The mean interactivity of the formation on a scale of 10 was of 8.9 ± 0.9 . All trainees (100% [$n = 14$]) agreed or fully agreed recommending this training to colleagues. This teaching met the vast majority of the trainees' expectations (93% [$n = 13$]). All but 1 trainee (93% [$n = 13$]) found that the training had helped them in their later medical consultations. For 36% ($n = 5$) of the trainees, it helped to deal with the patients' parents; for 36% ($n = 5$), it helped to not reproduce identified pitfalls; for 21% ($n = 3$), it im-

proved their self-knowledge; and for 7% ($n = 1$), the training added significant value to their residency.

All but one of the trainees (93% [$n = 13$]) were interested in having further communication training exercises, but only 21% ($n = 3$) benefited from other formations on breaking bad news in their neurosurgical residency. Indeed, although the majority of the respondents did not exclusively practice pediatric neurosurgery (64% [$n = 9$]), 93% ($n = 13$) had been in a situation comparable to the simulated scenario, and 86% ($n = 12$) thought that the training had a positive or highly positive impact on their professional career. Fifty-seven percent ($n = 8$) of participants called for an increased frequency of this type of training throughout residency, 21% ($n = 3$) desired a training session that lasted longer than 1 day, 14% ($n = 2$) wanted written recommendations, and 7% ($n = 1$) proposed computer-based simulations.

Statistical Analysis

The statistical analyses are detailed in Fig. 2.

We observed a certain consistency between the two periods. In both cases, the evaluation of the training was positive. Concerning the overall satisfaction of the trainees, an increase in the "fully agree" rate was found: 42.9% at the end of follow-up versus 14.3% immediately after the training ($p = 0.243$). At the end of follow-up, the "fully agree" rate concerning recommendation of the training to other neurosurgeons increased to 64.3% versus 35.3% immediately after the training ($p = 0.254$).

However, it should be noted that the "fully agree" rate of the evaluation of the training's duration showed a significant decrease at 21.4% at the end of follow-up versus 52.9% immediately after the training ($p = 0.044$).

Discussion

To date, this study is the first to investigate long-term results of a dedicated breaking-bad-news training program in pediatric neurosurgery. Several key findings can be pointed out. 1) The immediate satisfaction of the trainees was high, despite initial mixed feelings. 2) All trainees recommended this training after passing it. 3) Most did not benefit from any other simulation-based learning during their residencies. 4) Long-term results showed a high degree of satisfaction and usefulness even several years later. 5) The young neurosurgeons requested more frequent training, especially after some years of active practice.

Interpretation

The patient's satisfaction and reaction in case of surgical complications are strongly related to the medical discourse and nonverbal communication.¹² Effective skills in communication are indeed needed by neurosurgeons who are faced daily with complex and dreadful situations.^{10,17,24} The need for appropriate communication is even more important in pediatric neurosurgery due to the fact that both the patient and their parents are involved.²⁶ Various scientific societies have now incorporated strong communication skills in their recommendations,^{1,21} including the Teacher College of the French Society of Neurosurgery

TABLE 2. Short-term and long-term survey results

Short-Term Survey							
Questions	No. of Participants (%)						
	Extremely Satisfied	Very Satisfied	Satisfied	No Opinion	Somewhat Unsatisfied	Unsatisfied	Very Unsatisfied
Are you satisfied by this training?	2 (11.8)	11 (64.7)	3 (17.6)	1 (5.9)			
	Very Good		Good	No Opinion	Bad	Very Bad	
Global appreciation of the training							
Benefit	12 (70.6)		4 (23.5)	1 (5.9)			
Duration	9 (52.9)		8 (47.1)				
Organization	7 (41.2)		9 (52.9)		1 (5.9)		
Usefulness	8 (47.1)		8 (47.1)	1 (5.9)			
Atmosphere	11 (64.7)		6 (35.3)				
	Fully Agree		Agree	Moderately Agree	Moderately Disagree	Fully Disagree	
Would you recommend such a training to one of your colleagues?	6 (35.3)		8 (47.1)	3 (17.6)			
	Fully Agree		Agree	No Opinion	Moderately Disagree	Fully Disagree	
Do you consider that this training was useful for ...							
Your relationship w/ parents	9 (52.9)		6 (35.3)		2 (11.8)		
Your self-knowledge	6 (35.3)		5 (29.4)		6 (35.3)		
Avoiding the pitfalls	8 (47.1)		7 (41.2)	1 (5.9)	1 (5.9)		
Your medical improvement	8 (47.1)		7 (41.2)		2 (11.8)		
	Yes				No		
Were you reluctant to participate in this training?			5 (29.4)			12 (70.6)	
Should we continue to organize this training?			17 (100)				
Did this training change your communication habits?			14 (82.4)			3 (17.6)	
Long-Term Survey							
	Fully Remember		Remember	Moderately Forgot		Fully Forgot	
Do you remember the training you received on “annonce en neurochirurgie pédiatrique”?	10 (71.4)		3 (21.4)	1 (7.1)			
	Fully Agree		Agree	No Opinion	Moderately Disagree	Fully Disagree	
How do you currently evaluate the duration of training?	3 (21.4)		10 (71.4)		1 (7.1)		
How do you currently evaluate the pedagogy of training?	4 (28.6)		8 (57.1)	1 (7.1)	1 (7.1)		
Did the training meet your expectations overall?	6 (42.9)		7 (50)		1 (7.1)		
Would you recommend such training to one of your colleagues?	9 (64.3)		5 (35.7)				
Have the training goals been met?	5 (35.7)		8 (57.1)	1 (7.1)			

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TABLE 2. Short-term and long-term survey results

Long-Term Survey (<i>continued</i>)				
	Fully Agree	Agree	No Opinion	Moderately Disagree Fully Disagree
Was the training as you expected?	6 (42.9)	7 (50)	1 (7.1)	
Did the training help you in your medical consultations?	5 (35.7)	8 (57.1)		1 (7.1)
Would you be interested in another training of this kind?	5 (35.7)	7 (50)	1 (7.1)	1 (7.1)
Have you ever been in real life in a situation comparable to that simulated in the training?	9 (64.3)	4 (28.6)		1 (7.1)
Do you think this training has had an impact in your professional work?	5 (35.7)	7 (50)	2 (14.3)	
On a scale of 10, how do you evaluate the interactivity of the formation?				
1				
2				
3				
4				
5				
6				
7			1 (7.1)	
8			4 (28.6)	
9			5 (35.7)	
10			4 (28.6)	
Do you consider that this training was useful for ...				
Your relationship w/ parents?			5 (35.7)	
Your self-knowledge?			3 (21.4)	
Avoiding the pitfalls?			5 (35.7)	
Your medical improvement?			1 (7.1)	
How can we improve the training?				
Longer time			3 (21.4)	
Increased frequency			8 (57.1)	
Delivering recommendations on paper			2 (14.3)	
Computer-based simulation			1 (7.1)	
Have you had other training using actor-based simulation for breaking bad news in neurosurgery?				
Yes in pediatric neurosurgery				
Yes in adult neurosurgery			3 (21.4)	
Yes in adult & pediatric neurosurgery				
No			11 (78.6)	

(Collège des Enseignants de la Société Française de Neurochirurgie). Despite these academic recommendations and patient advocacy associations' wishes, the teaching of communication skills in pediatric neurosurgery is rare.¹¹ One classic limitation of all breaking-bad-news training was the absence of any investigation of long-term results.

This study emphasized the positive role of a single day of breaking-bad-news teaching during neurosurgical residency. Interestingly, the value of this training was confirmed even several years after the training completion, and the impact of the training on professional life even increased at the end of follow-up. The training duration that was ini-

FIG. 2. Number of “fully agree” answers to the 5 comparable items immediately after the training (short-term survey) and at the end of follow-up (long-term survey). Asterisks indicate a significant difference between short-term and long-term answers ($p < 0.05$).

tially judged as sufficient by the trainees was finally reassessed as too short some years later, highlighting the need for increased frequency of these training sessions. Despite the professional experience they had gained, the need of training for breaking bad news appeared to them even more essential.

Several frameworks for bad or difficult news delivery exist. Although none of them are specific, they can be applied to pediatric neurosurgery. SPIKES is one of the most widely used of these frameworks. It proposes 6 steps to improve breaking bad news. These steps, explaining the acronym, are: 1) Setting up the interview, 2) assessing the patient's Perception, 3) obtaining the patient's Invitation, 4) giving Knowledge and information to the patient, 5) addressing the patient's Emotions with empathic responses, and 6) Strategy and Summary.⁴ SPIKES has been translated into many languages and incorporated into numerous residency programs.²⁷ Japanese oncologists designed another framework: the SHARE protocol. It has 4 steps: 1) Setting up a supportive environment for the interview, 2) considering How to deliver the bad news, 3) discussing various Additional information that patients would like to know, and 4) providing REassurance and addressing patients' emotions with empathic responses. As visible in the acronym, the reassurance step is particularly highlighted in the SHARE framework due to the fact that this step is important for the patient and difficult for the physician.^{7,25}

The impact of breaking-bad-news training on a physician's communication skills is now well established, in particular in oncology.^{6–8,16} The aim of breaking-bad-news training is to produce long-lasting competence. However, the literature is lacking for long-term evaluations after training completion. To the best of our knowledge, the only study dealing with the long-term effect of breaking-bad-news training is a study done for internists published

in French.¹³ This interesting study shed light on the effectiveness of breaking-bad-news training for theoretical examinations even 2 years after the end of training. No effect was retrieved concerning a real-life simulation; the trained residents did not perform significantly better than control residents during Objective Structured Clinical Examination 3 months after communication training. Two principal factors could explain this result. First, the duration of the training was probably too short. Second, the assessment grid based on the work by Alexander et al. was not perfectly suited to evaluate the results of Objective Structured Clinical Examination.² The best evaluation remains patient evaluation.²⁵ It seems that an increased duration and the frequency of breaking-bad-news training are required to produce clinical effective progress; it was the request of 78% of the participants in the current study. However, our study showed that even a single day of training could provide long-lasting satisfaction to trainees; the implementation of breaking-bad-news training should not be discouraged by limited time constraints.

Another facet of physician-patient interaction is nonverbal communication. Nonverbal communication is defined as behavior without linguistic content. The role of nonverbal behavior has been less frequently explored than verbal communication but has proven to be helpful for patients, even after several months.^{3,12,18} It seemed of paramount interest to train residents in both verbal and nonverbal communication to improve patient care.²⁸ In the context of residents coming from several countries and whose mother language was not French, the feedback of the resident's nonverbal communication was also extremely informative.

Limitations to the Study

Due to the pilot nature of this study, several limitations

can be pointed out, and we only mentioned the most significant of these. There was a small number of participants enrolled in a single university academic neurosurgery department without a control group. The training's impact on the participants' abilities to break bad news was not evaluated through dedicated scores. The answer rate to the long-term survey was not complete. The participant's recall of the event was possibly limited. Separation of evaluation from the coordinators and teachers of the course would improve the objectivity of the trainees' answers. A validated measure of evaluation and assessment should be sought or developed over time. Professional consultation with experts in education and psychology could add important additional expertise. Nevertheless, the heterogeneity of the trainees' background—coming from several countries with different levels of surgical education—and the consistency of their answers underlined the lack of efficient communication training in neurosurgery residency despite the complexity of the specialty (potential high morbidity and mortality in the pediatric neurosurgical population).

Perspectives

The sustained effect of the short training depicted in this study calls for the incorporation of training in breaking bad news in neurosurgical education programs. If multiple sessions with specialized experts likely represent the gold standard, more limited but realistic useful means do exist, such as student peer teaching or serious games.^{9,29}

Conclusions

This study points out the high immediate and long-term effects of a formation dedicated to breaking bad news in pediatric neurosurgery. The vast majority of the trainees remembered the training and felt helped by this formation, even several years after its completion. This sustained effect calls for more training in communication in neurosurgery. Interestingly, 59% of the cohort were not from France. Thus, our study sheds light on the worldwide lack of training in communication during neurosurgical residencies. Larger studies are required to strengthen the conclusions of this study and to define gold standards for teaching and evaluating communication and interaction skills in neurosurgery. These gold standards are lacking; their definitions represent a challenging but important issue to solve.⁵

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Disclosures

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Author Contributions

Conception and design: Di Rocco, Zanello, Baugnon. Acquisition of data: Di Rocco, Zanello, Baugnon. Analysis and interpretation of data: Di Rocco, Zanello, Roux. Drafting the article: Di Rocco, Zanello, Roux. Critically revising the article: all authors. Reviewed submitted version of manuscript: all authors. Approved the final version of the manuscript on behalf of all authors: Di Rocco. Statistical analysis: Zanello, Roux.

Supplemental Information

Online-Only Content

Supplemental material is available with the online version of the article.

Supplementary Tables 1 and 2. <https://thejns.org/doi/suppl/10.3171/2019.12.PEDS19554>.

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